



SAS Bulletin

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I Must Be Hallucinating...

Archaeologists working in the prehispanic Americas know, perhaps better than most, that psychoactive drug use is not a recent phenomenon associated with the Swinging Sixties counterculture (“party hearty, dude”). Indirect and circumstantial evidence for recreational, ceremonial, and therapeutic drug use abounds in the archaeological records of numerous ancient American societies. But a new study, to appear in an upcoming issue of the *Journal of Archaeological Science*, provides some of the first direct evidence for the consumption of hallucinogens in the New World.

Juan Pablo Ogalde and colleagues at the University of Tarapacá (Arica, Chile) have discovered the presence of the mind-altering alkaloid harmine in the hair of an adult Andean male and an infant dating between AD 800 and 1200 associated with the Tiwanaku culture (ancestors to the Incas). Harmine helps humans absorb hallucinogens and may be a powerful antidepressant. Ogalde and colleagues used gas chromatography and mass spectrometry analysis on hairs from 32 mummies from the Azapa Valley in northern Chile, confirming the presence of harmine on individuals who were buried with an elaborate snuffing kit probably used for inhaling herbs. In support of the finding, X-rays show that the adult male appears to have suffered sniffing lesions near the nose.

Another study, also in press with the *Journal of Archaeological Science*, suggests that some prehispanic South Americans trafficked in drugs and drug paraphernalia. Petrographic analysis and TL and OSL luminescence dating of ceramic snuffing tubes and inhaling bowls found on the Caribbean island of Carriacou in the West Indies show that some prehispanic drug kits were not made using local materials. Scott Fitzpatrick and colleagues from North Carolina State University traced the ‘snuff stuff’ to South American groups dating between 100 and 400 BC.

But drug use may not be as pervasive as once believed. Take, for example, Black Drink, a tea-like beverage brewed by Native Americans throughout southeastern North America. Long thought to have been ingested for its emetic effects caused by methylxanthine alkaloids (e.g., caffeine), a new study by Nichole Bishop at the University of North Florida, reported in this issue of the *Bulletin*, suggests that the concentration of caffeine in the drink is negligible compared to contemporary teas. (I hate to think of what would happen if Bishop expanded her study to include Starbucks!) So sit back with a hot cup of Darjeeling and enjoy this issue of the *Bulletin*—but be careful, it may be more intoxicating than a cup of Black Drink.

E. Christian Wells, Editor



Sixteenth-century engraving by Theodorus de Bry (based on the illustration by Jacques le Moyne de Morgues) of a Timucua Black Drink ceremony from Southeast North America.

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Employment Opportunities

The **University of Texas at San Antonio** Department of Anthropology seeks to hire an archaeologist at the rank of Tenured Associate or Full Professor. Pending budget approval, two or more positions will be filled. The Department has recently inaugurated a Ph.D. program emphasizing anthropology's broad engagement with environmental issues. We are looking for candidates who will complement or enhance this focus, and who also will support the four-field emphases of our B.A., M.A., and Ph.D. programs. We seek specialists in complex societies (geographic area open) who focus upon issues of landscape formation, urbanism, core-periphery relations, and/or power and the politics of social difference. Required Qualifications: Ph.D. in Anthropology (emphasis in either cultural anthropology or archaeology); theoretically motivated research; desire and ability to contribute to Ph.D. program growth and expansion; established record of teaching, research, and service appropriate to the ranks of Associate or Full Professor with tenure. Preferred Qualifications: excellence in teaching; strong record of external funding; fluency across a broad spectrum of theory in anthropology; commitment to a four-field approach to teaching and research; ability to complement existing faculty specializations. Responsibilities include: teaching general anthropology, basic courses in either archaeology or cultural anthropology, elective undergraduate courses and core and specialized graduate courses in areas of specialization; ongoing research and service in a program that offers B.A., M.A., and Ph.D. degrees. In their applications, job candidates must clearly indicate the rank at which they would like to be considered. Applicants must submit: a letter of application that includes discussion of research, teaching, and service goals; a CV; sample publications; teaching evaluations; and, the names, addresses, email, and phone numbers of three references. Applicants who are selected for interviews must be able to show proof that they will be eligible and qualified to work in the United States by the time of hire. Applications must be postmarked no later than December 1, 2008. Send all application materials to Search Chair, Department of Anthropology, University of Texas at San Antonio, One UTSA Circle, San Antonio, Texas 78249-0649 USA.

The Department of Anthropology in the College of Arts and Sciences at the **University of Washington** invites applications for a full-time tenure-track assistant professor position in biocultural anthropology, beginning September 16, 2009. A PhD and evidence of a successful program of field-based research are required. We seek applicants who have demonstrated an ability to teach, and whose teaching and research interests focus on human origins and paleoanthropology with an area of specialization in either Africa or Asia. An active research program and willingness to facilitate student access to fieldwork is highly desirable. Teaching responsibilities include four courses per year at both the undergraduate and graduate level, including courses on human biological and cultural evolution based in the fossil record. University of Washington faculty engage in teaching, research and service. Please send letter of application, curriculum vitae,

and names, addresses, telephone numbers, and e-mail addresses of three references to Dr. Darryl Holman, Chair, Paleoanthropology Search Committee, University of Washington, Department of Anthropology, M32 Denny Hall, Seattle, Washington 98195-3100 USA. Electronic submissions cannot be accepted. Applications received by December 15, 2008 will have full consideration. For more information about this position contact Dr. Darryl Holman at djholman@u.washington.edu or by phone at 206-543-7586.

The Department of Archaeology at **Boston University** seeks a distinguished senior Classical Archaeologist to fill the James R. Wiseman Chair of Archaeology, an endowed professorship created at Boston University in honor of the founding chairman of the Department of Archaeology. The ideal candidate, will be hired as professor with tenure effective September 1, 2009, will have substantial experience in field research and excellence in teaching; regional and specialization open. Application letter, curriculum vitae, published paper or sample of writing and the names of three referees should be sent by December 15, 2008 to Professor Ricardo J. Elia, Boston University, Department of Archaeology, 675 Commonwealth Avenue, Boston, Massachusetts 02215 USA.

The Anthropology Department at **Southern Illinois University-Edwardsville** invites applications for a tenure-track Assistant Professor with research specialization in archaeology of the Midwest or Eastern North America. Ph.D. required at time of employment, beginning August 2009. Expectations of research, service, and quality undergraduate teaching and mentorship. Courses to be taught will include introduction to anthropology (4 fields) and an archaeological field school to be taught locally. Other desired courses could include North American prehistory, world prehistory, historical archaeology, cultural resource management, artifact analysis, paleoethnobotany, or geoarchaeology. Applications close January 1, 2009. Send vita, transcripts, contact information for three references, and separate one-page statements of teaching interests/philosophy and research interests to: Anthropology Chair, Box 1451s, Southern Illinois University Edwardsville, Edwardsville, Illinois 62026-1451 USA.

Brown University invites applications for a senior (associate or full) professor in the field of Mediterranean or Near Eastern archaeology. Applications are welcome from scholars interested in the complex societies of any part of this broad geographic expanse. Candidates are sought with expertise and interests complementary to the current faculty, especially but not exclusively in the following areas: archaeology and media, archaeology and text, landscape archaeology, material culture studies, and public humanities and cultural heritage. Candidates with active fieldwork projects, and strong technical skills, are particularly welcome. Candidates must have an outstanding record of scholarly achievement and leadership, as well as a proven record of publication, outreach and service commensurate with their career stage. For all ranks, excellence in, and commitment to, undergraduate and graduate teaching are essential. The successful candidate will be expected to

make major contributions to the ongoing development of the recently established Joukowsky Institute for Archaeology and the Ancient World. Candidates should submit a letter of application, a curriculum vitae and five names of referees with contact information (including email, if possible) by January 5, 2009; referees will be contacted directly by the Search Committee. Applications received by January 5th, 2009 will receive full consideration. For more information, contact: Susan E. Alcock, Chair, Search Committee, Joukowsky Institute for Archaeology and the Ancient World, Brown University, Box 1837, Providence, Rhode Island 02912 USA.

The **Oriental Institute of the University of Chicago** invites applications for the Oriental Institute's Annual Post-Doctoral Scholar Conference program for the 2009-2010 academic year. This is a twelve-month, non-renewable appointment. The Post-Doctoral Scholar will organize and conduct a two-day conference at the Oriental Institute on key comparatively oriented theoretical or methodological issues in the field of ancient studies (archaeological, text-based, and/or art historical avenues of research). We encourage cross-disciplinary proposals that deal with the ancient Near East (including Egypt) or that compare the Near East with other cultural areas. Applicants should take into consideration the research interests represented at the Oriental Institute. The conference will take place in early to mid March 2010. After the conference, the Post-Doctoral Scholar will work with publication staff to assemble and edit the proceedings for publication in the "Oriental Institute Seminars" series. The incumbent is also encouraged to pursue his or her own research while in residence and to interact with the Oriental Institute community. Information on past Oriental Institute Annual symposia can be viewed at: <http://oi.uchicago.edu/research/symposia>. Qualifications: Ph.D. in a discipline relating to ancient studies must be complete at the time of appointment. Applicants should send: 5-page proposal outlining nature and structure of the conference (including names and paper topics of six to eight key participants who have agreed to make presentations, should the conference be funded); curriculum vitae 3 letters of reference (these may be sent under separate cover); Electronic submissions are welcome. Deadline for completed applications is Friday, January 9th, 2009. Start date is September 1, 2009. Please send applications to: Post-Doctoral Scholar Program, attn. Mariana Perlinac, Oriental Institute, University of Chicago, 1155 East 58th St., Chicago, Illinois 60637 USA. Or e-mail to: oi-administration@uchicago.edu.

The **University of Michigan**, pending administrative approval, invites applications for a position in North American (continental US and Canada) archaeology to begin in fall 2009. The successful candidate will hold a joint (50% each) appointment as Curator in the Museum of Anthropology and a tenure track professorial position in the Department of Anthropology. Rank open. We seek candidates whose research integrates a theoretical commitment to core questions in anthropological archaeology with successful and ongoing fieldwork; who have a demonstrated record of directing/coordinating archaeological field projects; and whose research

interests and analytical expertise complement those of current faculty/curators. PhD in hand by August 2009. The successful candidate will have a strong record of external funding, publication, and demonstrated excellence in teaching commensurate with their career stage. Please send a cover letter describing your interest in the position, a C.V., a statement of research interests, a statement of teaching philosophy and experience, an example of your academic writing, and the names of three references as pdf or word documents to archsearch@umich.edu, with a hard copy to Archaeology Search Committee Chair, Museum of Anthropology, University of Michigan, 1109 Geddes Ave, Ann Arbor, MI 48109-1079 by January 10, 2009.

Southern Illinois University-Carbondale, Center for Archaeological Investigations, seeks its 2009-2010 Visiting Scholar (VS). The VS organizes and conducts an archaeological conference at SIUC, resulting in an edited volume of selected papers. The VS assembles and edits conference volume while in residence. The successful candidate is also expected to pursue his/her research and teach one seminar in his/her specialty. 11-month term appointment as a Visiting Scholar. Qualifications: Ph.D. in Anthropology or related discipline with specialization in archaeology. Degree must be completed by August 16, 2009. VS selected on the basis of a 5-page proposal outlining the nature and structure of the conference and on the strength of vita and references. Pre-application inquiries recommended. Closing date: February 1, 2009. Send letter, vitae, list of references, and proposal to: Dr. Heather Lapham, CAI, Faner 3479 - Mail Code 4527, Southern Illinois University Carbondale, 1000 Faner Drive, Carbondale, IL 62901; Tel: (618) 453-5031; E-mail: hlapham@siu.edu.

The Department of Anthropology of the **University of Alaska-Anchorage** seeks an archaeologist, Ph.D. in hand by August 9, 2009, for a full-time, tenure-track position as Assistant Professor of Anthropology. The successful applicant will be required to teach three courses per semester. These will include undergraduate courses on introductory anthropology, fundamentals of archaeology, and the rise of civilization, as well as advanced undergraduate and graduate courses on historical and northern archaeology. Also required is the ability to teach courses in archaeological theory and in contemporary field and lab techniques in archaeology. Demonstrated experience in teaching and in historical archaeology; the ability to teach a course in northern ethnography; and knowledge of geographical information systems (GIS) or other appropriate technical or data management/analysis expertise is also preferred. The candidate will demonstrate the capability of continuing or developing an active research program in northwestern North America. The appointment will include the UAA tripartite mission of teaching, research, and service, including both undergraduate and graduate student advising. Closing date is February 5, 2009. Applicant questions concerning the position posting may be addressed to Christine Hanson, by email at afclh@uaa.alaska.edu. Additional information about the position can also be found at: www.uakjobs.com/applicants/Central?quickFind=64779.

Awards, Fellowships, and Training

Postdoctoral Fellowship at the University of South Florida. The USF Department of Anthropology is among five departments participating in the university's Postdoctoral Fellowship Pilot Project in the Social Sciences and Humanities, 2009-2010. Applications are invited from anthropologists to join the department in Fall 2009 for one year, with the possibility of renewal. Applicants must have completed the doctorate no earlier than 2005, and no later than May 1, 2009. They will be expected to contribute to USF's current strategic initiatives, which include global literacy, interdisciplinary inquiry, and community engagement. USF doctoral graduates are not eligible. The USF Department of Anthropology is a national leader in Applied Anthropology, and will give preference to candidates whose research has applied or policy potential. Current faculty research focuses on six general areas of strength: Biocultural Dimensions of Health and Illness; Archaeological and Material Culture Studies; Community Identity and Heritage; Communication, Representation and Education; Global, Sustainable Resource Management and Economic Development; Constructions of Race, Ethnicity, and Gender. The successful applicant will work with faculty in one or more of these areas, pursuing her/his own research agenda and teaching one class each semester. We are especially interested in applicants who might develop graduate seminars on topics that complement existing offerings. A full description, deadline, and application procedures are available at <http://www.grad.usf.edu/postdoc.asp>. Applications must be submitted electronically, and should not be sent directly to the Anthropology Department. However, to inquire about this opportunity, please contact Department Chair Elizabeth Bird at 813-974-0802, or ebird@cas.usf.edu. Send all application materials by January 5th to the USF Graduate School at postdoc@grad.usf.edu.

Research Awards for Graduate Students in Archaeology. The Laboratory for Archaeological Chemistry at the University of Wisconsin-Madison is initiating an annual program of research award grants to graduate students in archaeology programs around the world. The lab staff strongly believes that major discoveries in archaeology in future years will come from laboratory investigations. In that light, the training of graduate students in analytical methods and their application is essential. This award is intended to further those goals. The awards are offered to support and encourage the application of chemical analyses in solving archaeological problems. The Laboratory for Archaeological Chemistry has been involved in the study of questions of archaeological interest for many years. The primary focus of research in the laboratory is on the characterization of prehistoric bone, soils, and pottery. A variety of other materials including stone, dyes, organic residues, metals and glass are also investigated in the laboratory. Instrumentation in the lab includes a (1) Inductively Coupled Plasma Atomic Emission Spectrometer for the rapid elemental characterization of a variety of materials with a resolution in parts per million, and (2) Finnigan Element Inductively Coupled Plasma High-Resolution Mass Spectrometer for isotopic and elemental characterization of many materials, often at the parts per billion

level. This instrument incorporates laser ablation as a sample introduction technique appropriate for many solids and for small or fragile samples. In addition the lab has access to a variety of other instrumentation and equipment on campus that is often used in our research. Application: Applications for the award should contain (1) a three-page letter from the applicant containing the specifics of the research and the analyses involved, (2) a curriculum vitae of the applicant, (3) a tentative table of contents for the dissertation, and (4) a letter of recommendation from the major advisor. The letter of application should contain detailed information on the research project, the kinds of analyses involved, the number of samples and analyses required, availability of samples with letter(s) of permission if appropriate, and a discussion of the importance of the analysis to the proposed research. This letter should also provide a timetable for research and completion of project. Discussions with the lab staff are recommended prior to application to ensure that the project meets award criteria and employs services available in the Laboratory for Archaeological Chemistry. There is no form for applications. Criteria for Award: The award will be made by the staff of the Laboratory for Archaeological Chemistry and major criteria for selection will be the significance of the research question, feasibility of the project, and impact on the student and the field. Deadline: 1 January for awards beginning in 1 September of the same year. Award: One award will be made each year consisting of analytical services involving elemental or isotopic measurements available with Laboratory for Archaeological Chemistry instrumentation. The lab encourages students to participate in analyses, where possible, in order to learn and understand the methods employed. Announcement: The award will be announced on 15 March each year. Awards should be appropriately acknowledged in any dissemination of results of the analyses and copies of resulting publications should be provided to the Laboratory for our files. Contact: Questions and Applications should be addressed to T. Douglas Price or James H. Burton, Laboratory for Archaeological Chemistry, University of Wisconsin-Madison, 1180 Observatory Drive, Madison Wisconsin 53706 USA. Phone: 608-262-2575 (tdp), 608-262-0367 (jhb), 608-265-4216 (fax). Email: tdprice@facstaff.wisc.edu or jhburton@facstaff.wisc.edu. For further information on the Laboratory for Archaeological Chemistry, please see our web site at www.wisc.edu/larch/aclab/larch.htm.

NSF-funded Awards for Archaeometry at the Field Museum. The Elemental Analysis Facility (EAF) at the Field Museum invites proposals for a limited number of NSF funded awards for archaeometry projects requiring the use of LA-ICP-MS. Grants will be available for three years (2008-2011). The EAF hosts a Varian inductively coupled plasma-mass spectrometer (ICP-MS) and two laser ablation systems: a New Wave UP213 laser ablation (LA) system with a 5 cm x 6 cm chamber and a New Wave UP266, with an experimental adaptable chamber, dedicated to the study of large objects. Complementing the ICP-MS instrumentation, the EAF also hosts a LEO EVO 60 XVP Scanning Electron Microscope with an environmental chamber equipped with an Oxford Inca

Energy Dispersive Spectroscopy system, two portable XRF systems and a digital imaging petrographic microscope. This NSF funded program aims at facilitating the access of the EAF to researchers and students by offering funding to offset LA-ICP-MS analytical costs. Researchers should indicate whether they will be in residence at the Museum to run their samples, or whether they are requesting Museum staff to undertake the analysis. In some cases, students from outside the Chicago area are eligible for limited funding for travel and accommodation. Students requesting travel funding should submit a travel budget. A panel including outside and Field Museum scholars will review proposals twice a year. All parties who wish to undertake a collaborative project in the lab should forward a short proposal (2-4 page) for consideration. The proposal should address the research problem, the size of the specimens, and the type, number, and contexts of the samples, whether the scholar will be in residence and travel budget if appropriate. Curriculum vitae for the principal collaborator(s) should also be included. Complete proposals must be received by March 31 and September 30, each year. You should inquire with Laure Dussubieux, lab manager, before submitting any proposal at ldussubieux@fieldmuseum.org. Additional information can be found at www.fieldmuseum.org.

Conference News and Announcements

The Science of the Human Past, December 5, 2008, Broad Institute at MIT-Harvard. Ongoing research in the natural and physical sciences is reconfiguring our understanding of the human past. Advances in human genetics, work on ancient DNA, studies of migration and dietary history, computational linguistics and palaeoenvironments is creating new knowledge of both the human present and historical past. For the first time ever at Harvard University and the Broad Institute, the Symposium brings together a group of leading researchers in the scientific investigation of the human past to present their recent work and to launch a dialogue that bridges the natural and social sciences and the humanities. The Symposium will be a unique opportunity for researchers and students of diverse backgrounds to learn what is being discovered today about the human past in laboratories around the world and to imagine how those discoveries might be pursued in the areas of investigation as diverse as genetics, archeology, historical migrations, epidemiology, and computer sciences. Speakers and themes include: Michael Hammer, University of Arizona; Michael McCormick, Harvard University; Svante Pääbo, Max-Planck-Gesellschaft, Leipzig; Nick Patterson, Broad Institute; Pardis Sabeti, Harvard University; Beth Shapiro, State University of Pennsylvania; Stuart Shieber, Harvard University; Mark Thomas, University College, London; Noreen Tuross, Harvard University; Tandy Warnow, University of Texas at Austin; and Steve Weiner, Weizmann Institute of Science. To register go to <http://www.broad.mit.edu/registration/> and scroll down to this event.

The Dead Sea Rift as a Natural Laboratory for Earthquake Behavior: Prehistorical, Historical, and Recent Seismicity, an international workshop and field trip, 16-23 February 2009, Israel and Jordan. Organized by the Geological Survey of Israel (Convener: Rivka Amit) and INQUA Paleoseismology Subcommittee (Chairman: Alessandro M. Michetti). The Workshop is aimed at improving our understanding of the seismic hazards with an emphasis on the study of the environmental effects of earthquakes and on the application of the ESI 2007 intensity scale. During the field trip the participants will be able to directly observe and discuss the unique geological and archaeological field evidence of large devastating seismic events found along the Dead Sea Rift. This Workshop will provide an opportunity to bring together geologists, paleoseismologists, archaeoseismologists, seismologists and engineers, in one of the most studied seismic provinces on earth, to discuss and transfer methodologies in the area of seismic hazard assessment. For the DSR 2009 program, logistic details and registration forms please contact Rifka or Alessandro at the email addresses given below. Registration and payment should be completed by 5 January 2009. The Focus Group on Paleoseismology and Active Tectonics has received limited funding from INQUA in order to partially support the participation of young scientists (MSc, PhD); please kindly send via email to the Scientific Secretary of the Focus Group (inquascale@apat.it or luca.guerrieri@apat.it) a copy of your CV and a recommendation letter. Deadline: 25 December 2008.

National Park Service's 2009 Archaeological Prospection Workshop. The National Park Service's 2009 workshop on archaeological prospection techniques entitled Current Archaeological Prospection Advances for Non-Destructive Investigations in the 21st Century will be held May 18-22, 2009, at the National Park Service's National Center for Preservation Technology and Training, Natchitoches, Louisiana. Lodging will be at the Ramada Inn. The field exercises will take place at the Los Adaes State Historic Site (a Spanish presidio and capital of the Spanish province of Texas between 1719 and 1772). Co-sponsors for the workshop include the National Park Service, the U.S. Army Corps of Engineers, Los Adaes State Historic Site, Northwestern State University of Louisiana, and the Louisiana Division of Historic Preservation. This will be the nineteenth year of the workshop dedicated to the use of geophysical, aerial photography, and other remote sensing methods as they apply to the identification, evaluation, conservation, and protection of archaeological resources across this Nation. The workshop will present lectures on the theory of operation, methodology, processing, and interpretation with on-hands use of the equipment in the field. There is a registration charge of \$475.00. Application forms are available on the Midwest Archeological Center's web page at <http://www.nps.gov/history/mwac/>. For further information, please contact Steven L. DeVore, Archeologist, National Park Service, Midwest Archeological Center, Federal Building, Room 474, 100 Centennial Mall North, Lincoln, Nebraska 68508-3873: tel: (402) 437-5392, ext. 141; fax: (402) 437-5098; email: steve_de_vore@nps.gov.

DIG: Developing International Geoarchaeology 2009 Conference and Instrumental Neutron Activation Analysis Workshop, May 25-29, 2009 at McMaster University, Hamilton, Canada. This conference is jointly organized and supported by the Department of Anthropology, School of Geography and Earth Sciences and the Centre for Neutron Activation Analysis at the McMaster Nuclear Reactor. We invite participants to discuss all geoarchaeological topics including: Method and Theory in Geoarchaeology, Geochemical Characterization and Material Studies, Soil Micromorphology, Palaeoenvironmental Reconstruction, Frontiers in Geoarchaeology, Submerged Landscapes and Underwater Geoarchaeology, Human-Environment Interaction, Site Formation Processes, Methods in Spatial Analysis, Dating Methods. We are also excited to announce the Instrumental Neutron Activation Analysis Workshop. Participants will have the opportunity to gain hands-on experience with INAA, to attend informal discussions led by researchers in this facility, and to learn about the practical applications of INAA in geoarchaeological research. Please refer to our website for further details: <http://socserv.mcmaster.ca/dig/index.html>.

New Journal, Archaeological and Anthropological Sciences

Springer announces a new journal, *Archaeological and Anthropological Sciences* (ISSN: 1866-9557), <http://www.springer.com/earth+sciences/journal/12520>. The journal aims to publish articles covering the full spectrum of natural scientific methods, which are now a fundamental part of modern archaeological research, with the emphasis on the archaeological contexts and the questions being studied. In this way it aims to bridge the gap between archaeologists and natural scientists providing a forum to encourage the continued integration of scientific methodologies in archaeological research. Topics include: Archaeology, Geology/Geophysical Prospection, Geoarchaeology, Geochronology, Palaeoanthropology, Archaeozoology and Archaeobotany, Genetics and other Biomolecules, Material Analysis and Conservation Science. The journal is endorsed by the German Society of Natural Scientific Archaeology and Archaeometry (GNAA), the Hellenic Society for Archaeometry (HSC) and the Association of Italian Archaeometrists (AIAR) and will be published quarterly with each issue including one invited review article focusing on one of the many facets of archaeological science, either in terms of a particular methodology or the archaeological questions being asked.

SAS Bulletin Seeks New Editor

The Society for Archaeological Sciences is seeking an Editor-in-Chief for its quarterly publication, *SAS Bulletin: Newsletter of the Society for Archaeological Sciences*. For

over 30 years, the *SAS Bulletin* has been an integral part of the SAS as a means to share information about the latest research in archaeological science as well as jobs, training, conferences, Society business, and other relevant news. The first Editor in 1977 was R. E. Taylor, who was followed in later years by Suzanne P. De Atley, George "Rip" Rapp Jr., Patrick E. Martin, Robert S. Sternberg, Christopher L. Nagle, Robert H. Tykot, and, since 2005, E. Christian Wells. The Editor is responsible for the *Bulletin's* content and publication schedule. To help in this effort, the Editor is joined by a group of associate editors, each with the responsibility to collect information about a different sector of archaeological science and to share this information with the Editor for publication in the *Bulletin*. The current areas of archaeological science covered in the *Bulletin* include: archaeological ceramics, archaeological chemistry, archaeometallurgy, bioarchaeology, dating, geoarchaeology, and remote sensing and GIS. There are also associate editors for book reviews and the meeting calendar. Copies of previously published issues are available on-line, <http://www.socarchsci.org/sasb.htm>. The new Editor will mail their first issue (Volume 33, Number 1) to the membership on February 1, 2010. Please send inquiries and proposals to Christian Wells, cwells@cas.usf.edu.

Non-destructive Chemical Analysis of Archaeological Materials using Energy Dispersive X-ray Fluorescence at the Université de Montréal

Adrian L. Burke

Département d'anthropologie, Université de Montréal

Gilles Gauthier

Département de chimie, Université de Montréal

A recent grant from the Canadian Foundation for Innovation has led to the creation of a new laboratory for the non-destructive chemical analysis of archaeological materials at the Université de Montréal. This research-dedicated laboratory is under the direction of Dr. Adrian L. Burke, Département d'anthropologie, and operated by a full time research scientist with 30 years of experience in geochemistry: Gilles Gauthier, Département de chimie. Our objective is to contribute to the development of non-destructive analysis of archaeological materials using energy dispersive X-ray fluorescence by improving the precision and accuracy of quantitative chemical analyses, reducing limits of detection, as well as increasing the analytical throughput for archaeological collections.

The instrument we have acquired is a PANalytical Epsilon 5 EDXRF instrument equipped with a 100kV generator, a 600W Gd side-window X-ray tube, 15 secondary targets set in a 3D configuration (tube- sample- target) thus providing a polarized beam path, a multi channel analyzer with digital signal processing of up to 16,000 channels, and a liquid nitrogen cooled Ge detector. The system has a fully integrated X-Y sample changer

that can accommodate up to 133 samples. Samples are always loaded into the instrument in stainless steel sample holders limiting the size of the samples to 50 mm in diameter and 30 mm in height. A 12 rpm spinner ensures a more uniform X-ray beam exposure. The instrument is calibrated using 20 geological certified reference materials. Two applications have been developed for geological rock slabs and lithic artifacts, one for major elements and one for trace elements using Fundamental parameters and Compton corrections respectively to counter matrix effects and surface irregularities of archaeological artifacts. Total analysis time per sample is roughly 3 hours; typical run times are 50 minutes (600 s per target X 4 targets + dead time) for major elements and 2 hours and 20 minutes (900 s per target X 5 targets + dead time) for trace elements. The lab also possesses a planetary ball mill and a hydraulic press to produce powdered pellets of geological rock samples.

Our research centers primarily on the sourcing of lithic raw materials used to make stone tools in prehistoric northeastern North America. This research is based upon a comparative lithic reference collection of over 500 georeferenced samples from geological formations/members and all known quarries in the Northeast. Our lithic reference collection is based on the comparative collection created by archaeologist Yvon Codère in the 1980s and 90s. The entire collection is now entered in FileMaker and is searchable by formation name, location, GPS coordinates, color, etc. All samples are photographed and many have been thin sectioned and studied using a petrographic microscope.

A sourcing project typically begins with a macroscopic and low-power microscopic analysis of archaeological lithic tools and debitage. These artifacts are compared to the lithic reference collection and materials that resemble them are chosen for chemical analysis and comparison. Burke has worked on many of the prehistoric quarries in the Northeast (Burke 1997, 2000, 2002, 2003, 2006a, b, 2007a, b; Burke and Chalifoux 1998) and the geological materials used in our chemical analyses are samples taken *in situ* at the quarries by Burke or Codère. With very few exceptions the quarry/source samples come from precise formations or members (they are not gifts from colleagues) thus guaranteeing the geoarchaeological provenance of the comparative reference materials and the reproducibility of results. Where possible, tens of samples from each quarry/source are analyzed in order to measure the intra-source variability of the geological sources and to create a geochemical profile specific to that source.

Typical lithic raw materials that have been analyzed to date include: chert, rhyolite, hornfels, jasper, quartzite, chalcedony, siliceous shale, and mudstone. Contexts range from the Early Paleoindian site of Bull Brook in Massachusetts, to the Late Paleoindian chert quarries of the Gaspé Peninsula of Quebec, to the Late Archaic sites of southern Quebec and Ontario, to the Woodland or Ceramic period sites of the Maritime Provinces and Maine. More recently we have carried out analyses on siltstone from quarries in Arctic Canada, obsidian from Aztec sites in Mexico, and jasper from Middle Paleolithic sites in

Portugal. Lithic source characterization using basic geochemical variation diagrams and an adapted spider diagram seem quite promising tools at this stage in assigning a specific geochemical signature to known quarries. Naturally, as we expand our data set our signatures will become more robust. We have also started to do research on the native copper sources of Lake Superior, Nova Scotia, and Arctic Canada, and on copper alloys introduced to these areas by European explorers and traders.

In analyzing archaeological artifacts one is automatically confronted with surface weathering that has altered the chemical composition of the outer parts of the sample. XRF is mostly a surface dependent analysis, especially for the light elements. If one is not permitted to chemically or mechanically remove the exposed surfaces one must take great care in a non-destructive approach such as ours to use more robust elements. In this respect we purposely chose this EDXRF system for its gadolinium anode X-ray tube in order to maximize the excitation of the heavier and less mobile elements at the expense of the lighter ones. We have undertaken a specific study of weathered and non-weathered geological and archaeological samples from three different prehistoric chert and hornfels quarries in southern Quebec. A rock saw was used to remove altered surfaces. These cut and polished surfaces were compared to relatively flat weathered surfaces from the same blocks. Weathered flakes were then compared to these data in order to test our ability to accurately assign weathered artifacts to a known quarry (Figures 1a and 1b).

As geochemists have previously pointed out, the lighter elements with greater ionic radii and lower electronegativities (greater mobility) will be the most affected by natural weathering processes. It appears, in our study, that the major elements (Figure 1a) are significantly affected by the weathering of the samples. On the other hand, some of the heavier or higher energy elements such as the lanthanides and the high field strength elements (Figure 1b) seem unaffected by the surface weathering judging from the overall fit of the values of the weathered hornfels flake with the box plot values for the cut and polished quarry hornfels. Based on these results, and to facilitate visualization of the simultaneous matching of a large number of elements we have chosen to use a spider diagram approach to assign archaeological samples to specific geological sources (Figure 2). Our initial results are promising. They suggest that despite surface weathering of archaeological artifacts, many of the fine-grained, highly siliceous rocks that were used during prehistory can be accurately assigned to a geological source or quarry using a non-destructive EDXRF surface analysis. We continue to work on a variety of lithic raw materials in order to increase the robustness of our dataset (precision, accuracy, limits of detection). The EDXRF instrument offers great advantages to the archaeometrist, not only in the non-destructive analysis of archaeological artifacts “as is” but also in the high sample throughput that allows for dozens of samples to be run everyday, not to mention the re-use of these samples by other techniques (e.g., Microprobe, LA-ICP-MS). Of course, because no archaeometric technique can ever provide the answer to all of our questions, we continue

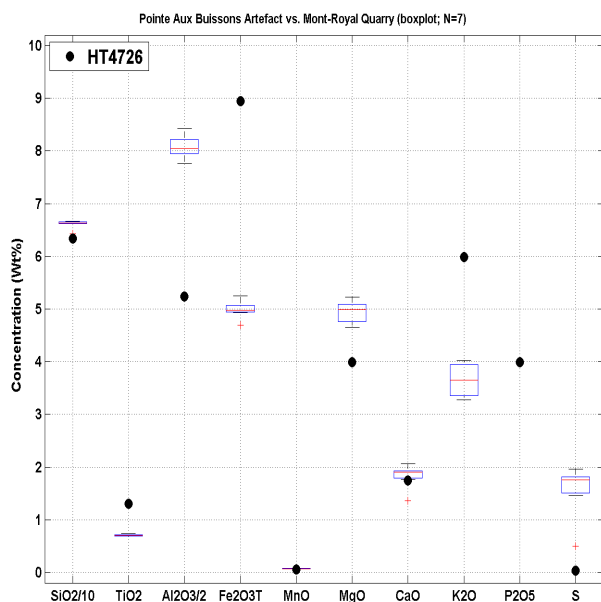


Figure 1a. Box plot values for EDXRF analysis of a heavily weathered hornfels flake (dots) compared to the values for the Mont Royal hornfels quarry (boxes).

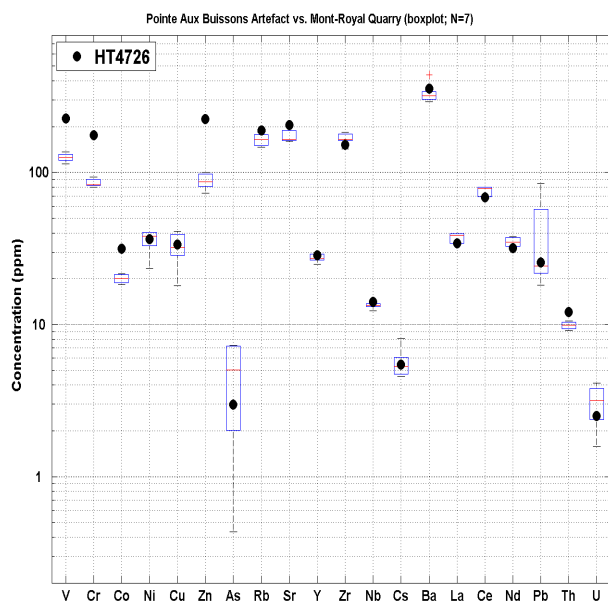


Figure 1b. Box plot values for EDXRF analysis of a heavily weathered hornfels flake (dots) compared to the values for the Mont Royal hornfels quarry (boxes).

to systematically carry out thin section petrographic, SEM elemental mapping, and INAA analyses of a sub-sample of our geological and archaeological assemblages in order to provide complementary data and to test the accuracy of our EDXRF results.

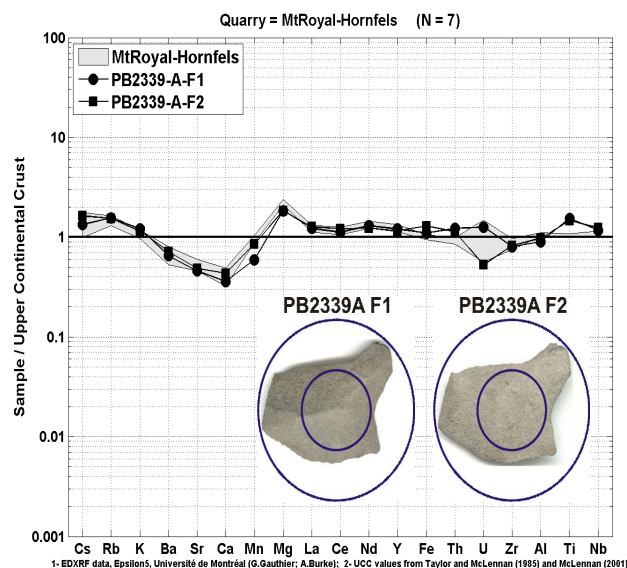


Figure 2. Results of the EDXRF analysis of a hornfels flake from the Pointe du Buisson site compared to the geochemical pattern of the Mont Royal hornfels quarry (grey area). Both faces (F1, F2) of the artifact were analyzed showing very good reproducibility on weathered samples. We conclude that this hornfels was extracted at the Mont Royal quarry in Montreal and then transported or exchanged to the Pointe du Buisson Woodland period site some 35 km to the southwest.

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and must be analyzed accounting for the artistic liberties of the artist, the nature of the drawing is still suggestive of basic cultural practices.

The consumption of Black Drink was not restricted to ritual, but was consumed regularly and in a variety of different contexts. Hudson claims that the consumption of the Black Drink was also regarded as a highly social event and was sometimes unrelated to ceremony (Hudson 1979). Jonathan Dickinson, an explorer that shipwrecked off the east coast of Florida in 1699, documents the casual consumption of the Black Drink, similar to a modern-day "coffee-break" and witnessed no ill effects in relation to its ingestion (Dickinson 1697). In some instances, the consumption of the beverage was used as a means of symbolic separation from the female sex since many Native groups did not allow women to participate in the drinking the beverage (Fairbanks 1979; Hudson 1979, 2003).

The plant used to brew the black drink, Yaupon holly, or *Ilex vomitoria*, grows native along the southeastern and gulf coasts of North America. The shrub is found in woody, upland regions and averages 2-4 m in height (Edwards 2005; Hudson 1979). The species name, "vomitoria" is directly related to the plant's emetic reputation.

According to historical texts, the methods of brewing vary by tribe and region. The leaves of the Yaupon were collected by Native Americans in the late spring and early to middle summer depending on their geographic location (Hale 1891, as cited in Hudson 1979). Dickinson observed the St. Lucia Indians preparing the black drink by boiling the parched leaves of the yaupon holly (Merrill 1979, Dickinson 1697). Other accounts state that the roasted leaves and twigs were used in the preparation of the beverage (Hudson 1979). Tamara Spike claims the leaves "were dried and roasted" (2007:47) prior to boiling. Later accounts by Spanish also describe the preparation of the tea in which the parched leaves were boiled until a liquid dark in color formed (Sturtevant 1979). Black Drink was usually boiled for about 30 minutes (Hale 1891, cited in Hudson 1979). After boiling, the beverage was strained (Merrill 1979) and served hot (Hudson 1979).

Ilex vomitoria is known to contain methylxanthine alkaloids which act as stimulants in the body (Edwards 2005). The most popular of these stimulants is caffeine. Some scholars postulate that the Native Americans collected *Ilex vomitoria* during early to middle summer, when the caffeine content was at its highest, thus increasing maximum consumption of the chemical (Power 1919). Moreover, many published sources claim the emetic effect of the Black Drink is related to its high caffeine content obtained through the use of the *Ilex vomitoria* plant:

"caffeine, the principal psycho-pharmacological ingredient in this decoction, is a central nervous system stimulant and is present in respectable amounts in properly prepared black drink. The roasted leaves of cassina contain as much caffeine as coffee....Excessive consumption of some of the black drink decoctions produced vomiting which seems to have been part

The Black Drink: It's Not the Caffeine

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The Black Drink was a tea-like drink brewed by many Native American groups of the Southeast. One of the most interesting, and notorious, characteristics of the Black Drink is its emetic effect. Several written accounts indicate that upon consumption, the drinker would vomit (Brown 1994; Edwards 2005; Hudson 1979, 2003; Milanich 1999).

The Black Drink is often associated with ritual and ceremony, particularly those relating to cleansing and thus was used specifically for its emetic qualities (Hudson 1979; Milanich 1999). When the Black Drink was consumed to induce vomiting, notions of purity were often intertwined. The act of vomiting was a physical manifestation used to remove pollutants from the body. Indeed, some cultures refer to the beverage as the "White Drink" in reference to the tea's "purifying" properties.

One of our most popular portrayals of Black Drink ritual was created by artist/explorer Jacque LeMoyne. LeMoyne's artwork, "Proceedings of the Floridians in Deliberating on Important Affairs" (de Bry 1591), depicts a group of Timucuan Indians brewing and drinking the Black Drink. The scene includes two male individuals vomiting, presumably after consumption of the liquid. Although LeMoyne's drawings cannot be considered photorealistic depictions of Native culture,

of the ritual.” -Robin Brown *Florida’s First People: 12,000 Years of Human History* p. 126

“...black drink is a powerful stimulant, containing large amounts of caffeine.” -Tamara Spike *Conceptions of Purity & Pollution among the Timucua of Spanish Florida*, p. 41

“The beverage, which contains caffeine, was drunk by...the Timucua....People who drank the black drink sometimes vomited.” -Jerald Milanich *The Timucua*, p. 174

“The main active ingredient of Black drink is caffeine....The physiological effects of black drink are mainly those of massive doses of caffeine....The black drink could have delivered as much as 3.0 to 4.0 grams (of caffeine).” -Charles Hudson *The Southeastern Indians*, pp. 226, 228

Organic laboratory techniques were used to extract and directly measure the caffeine content in a sample of simulated Black Drink (Pavia 2006). Based on the results, it appears that the caffeine content of the beverage is significantly low and thus is not responsible for the associated emetic effect.

Collection & Processing of Ilex vomitoria

Ilex vomitoria was identified with the assistance of a park naturalist and with the author’s own familiarity with the plant. The leaves were collected on April 9th, 2008 at a local nature center in Jacksonville, Florida. To ensure that the caffeine content would be varied and not based on the chemical properties of one plant, the leaves were collected from approximately 20 different yaupon hollies. The locations of the plants varied along the nature center’s trails including a mixed hardwood forest and swampland. The leaves that were chosen were of varying degrees of color (ranging from a dark green to a lighter green) and located on different portions of the plant (base, top, etc).

The leaves were roasted the same day they were collected. Roasting the leaves in preparation for the Black Drink makes the caffeine more soluble in water. It is for this same reason that coffee beans and tea leaves are roasted prior to brewing.

The yaupon leaves were roasted in a copper fire pit over wood and coals. A sheet of aluminum foil was placed over the coals and the leaves were spread on top as close to a single layer as possible. The leaves were continually turned to prevent burning. After several minutes, the leaves began to sweat, smoked and turned a dark brownish color. The total roasting time was approximately 10-15 minutes. The leaves were immediately crushed by hand and transferred to an airtight container where they were stored until the Black Drink simulation was brewed.

Determining Caffeine Content

Caffeine content was determined through organic lab techniques that measure the mass percent of caffeine present

in the leaves (Pavia 2006). Both the control group, consisting of Publix brand tea, and the Black Drink simulation were prepared and analyzed identically and simultaneously.

Approximately 2.5 g of crushed leaves were boiled in the laboratory equipped with a reflux apparatus for condensing (see Table 1 for exact measurements). The heat source was supplied through a rheostat set at approximately 65-75 percent of 120v. The tea was brewed at a rolling boil for 30 minutes. The liquid was then vacuum filtered through a Buchner funnel and the 50 ml of “black drink” were collected in an Erlenmeyer flask with side arm. This procedure was repeated twice to ensure maximum extraction of caffeine from leaves and yielded an aliquot of 100 ml of Black Drink simulation. This aliquot of Black Drink simulation was then reduced to a usable portion of approximately 15-20 ml.

The Black Drink concoction was then poured into a separatory funnel and 10 ml of methylene chloride were added. The solution was shaken vigorously for approximately a minute and frequently vented to avoid the build-up of carbon dioxide. The solution was then allowed to stand and separate for approximately ten minutes. The lower layer, containing the methylene chloride, caffeine, tannins, alkaloids and other substances, was collected in a beaker. This procedure was repeated twice to ensure maximum extraction of caffeine from the aqueous “waste” layer and yielded approximately 20-25 ml of organic substances.

The organic layer, containing the caffeine and other substances, was divided into four vials. Vials were placed in a centrifuge for 5 minutes to further remove aqueous wastes from the caffeinated organic layer. Using a pipette, the lower organic layer, containing the methylene chloride, caffeine and other organics, was extracted and placed in a flask. The procedure was repeated to ensure maximum caffeine yield from the aqueous layer. Sodium sulfate (NaSO_4) was added to the resulting aliquot of methylene chloride to collect the aqueous precipitates. Methylene chloride was then removed from the organic solution by evaporation on a hot plate. Caffeine, chlorophyll and other organic substances remained as residuals in the flask.

To separate the caffeine from the other organics, a sublimation apparatus was assembled. A test tube filled with ice water (a “cold finger”) was inserted into the Erlenmeyer flask with side arm (containing the caffeine and other substances’ residue) and connected to a vacuum. A Bunsen burner was used to heat the flask and sublime the caffeine. The caffeine condensed and collected on the cold finger.

The cold finger was dipped into an aliquot of methylene chloride to accurately and effectively isolate the caffeine so that it could be quantified. The methylene chloride was then evaporated on a hot plate and the caffeine remained in the beaker. The mass of the caffeine and beaker was determined using an analytical scale. The mass of caffeine present was determined by the difference of the mass of the beaker

(previously determined) from the mass of the beaker and the caffeine (Table 1).

chromatography. Their results correspond with my own, yielding a median caffeine mass percent of less than 1 percent for their simulated black drink.

Interpreting the Data

Very little caffeine is present in the black drink. A total of 50 mg of caffeine were collected from the Publix tea (Package claims content of 55 mg of caffeine). Only 4 mg of caffeine were collected from the black drink. The Black Drink contained significantly less caffeine than the control group. Therefore, *caffeine is not the agent responsible for the emetic effects associated with the consumption of the black drink*. In fact, the caffeine content of the Black Drink is relatively low in comparison to other substances.

To more appropriately compare caffeine content, mass percents of caffeine were also calculated for the two experimental samples. A mass of 2.3300 g of Publix tea leaves were used in the analysis. The yield of caffeine was 0.0500 g with a mass percent of 2.1459. A mass of 2.4659 g of *Ilex vomitoria* tea leaves were used in the analysis. The yield of caffeine was 0.0040 g with a mass percent of .1622. By directly comparing mass percents, we find that the Publix tea contained 92 percent more caffeine than the Black Drink.

A similar experiment was conducted by Edwards and Bennett (2005) using caffeine content to differentiate between *Ilex* species. The authors determined the mass percent of caffeine present in the plants by using high-pressure liquid

What Is Responsible for the Emetic Effects?

The emetic effects of the Black Drink have often been highlighted. Caffeine is the frequently cited explanation for these effects. However, several possibilities besides caffeine content could be responsible for the vomiting associated with consumption.

Charles Hudson offers several explanations for the Black Drink’s association with vomiting. Hudson (1979) claims that in many instances Black Drink was served in social settings and consumed without vomiting. The Black Drink’s association with enemas could have been a result of the Europeans attempts to emphasize the “bizarre and dramatic” (Hudson 1979:4) practices of the Native people. Therefore, the Black Drink’s reputation was misrepresented in the historical record as an attempt to sensationalize the Native Americans’ ritual and daily practices. Even today, sensationalism is frequently used and could be a reasonable explanation for the Black Drink’s status.

A chemical besides caffeine could be responsible for emetic effects. Holly leaves are toxic. Many chemicals that cause vomiting are present in the leaves including ilicin, ilicic acid and chlorogenic acid (Hudson 1979). In the laboratory experiment used to analyze the caffeine content other alkaloid substances

Table 1. Comparison of Experimental Black Drink Tea and Commercially Available Black Tea.

Simulated Black Drink		Publix Tea	
mass of leaves (g)	2.4659	mass of leaves (g)	2.3300
volume deionized H2O (ml)	50	volume deionized H2O (ml)	50
boiling time (min)	~30	boiling time (min)	~30
2nd preparation		2nd preparation	
volume deionized H2O (ml)	50	volume deionized H2O (ml)	50
boiling time (min)	~30	boiling time (min)	~30
Total Volume of Black Drink (ml)	~100.00	Total Volume of Publix Tea (ml)	~100.00
Determining Caffeine Results		Determining Caffeine Results	
mass of beaker (g)	34.2055	mass of beaker (g)	34.2522
mass of beaker + product (g)	34.2095	mass of beaker + product (g)	34.3022
mass of product (g)	0.0040	mass of product (g)	0.0500
mass of product (mg)	4.0000	mass of product (mg)	50.0000
		% yield of possible 55 mg	90.90%
mass % of caffeine	0.1622	mass % of caffeine	2.1459

were presumed to be present (further analysis would confirm this assumption). The presence of these substances could all be held responsible for the emetic effect associated with the consumption of Black Drink.

Hudson also notes that the term “black drink” is generic for many types of tea Native Americans brewed and does not solely refer to the substance made from *Ilex vomitoria*. Several of these brews contain additional plants that could induce vomiting. One such plant is the button snakeroot. Known to cause vomiting, the plant is often recorded as an addition to several Native American teas (Fairbanks 1979; Hudson 1979).

A final explanation for the Black drink’s emetic effect is the “placebo effect” advocated by social pressures. Those who consumed the Black Drink in association with ritual and ceremonial practices knew they were expected to vomit. In order to meet these social pressures, Native Americans were able to self-induce vomiting. Hudson (1979) claims that many Indian cultural practices included vomiting such that the natives were able to do so willfully.

Conclusion

The Black drink is a very important aspect of Southeastern Native American culture. However, very little is known about one of its most notorious features, the emetic effect. For decades, many have believed the beverage to contain massive amounts of caffeine and subsequently held this chemical responsible for the vomiting associated with its consumption. However, limited chemical analysis has been conducted on the caffeine content of the Black Drink. No chemical analysis had been conducted since 1919 (Hudson 1979).

Recent experiments reveal that the caffeine content of the Black Drink is extremely low, even in comparison to modern teas. The mass percent of the simulated Black Drink is 92 percent less than that of the control group of standard black (Publix brand) tea. Thus, caffeine is not responsible for the vomiting associated with the consumption of the Black Drink.

Further analysis on the beverage would provide useful information about the drink and its role in Native American culture. Hudson (1979:1) claims, “The truth about this native tea is beclouded by faulty knowledge.” Hopefully, more extensive research will replace preconceived notions surrounding the Black Drink.

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Least Cost Path Analysis and Social Interaction in the Mimbres Area of Southwestern New Mexico

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Archaeology has used material culture to infer social organization at various scales. Within the Southwestern U.S., ceramics have traditionally been the material class used to infer social organization for the late prehistoric inhabitants of the

area. While ceramic characterization studies within the Mimbres area have been able to discern that there were many producers of pottery and that their wares were widely distributed, these data are often difficult to interpret and, until recently, were not completely coherent (Chandler 2000, Creel et al. 2002, Dahlin et al. 2007, Gilman et al. 1994, James et al. 1995). Lithics, however, have seen relatively little use as an indicator of social organization during the Late Prehistoric Periods.

Here, we use obsidian provenance studies from throughout the Mimbres area to discern spatial and temporal patterns taking place at the macro-scale to complement the patterns within the ceramic bulk chemical compositional data sets. During the Mimbres Foundation's work throughout the valley, researchers noted that obsidian use fluctuated through time. During the Classic Period its use peaked, where it comprised upwards of two percent of sites' overall lithic assemblages (Dockall 1990, Minnis 1985). More recent studies have shown that while obsidian constitutes only a minimal proportion of the overall lithic assemblage, it represents the preferred material from which projectile points were manufactured (Taliaferro 2004a, 2004b). These general patterns, while possibly due to sampling error, suggest that at least for the Late Prehistoric Periods, obsidian is a well suited material class to make inferences pertaining to social interaction throughout the region.

The Sourced Obsidian Sample

In order to further analyze patterns present in obsidian data, we synthesized data pertaining to sourced samples from over 40 sites across the region, and then conducted least cost path (LCP) analysis from archaeological sites to obsidian source locales to test if obsidian procurement met with a particular set of expectations.

Our sample consisted of 593 sourced obsidian artifacts recovered from over 40 sites located throughout the Mimbres region (Figure 1). The sites from which samples were obtained represent nearly the complete chronological sequence for the area, but for the intents of this study, only those components dating from the Late Archaic through the terminal Classic Period (ca. AD. 1150-1180) were used. This was due in part to both small sample sizes for early and late components as well as incomplete temporal coverage for portions of the study area.

The sites were divided into seven broad geographical zones to facilitate analysis (Figure 2). Five of these zones are located in the more mountainous region north of Old Town: the Luna / Reserve area, the Burro Mountain Range / Gila area, the Mimbres River Valley, the Eastern Mimbres area, and the Cookes Range. The two remaining zones, the areas around the Cedar and Florida Mountains, are located in the basin and ranges to the south.

In simply comparing the characterized obsidian assemblages between different zones, general patterns can be discerned (Figure 2). Sites in the Cedar and Florida Mountain zones obtained most of their obsidian from the relatively nearby

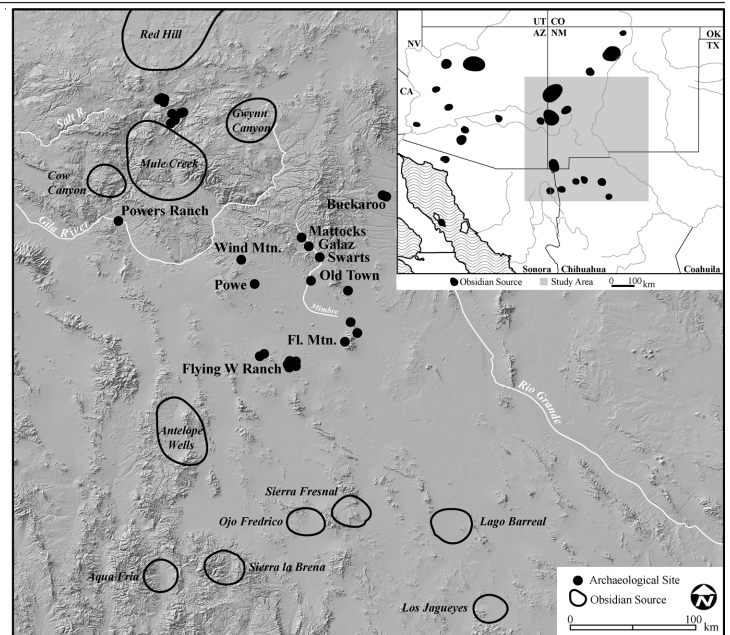


Figure 1. Location of selected obsidian source locales and archaeological sites used in the study.

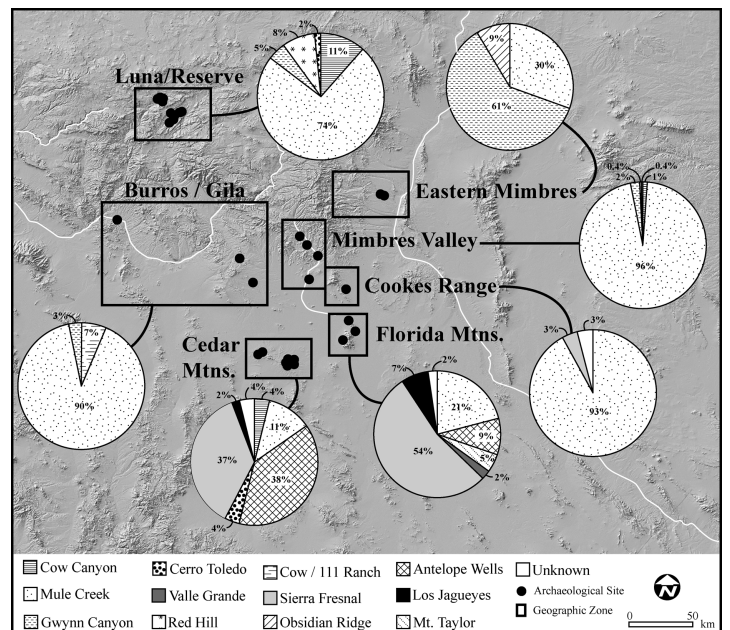


Figure 2. Results of obsidian characterization analyses for individual geographical zones.

Chihuahuan sources of Antelope Wells, Sierra Fresnal, and Los Jagueyes, with northern sources showing up in smaller frequencies (Shackley 2002, 2004a, 2004b; Shackley and Henrickson 2007a). Conversely, Sites in the northern zones obtained the majority of their obsidian from northern sources, primarily Mule Creek sub-groups, with smaller frequencies of Cow Canyon, Gwynn Canyon, and Red Hill (Shackley 2005, 2007; Shackley et al. 2006a, 2006b; Shackley and Henrickson 2007b; Stevenson 1993; Taliaferro 2004a, 2004b). Both northern

and southern zones contained samples that originated from sources in northern New Mexico. These were most likely procured from secondary deposits in the Rio Grande alluviums. Although limited by small sample sizes or lack of data for some time periods, temporal trends in all seven zones suggest little change through time with regards to the obsidian source materials predominantly procured in each zone.

Least Cost Path Analysis

To further investigate the initial patterns present within the data set LCP analysis was conducted between sites and obsidian source locales present within individual site's sourced obsidian assemblage (Figure 3). We used relative costs to assess whether procurement of obsidian met with the expectation that, all things being equal, individuals will target the least costly resource to procure. We then analyzed spatial and temporal trends within the sourced obsidian data.

If procurement of obsidian met with the expectation and individuals were indeed targeting the least costly resource, and if access to these resources was not hindered by social factors, then data obtained from the LCP analysis should indicate that Mimbres people were focusing on procuring materials present in the least costly source group. Thus, this source would constitute the majority of individual site assemblages. Likewise,

a proportional representation of sources based on cost differences would be present if multiple sources had similar procurement costs.

Where these expectations are not met, it suggests that other factors are involved in the procurement of obsidian. Differences in the quality of raw material could lead to the least costly source to not be used by individuals who opt for a more costly, but more suitable, material. Similarly, differences in the culturally perceived value of materials from differing sources could lead to more costly resources being procured by social groups. Finally, shifting social networks could restrict material exchanges or access to particular source groups, causing individuals to opt for more costly resource procurement.

The least cost path analysis was conducted within ArcGIS utilizing spatial information for obsidian and site locations as well as a 90 meter digital elevation model (DEM) constructed from the Shuttle Radar Topography Mission (SRTM) (CGIAR-CSI 2007). Spatial information for obsidian sources was calculated utilizing the information found in Shackley's 2005 publication. These data were georeferenced using rubber-sheeting and a series of points was established around the perimeter of the source locales. From here the spatial mean for each of the source locales was calculated using an ArcView Project script developed by Lee and Wong (2000). The cost surface was calculated by assessing the slope of the SRTM DEM. This surface was then reclassified to mimic the cost of traversing differentially sloped terrain. Thus, a simple friction cost surface was created where terrains with a slope of 0-5% cost five relative units to traverse one 90 meter cell, slopes of 5.01-10% cost ten relative units to traverse, and through to terrains with a slope of 95.01-100% which would cost 100 relative units to traverse one 90 meter cell. Cost direction surfaces and cost distance surfaces were constructed from the reclassified cost surface for each of the spatial means of the different obsidian source locales. These surfaces were then utilized to construct the least cost path from different obsidian source locales to the different archaeological sites that had obsidian from those localities. These paths were then clipped using shapefiles constructed from the rubber-sheeted source map (Shackley 2005). This vector path was then converted to a raster file. The least cost raster path was multiplied with the original reclassified cost surface to calculate the cost of traversing that particular least cost path.

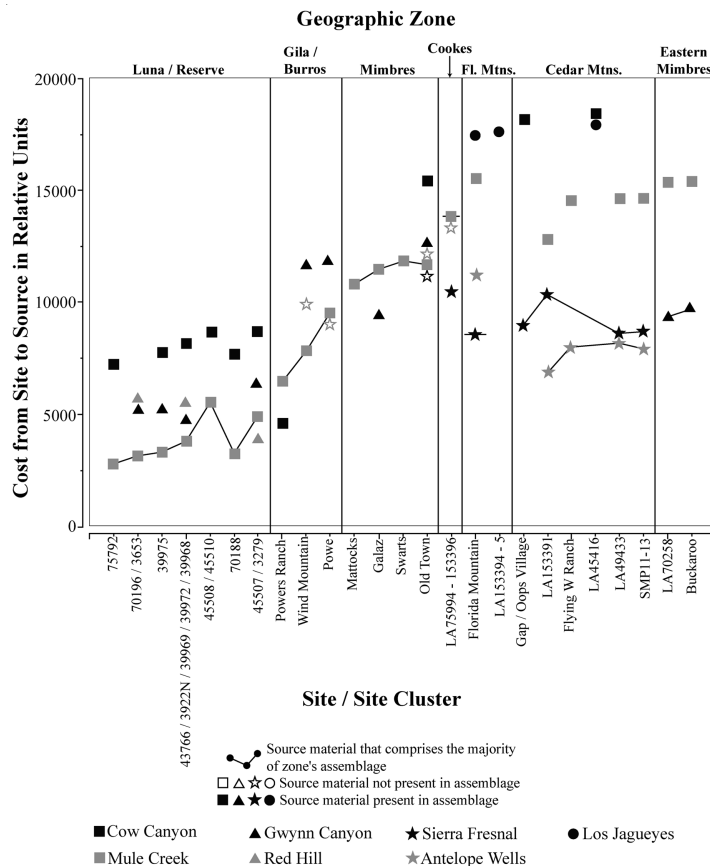


Figure 3. Results of least cost path analyses between obsidian source locales and individual sites / site clusters.

Results

The results of the LCP analysis are depicted in Figure 4. This figure shows the relative cost of procuring obsidian from specified sources. The sources connected with black lines represent the source group from which the majority of sourced samples from the overall area were procured. Generally, the trend of groups or individuals procuring the least costly resource within each area prevails. Interesting to note are the sites which did not procure obsidian in the most efficient manner. The Powe Ruin in the Gila / Burros area, Old Town in the Mimbres Valley area, and LA75994-LA153396 in the Cookes Range area, not

only procured material from more costly source locales, but less costly resources were not present in their assemblage. This perhaps attests to the strength of the social ties reinforced through obsidian procurement practices within the study area.

The results of our analysis indicate that there are differences in the interaction networks of people in the mountainous northern area of the region from those in the southern basin and range area (Figure 4). In the southern areas surrounding the Cedar and Florida Mountains, social groups tend to target materials originating from the Antelope Wells and Sierra Fresnal source groups. While Los Jagueyes source material is present in Late Archaic Period and Early Pithouse Period contexts in these areas, this material ceases to be procured after the beginning of the Late Pithouse Period. This suggests either a change in the social networks or a change in the mobility practices by groups inhabiting the areas.

Near the beginning of the Classic Period, groups inhabiting these southern areas began to incorporate materials from northern area source groups into their lithic technologies. This suggests the gradual incorporation of these communities into the northern area social network. Finally, changes in the assemblages within the Luna / Reserve area during the Pueblo Periods possibly suggest either a change in social networks or a restriction of access to the Red Hill source group.

Acknowledgements

We would like to thank Dr. Darrell Creel and Dr. Pat Gilman for helping with our research endeavors. Dr. Margaret Nelson graciously allowed us to use information for sites in the Eastern Mimbres Area. Likewise, Tom Holcomb, and the Bureau of Land Management, Las Cruces District, played a key role in funding and permitting many of the projects that produced samples used in this study. Dr. Gary Schnell, the Curator of Ornithology at the Sam Noble Museum of Natural History, helped in earlier presentations of this research. In addition, the Maxwell Museum, the Peabody Museum, the Amerind

Foundation, and the Texas Archaeological Research Laboratory all contributed, or allowed, obsidian from their collections to be analyzed. Funding was also provided by The National Science Foundation (Grant No. NSF-BCS-0624987), the University of Oklahoma, the Amerind Foundation, the University of Texas at Austin, and the Texas Archaeological Research Laboratory. Their help is greatly appreciated by the authors. Any inaccuracies contained within are the sole fault of the authors.

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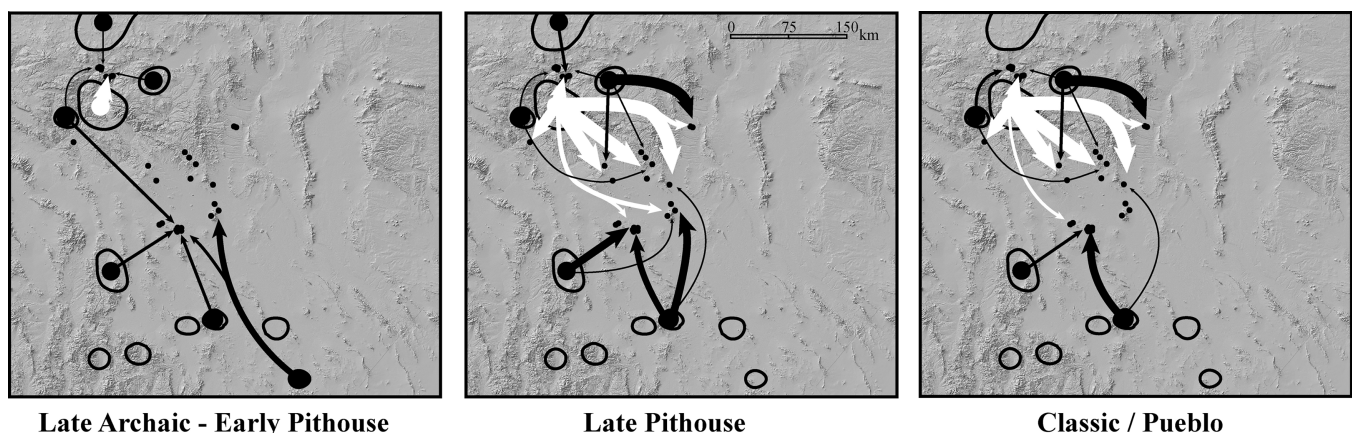


Figure 4. Depiction of temporal trends in the intensity of obsidian use within each geographical zone. The obsidian source groups' intensity of use is indicated by line thickness.

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Geoarchaeology

Jane A. Entwistle, Associate Editor

The 6th World Archaeological Congress (July 2008) in Dublin, Ireland, was the venue for a session on anthrosols, entitled 'Geoarchaeology and Dark Earth's'. The session organisers, Yannick Devos (Universit Libre de Bruxelles), Manuel Arroyo-Kalin (University of Cambridge), and Cristiano Nicosia (Geoarchaeological and Soil Micromorphological Consultant) noted that although dark earths have often been considered only of rather ephemeral interest for archaeological understanding, in the last decades, geoarchaeological studies have begun to show the enormous potential of studying these soils in their own right.

Researchers of European and Amazonian dark earths shared their research experiences, research strategies and insights on these archaeological soils. Kirsty Golding, University of Stirling, presented work from her PhD thesis 'The Effect of Waste Disposal on Soils in and Around Historic Small Towns' (June 2008), a summary of which is reproduced with her permission.

"Soils in urban environments are distinctive in that they are primarily modified through waste amendments. Much consideration has been given to how urban soil properties reflect current human influence; however, recent studies highlight their potential as historical archives. The impact of waste disposal on the nature, properties and formation of urban soils is significant, especially in historic small towns where the extent and complexity of refuse management practices is only just emerging."

"The study used a multi-method approach to characterise and understand modes of urban anthrosol formation in three Scottish burghs; Lauder, Pittenweem and Wigtown. The objectives were threefold; to establish the nature and diversity of urban anthrosols in and near to historic small towns, to characterise and account for the multiplicity of urban anthrosols in and near to historic small towns, and to elucidate the processes

associated with waste management and disposal in historic small towns.”

“Physical, chemical and micromorphological analysis of topsoil deposits indicated sustained addition of past waste materials to soils within and near to historic small towns. Soil characteristics were heterogeneous across burghs; however, distinct patterns according to past functional zones were identified. The burgh core and burgh acres are important areas of interest at all three burghs. Soil modification was most pronounced within burgh cores resulting in the formation of hortic horizons. Soils within burgh cores are characterised by neutral pH, increased organic matter content, enhanced magnetic susceptibility and elevated elemental concentrations such as calcium, phosphorus and potassium. In comparison the nature and extent of soil modification within burgh acres is more varied. At Lauder hortic soils were identified in the burgh acres suggesting pronounced soil modification through cultivation. Deepened topsoil in the burgh acres at Pittenweem provided evidence for application of mineral rich waste materials in the past. Moreover, magnetic and elemental enhancement (barium, phosphorus, lead, zinc) within the burgh acres south of Wigtown revealed historic soils based anthropogenic signal.”

“Changes in soil characteristics at Lauder, Pittenweem and Wigtown can be explained through processes of waste management and disposal in the past. Evidence from micromorphological analyses suggests that waste in burgh cores typically comprised domestic waste, animal waste, building materials and fuel residues. These materials were also identified within burgh acres, although it is noted that their abundances were significantly lower. Variation in urban anthrosol characteristics between burghs is attributed to differing industries and patterns of resource exploitation, for example marine waste associated with fishing was only identified in coastal burghs.”

“The sustained addition of waste materials to soils within and near to historic small towns was an effective waste management strategy. Waste disposal in burgh cores was likely to be a combination of direct application and midden spreading in back gardens. This led to enhanced soil fertility which was important in the development of urban horticulture; particularly for poorer inhabitants who did not have access to arable farm land adjacent to the burgh. Dunghills acted as temporary stores of waste in the main thoroughfares of Lauder, Pittenweem and Wigtown. These dunghills were systematically transported to the burgh acres for further use as a fertiliser; hence, an early form of urban composting. Processes of waste disposal could not be deduced from soil characteristics alone; however, likely methods include direct waste deposition, storage and redistribution of midden waste, and storage and redistribution of dunghills.”

Results of this study are currently being submitted for publication. For further details of session speakers and abstracts, readers are referred to the website, <http://www.ucd.ie/wac-6/>.

Remote Sensing and GIS

Apostolos Sarris, Associate Editor

The EARSEL 1st International Workshop on “Advances in Remote Sensing for Archaeology and Cultural Heritage Management” took place in Rome during Sept 30-Oct 4, 2008 and it was the first one organized by EarSel on Cultural Heritage. The workshop opened with welcome addresses by V. Cuomo (Director of the Institute of Methodologies for Environmental Analysis of CNR), M. Mautone (Director of Cultural Heritage Department of CNR), Giuseppe Cavarretta (Director of Earth and Environmental Department of CNR) and R. Goossens (President of EarSel). They all stressed the need of synergy between the different disciplines and the importance of remote sensing in archaeological research. R. Goossens also announced the creation of a Special Interest Group (SIG) of EarSel dealing with “Archaeology and Heritage.” He also presented the views of M. Hernandez (Unesco) who stressed the need of documentation for cultural monuments and sites and the open initiative of Unesco and ESA.

The workshop consisted of different thematic sessions that indeed captured the attention of the audience and they were of high scientific quality. The session on “Satellite imagery for archaeology: data processing methods and study cases” included examples from Sudan, India, Hierapolis (Turkey), Norway, Angkor (Cambodia), Yemen and Italy. The session on “Aerial archaeology: from the historical photographs to multispectral and hyperspectral imagery” focused on the use of different sensors (historical-WW aerial photos, MIVIS, digital UV photography, a.o) in detecting archaeological targets. The virtual reconstruction of sites, monuments and cities was also presented in the session titled “3D visualization and Virtual reconstruction of landscapes and sites”, drawing examples from Hatra (Iraq), Rome and Portus (Italy), Titani Acropolis (Greece), a.o. Other sessions dealt with the application of ground based prospection techniques (e.g. GPR, magnetics, ERT) applied in Piazza d’Armi-Veio (Rome, Italy), Sikyon & Kassaneba-Devinu (Greece), Koekelare (Belgium), Hierapolis (Turkey), a.o. A few more distinct presentations dealt with the application of holographic radar, inverse scattering algorithms for GPR processing and microwave GPR tomography applied in historical buildings. A. Schmidt gave also a review on the use of ground based and satellite remote sensing techniques in the context of World Heritage sites in South Asia. Actually, just a few presentations dealt with the integration of air/space borne and ground remote sensing techniques drawing examples from Italy, Czech Republic and Peru. The session on the applications of active and satellite sensors (lidar and SAR) indicated the increasing interest and use of the particular sensors, especially with a presentation from NASA dealing with the hydrologic history of eastern Sahara, stressing the different directions of research that could derive from the application of the above techniques. As expected, the sessions dealing with remote sensing and GIS from CRM and documentation and landscape/paleoenvironmental applications consisted of a large number of presentations with examples from Italy, Greece, Libya,

Norway, Turkey, Peru, Russia, Tunis, Ethiopia, Germany, G. Britain, Sahara, a.o. The above presentations made use of the GIS spatial analysis tools, satellite imagery, geophysical prospection, historical maps, aerial photography, geomorphological analysis, a.o. The final session was devoted to the "International Archaeological missions consisting outstanding Laboratories of archaeological science."

As R. Goossens summarized in the end of the workshop, the outcome of the workshop pinpointed a few tendencies that exist worldwide, mainly dealing with the gap that exists between archaeologists and technicians, the importance of both the content and the precision of the images and the need of high resolution satellite images. There was a good discussion about the above topics, although no strict answers were given on the way that the specific scientific directions will develop. It has to be mentioned that the work of the workshop was interrupted for an hour due to a protest of the researchers of CNR against the potential reduction of resources in Italian research. This reflects a similar situation that goes on worldwide and may have even more serious consequences in the archaeological sciences. The next workshop of Earsel on Remote Sensing applications in Archaeology is planned for 2010 in Paris.

Archaeological Ceramics

Charles C. Kolb, Associate Editor

The column in this issue includes seven topics: 1) Announcement; 2) Book Review; 3) Brief Book Reviews; 4) New British Archaeological Reports; 5) Previous Meetings; and 6) Forthcoming Meetings.

Announcement

Ceramic Petrology Group News: Dr. Caroline Cartwright (Treasurer, Ceramic Petrology Group, Department of Conservation and Scientific Research, British Museum London WC1B 3DG) has informed the membership that Dr. Michela Spataro is the new ceramic and stone scientist at the British Museum is assuming the position that Andrew Middleton held previously in Conservation and Scientific Research. Andrew has recently retired (and we shall miss him). Michela has also kindly agreed to take over (from Louise Joyner) the role of Editor of the *Old Potter's Almanack* (OPA). Susan Pringle will continue as Production Editor of the OPA. This is excellent news for the *Ceramic Petrology Group* (CPG) and Prehistoric Ceramics Research Group (PCRG). Subscribers will soon be receiving an issue of the OPA later this year after its regrettable absence for several years. Members of the CPG and PCRG are encouraged to send news, book reviews, announcements, contributions (in the form of text and images) to Michela by email at m spataro@thebritishmuseum.ac.uk It should be noted that if the contributions are very lengthy or your images very large, the email system at the British Museum will likely not be

able to cope. Contributions can also be sent on CD by post to Michela at the following address: Dr. Michela Spataro, Editor, *Old Potter's Almanack*, Department of Conservation and Scientific Research, British Museum, London WC1B 3DG, UK. For inquiries regarding meetings, conferences, membership, subscriptions, and matters for the treasurer, contact Caroline Cartwright by email at ccartwright@thebritishmuseum.ac.uk. She has announced that Dr. Ruth Siddall has offered to host the next Ceramic Petrology Group meeting at University College London in February 2009. Charlie Kolb has been the OPA's North American Correspondent since 1992.

Book Reviews

Chandra L. Reedy, *Thin-Section Petrography of Stone and Ceramic Cultural Materials*. London: Archaeopress, 2008. vi + 256 pp., 341 color figures, references, index, CD-ROM. ISBN 9781904982333, £70.00 / \$120.00 (paperback). The petrographic analysis of archaeological ceramics was derived from the geological sciences and its potential application in resolving more precisely the potential areas of the fabrication was realized initially in the American Southwest in the 1930s by Anna O. Shepherd who, in 1936, published "The Technology of Pecos Pottery" (in Kidder, A. V., and Shepard, A. O., *Pottery of Pecos, Volume II*, New Haven: Published for Phillips Academy by the Yale University Press; London: H. Milford, Oxford University Press, pp. 389-587). This pioneering effort was soon followed by Shepard's related study of ceramic decoration, *Rio Grande Glaze Painted Ware: A Study Illustrating the Place of Ceramic Technological Analysis in Archaeological Research* (Washington: Carnegie Institution of Washington, 1942) and her studies in southern Mesoamerica on a unique ceramic, *Plumbate: A Mesoamerican Tradeware* (Washington: Carnegie Institution of Washington, 1948). Shepard provides some additional background to these in her *Ceramics for the Archaeologist* (Washington: Carnegie Institution of Washington, 1959). Other American researches emulated and expanded this methodology (Frederick Matson, Ron Bishop, Pamela Vandiver, Hector Neff, Prudence Rice, James Sheehy, Mary Hopkins, and Charles Kolb, among others). At the British Museum, Ian Freestone and his colleagues undertook additional studies (Freestone, Johns, and Potter (eds.), *Current Research in Ceramics: Thin Section Studies*, London: British Museum, 1982), and David P. S. Peacock applied the technique in England ("The Scientific Analysis of Ancient Ceramics: A Review," *World Archaeology* 1:375-389, 1989).

Another significant publication was edited by Andrew Middleton and Freestone edited *Recent Developments in Ceramic Petrology* (London: British Museum, 1991). A more recent, ambitious project was Louise Joyner's edited online publication *Production and Distribution of Pottery in the Eastern Mediterranean: Applications of Ceramic Petrography*, York: Council for British Archaeology, University of York, UK. *Internet Archaeology* 9, <http://intarch.ac.uk/journal/issue9/edit8.html>. The seven contributions in this special section of *Internet Archaeology* focus on ceramic materials dating from the Pre-Pottery Neolithic to the Islamic period,

with four devoted to the Bronze Age. The thin-section illustrations in digital form provided an important baseline for further analyses.

Methodologically, Rigby's *The Thin Section Mineralogy of Ceramic Materials*, 2nd ed. (London: British Ceramic Research Association, 1953) was one of the standard reference works for ceramic petrologists, while a series of highly illustrated thin section atlases have been valuable: W. S. MacKenzie and C. Guilford, *Atlas of Rock-forming Minerals in Thin Section* (Essex: Longman Scientific and Technical; New York: John Wiley and Sons, 1980), W. S. MacKenzie, C. H. Donaldson, and C. Guilford, *Atlas of Igneous Rocks and their Textures* (Essex: Longman Scientific and Technical; New York: John Wiley and Sons, 1982), W. S. MacKenzie and A. E. Adams, *A Color Atlas of Rocks and Minerals in Thin Section* (New York: Wiley/Halsted, 1994); and B. W. D. Yardley, W. S. MacKenzie, and C. Guilford, *Atlas of Metamorphic Rocks and their Textures* (Essex: Longman Scientific and Technical; New York: John Wiley and Sons, 1990). A. R. Philpotts' monograph entitled *Petrography of Igneous and Metamorphic Rocks* (Englewood Cliffs, NJ: Prentice-Hall, 1990) has also been a valuable resource. The color illustrations, especially in MacKenzie's publications, added a significant dimension to the analysis.

What is past is prologue. Chandra L. Reedy's newly published monograph – summer 2008 — *Thin-Section Petrography of Stone and Ceramic Cultural Materials*, is the best single source on this topic and anyone who is engaged in ceramic analysis should have this invaluable resource readily available on their bookshelves'. The manual has nine clearly and carefully-written chapters that briefly elucidate the methods of thin-section petrography while four separate chapters detail the varieties of stone (volcanic, plutonic, sedimentary, and metamorphic). Four additional chapters focus on the topics of pottery and inclusions; provenance studies; fabrication, use, and deterioration; and non pottery ceramic and clay materials. These narratives are supplemented by 341 color illustrations (339 thin-section photomicrographs and two histograms), 798 references (pp. 233-251), and a detailed four-page triple-column index. The accompanying CD-ROM illustrates all of the photomicrographs and allows the viewer to examine each image in both plane polarized and crossed polarized light. The chapters, section numbers, and figure numbers on the CD correspond to the book's chapters, sections, and figure numbers. The content of the CD-ROM may also be accessed at <http://www.udel.edu/CHAD/petrography>.

Reedy is absolutely the "right" person to prepare this resource. She is a Professor in the Center for Historic Architecture and Design (School of Urban Affairs and Public Policy), a Professor in the Department of Art History, and an Affiliated Faculty in the East Asian Studies Program at the University of Delaware, Newark, DE. She received her doctorate from the interdisciplinary Archaeology Program at the University of California, Los Angeles where her dissertation research focused on materials analysis of art and archaeological

objects and on the South Asian region. After serving as associate conservation scientist at the Los Angeles County Museum of Art, she moved to the University of Delaware where she specializes in the study and documentation of traditional materials and technologies. Her goals are to better understand the history and reasons for change, range of fabrication methods, possible functions, aesthetic intents, and values expressed by material culture. She also develops and tests new preservation methods and strategies. Her primary interest is Tibetan art and material culture, with secondary interests in South and Southeast Asia, along with Europe and North America. Reedy is the author of *Himalayan Bronzes: Technology, Style, and Choices* (University of Delaware Press, 1997) as well as the author or co-author of four other books and more than 60 book chapters and journal papers. Readers of this column likely know her articles that appeared in the *Journal of the American Institute for Conservation*: "Thin-section Petrography in Studies of Cultural Materials" 33(2):115-129 (1994) and "Review of Digital Imaging Analysis of Petrographic Thin Sections in Conservation Research" 45(2):127-146 (2006). For eight years she served as Editor-in-Chief of the *Journal of the American Institute for Conservation* and was Associate Editor of *Archaeometry* for five years.

In addition, Reedy also maintains an active program of ethnographic research, especially in Asia. Recently, she worked in Dharamsala, India and in Tibetan regions of China (Sichuan Province, and in Lhasa). Studying the materials, processes, and products of traditional workshops; and learning to decode both tangible and intangible aspects of objects, buildings, works of art, and village designs to better understand historic and archaeological materials and sites, how and why they change, and how to best preserve their most significant components. Reedy serves as Director of the Laboratory for Analysis of Cultural Materials (within the Center for Historic Architecture and Design), where the research emphasis is on objects and building materials of stone, ceramics, metals, and glass. A special strength of this laboratory is thin-section petrography and other uses of light microscopy, and new methods of digital image analysis to update these techniques. Her dedication to teaching and research are evident in *Thin-Section Petrography of Stone and Ceramic Cultural Materials*.

Reedy's manual is a comprehensive illustrated overview of the minerals and textures seen in polarized light microscopy of cultural artifacts. It focuses on the specific applications of thin-section petrography to the study of cultural materials made of stone (as found in architecture, sculpture, tools, etc.) and ceramic objects (earthenware, stoneware, porcelain, brick and tile, etc.). Using this manual, a reader will be able to learn the techniques used to identify and characterize such materials; differentiate between them; monitor the extent of their deterioration; determine where they may have originated; and interpret their fabrication, decoration, and use history. She has selected the "most representative" cultural materials for which thin-section petrography has been used as a major research tool and conducted a thorough survey of the literature in which she references primary publications from the past and more

recent scholarship as well. The eight topical chapters are roughly equally divided between “stone” (Chapters 2 through 5) and “ceramics” (Chapters 6 through 9). In the former group she discusses the stone materials in relation to their cultural uses, provides extensive information on the mechanisms of deterioration, and includes information on conservation treatments. I shall next summarize the chapter contents.

In “Chapter 1: Thin-Section Petrography of Stone and Ceramic Cultural Materials” (pp. 1-7, 4 color figures), Reedy considers the methodology of thin-section petrography, reviews problems unique to cultural materials, and discusses the organization of the subsequent chapters. “Chapter 2: Volcanic Igneous Stone Materials” (pp. 9-25, 34 color figures) documents eight groups of stone: obsidian, pumice, and scoria; tuff (and tuff as a cultural material, deterioration mechanisms and conservation treatments); rhyolite; dacite, trachyte (and trachyte as a cultural material and deterioration mechanisms); andesite; basalt and diabase; and phonolite and trachyte. In “Chapter 3: Plutonic Igneous Stone Materials” (pp. 27-40, 27 color figures), she considers eight topics: granite (granite as a cultural material, deterioration mechanisms, and conservation treatments); granodiorite (and granodiorite as a cultural material, and deterioration mechanisms); tonalite, diorite; gabbro (and gabbro as a cultural material and deterioration mechanisms); syenite; monzonite; and anorthosite. “Chapter 4: Sedimentary Stone Materials” (pp. 41-71, 59 color figures) has seven divisions: shale (and shale as a cultural material); siltstone (and siltstone as a cultural material); sandstone (and sandstone as a cultural material and deterioration mechanisms); conglomerate and breccia; sedimentary carbonates (chalk, limestone and dolomite, limestone and dolomite as a cultural material and the deterioration mechanisms); travertine and tufa; sedimentary silicates (and as cultural materials); and evaporites. In “Chapter 5: Metamorphic Stone Materials” (pp. 73-108, 47 color figures), she focuses on nine major topics: slate, meta-argillite and metasiltstone; phyllite (and phyllite as a cultural material); schist (talc schist and steatite/soapstone; greenschist, greenstone, and epidiorite; blueschist; and schist as a cultural material); gneiss (and gneiss as a cultural material); marble (marble characterization and source identification, deterioration mechanisms, and conservation treatments); amphibolite, quartzite and serpentine (sections on these as cultural materials).

“Chapter 6: Pottery Product Types and Inclusions” (pp. 109-150, 68 color figures [two are histograms]) focuses on two salient topics: “Characterizing Ceramic Types” (earthenware, stoneware, porcelain [both hard- and softpaste], and stoneware/fritware) and “Characterizing Inclusions in Clay” (discussion of methods for characterizing inclusions, lithics, sand, calcium carbonates, organic material, grog, and other inclusions). One important aspect of this chapter is that Reedy initially gives an overview of the types of information that may be seen in thin section and in the second part of this chapter provides a more detailed discussion of this information. Both traditional and newly-emerging technologies – especially digital image analysis – are also reviewed. “Chapter 7: Pottery Provenance Studies” (pp. 151-172, 17 color figures) has four

components: classifying pottery by using nonplastic inclusions; identifying production groups or workshops; examining temper changes and variation over time and space; and identifying specific geological sources of nonplastics. She points out that more precise information on composition derived from thin-section analysis permits a researcher to develop a set of standards that may subsequently be employed for classifying a larger number of objects in the field by using low-power binocular microscopy. The sections on diachronic and spatial variations in provenance, she demonstrates, are valuable in identifying specific geological sources for the nonplastics and deducing possible exchange relationships. In “Chapter 8: Pottery Fabrication, Use and Deterioration” (pp. 173-210, 53 color figures), Reedy discusses identifying clay processing choices; reconstructing forming methods; inferring firing conditions; deducing intended function; interpreting voids and porosity data; studying decoration and surface/clay body interfaces; slips; paint and enamel; organic and salt coatings and “glazing”; glazes; transfer print; incised, impressed, and applied decoration; explaining technological choice, variation, and change; and studying deterioration products. The uses of thin-section petrography to elucidate manufacturing parameters (for example, clay selection, forming methods, and firing conditions) are also reviewed. Her discussion of decoration is especially valuable. The final essay, “Chapter 9: Non-Pottery Ceramic Materials” (pp. 211-237, 32 color figures), contains important information on sculpture and molded or stamped objects; bricks; tiles; and casting core materials. Here, she touches upon terracotta sculptures, larger ceramic sculpture, clay tablets, and the use of clay cores in bronze casting. Crucibles used in metallurgy are not considered.

While especially valuable for archaeologists who seek to characterize ceramic materials, this manual is also important for those researchers interested in documenting stone objects (lithic tools, stone sculpture and architecture, etc.), as well as museum conservators working in the laboratory or the field. Readers might quibble about topics that might have been included but, in sum, although this is a relatively expensive volume, it is a superb manual and well worth the expense. Archaeopress is to be congratulated for editing and producing this fine volume. Reedy’s monograph is a welcome addition to the literature on thin-section petrographic studies. The illustrations in both print and digital forms are excellent, and the images in both plane polarized and crossed polarized light are to me as a contributor to ceramic thin-section studies, especially relevant and valuable resources.

Brief Book Reviews

George Avery (editor), *French Colonial Pottery: An International Conference*. Natchitoches, LA: Northwestern State University Press, 2008. 504 pp., 340 color plates. ISBN: 978-0-917898-29-7, \$75.00 plus \$8.00 shipping. Order from Northwestern State University Press, P.O. Box 5305, Natchitoches, LA 71497; phone orders: 318/357-4586. e-mail orders: sepulvado@nsula.edu. The editor is Cultural Heritage Resource Coordinator, Center for Regional Heritage Research,

P.O. Box 13047-SFA Station, Stephen F. Austin State University, Nacogdoches, TX 75962. In September 2002, an international conference for the study of French Colonial pottery in North America was held at the Méri Center of the Tunica-Biloxi Tribe of Louisiana, located in Marksville, Louisiana. The conference represented the first international meeting to focus directly on the classification of French Colonial period pottery. The goal was to provide a forum for archaeologists who have recovered French pottery at 17th and 18th century historic sites in the United States, Canada, and France to present and discuss the classification of these ceramics. This long-awaited publication has 14 chapters and contains the edited or substantially rewritten versions of most of the conference presentations and is augmented by 340 splendid color photographs of French Colonial period pottery. An emphasis in this publication is to provide many illustrations of whole vessels and/or sherds that would provide a useful reference guide for French Colonial pottery. There are discussions of the ceramic recovered from sites in Louisiana, Illinois, Alabama, Arkansas, Texas, the St. Lawrence River Valley, Fortress Louisbourg, and France. The initial chapter by Earl Barbry, Jr. of the Tunica-Biloxi Tribe of Louisiana reviews on his experiences with the Tunica "Treasure," along with color photographs of most of the French pottery from the Tunica collection. The authors of the other chapters represents a "who's who" of scholars who publish on French Colonial pottery — John Walthall, Gregory Waselkov, Edward Jelks, Marcel Mousette, Ives Monette, Marc Richer-LaFlèche, Henri Amouric, Lucy Vallauri, James Bruseh, Jeff Durst, Kathleen Gilmore, Nancy Reese, Shawn Carlson, John House, Aubra Lee, George Avery, Pete Gregory, Jason Emery, and Jeffrey Girard. The editor and conference organizers anticipate that this publication may serve as a focal point for further discussions of classifying French Colonial ceramics.

Alexandre Livingstone Smith, *Chaîne opératoire de la poterie: Références ethnographiques, analyses et reconstitutions*, 2007, Thèse présentée à Université Libre de Bruxelles, Faculté de Philosophie et Lettres, 2000-2001, Directeur: Monsieur Pierre De Maret. ISBN: 978-9-0747-5223-7; Dépôt légal : D/2007/0254/21. © Musée royal de l'Afrique centrale, Tervuren, Publications digitales, 461 pp. pdf 11 MB [in French], <http://www.africamuseum.be/publications/publications/poterie.pdf>. (Toute reproduction de cette publication, que ce soit par impression, photo-offset, photocopie, microfilm ou tout autre moyen, est interdite sans l'autorisation écrite préalable du Musée royal de l'Afrique centrale, Leuvensesteenweg 13, 3080 Tervuren, Belgique). In his ethnoarchaeological study of Faro, Nord Cameroun, and Burkina Faso, Togo and Cameroun, Alexandre Livingstone Smith, Musée royal de l'Afrique Centrale (Belgian Royal Museum for Central Africa), Tervuren, Belgique, provides the geological background on the minerals and clays used in pottery making, undertakes and reports technical studies (thin section microscopy and chemical: XRF, INAA, ICPMS), considers the selection of raw materials, preparation (clay and temper mixing), discusses the analytical results of vessel construction, and reports firing methods and firing temperature data for the traditional hand-built pottery produced in Central African communities.

Gerald W. R. Ward (*editor*), *The Grove Encyclopedia of Materials and Techniques in Art*, Oxford and New York: Oxford University Press, 2008. 864 pp., 45 color plates, 97 halftones, 43 line drawings. ISBN13: 978-0-19-531391-8, ISBN10: 0-19-531391-7864, \$125.00. Ward is Katharine Lane Weems Senior Curator of Decorative Arts and Sculpture, Art of the Americas, at the Museum of Fine Arts, Boston, Massachusetts, USA, and earlier in his career served as curator at the Yale University Art Gallery and the Henry Francis du Pont Winterthur Museum. The current volume edited by Ward has more than 400 entries in an alphabetical form and is a companion to Gordon Campbell's edited *The Grove Encyclopedia of Decorative Arts* (Oxford University Press, 2006) with 3,000 entries. Ward has prepared an up-to-date volume that incorporates recent changes in conservation, restoration, as well as new materials and techniques in video and digital art. It provides information on historical and current uses of materials and techniques in a wide range of areas from painting and sculpture to non-traditional media. *Materials and Techniques* includes materials in art practice (e.g., ink, enamel, digital materials); materials in conservation (e.g., adhesives); classes of artifacts (e.g., mosaics, ceramics); techniques and methods (e.g., book binding, gilding, printing, weaving), terminology (e.g., rustication), tools (e.g., easel, laser), theory (e.g., technical examination, conservation controversies), fakes and forgeries, and essays on conservation theorists and practitioners. Museum curators, conservators, collection managers, and practicing archaeologists are likely to find the discussions of new procedures in artifact conservation useful in their work. Entries such as adobe, earthenware, porcelain, and terracotta are written to be accessible to a wide range of readers, and this work is designed as a reliable and convenient one-volume resource.

New British Archaeological Reports International Series

Gianmarco Alberti, *La ceramica eoliana della facies del Milazzese: Studio crono-tipologico e culturale sulla base dei dati editi da Filicudi, Lipari, Panarea, Salina*, BAR S1767, 2008, ISBN 9781407302560, £64.00. ii + 420 pp., 60 pages of figures, maps, plans, tables, drawings and photographs, and 3 data appendices and catalogue (in Italian with an English summary). This study deals with the ceramic repertoire of the Aeolian Middle Bronze Age culture, the so called Milazzese facies. The work takes into account the edited documentation from the four main settlements on the Aeolian Archipelago, unearthed by Luigi Bernabò Brea in several excavations between 1940 and 1970. These settlements are on the Montagnola of Filicudi, the Acropolis of Lipari, Capo Milazzese at Panarea, and at Portella on the island of Salina. At the latter site, more recent excavations are also taken into account in this present study. The aim of this work is twofold: to devise a formalized typology for the Milazzese ceramic repertoire (to be used as a basis for the chrono-typological analysis of the pottery assemblages) and to assess the chronological and typological achievements in an historical and, broadly speaking, cultural perspective. Chapter 1 provides a description of the Milazzese facies and of the various aspects of its material

culture. Chapter 2 deals with the problem of the stratigraphy of the Aeolian MBA settlements. Chapter 3 looks at Aegean pottery from Milazzese contexts. Chapter 4 devises a typology for the Milazzese pottery assemblage. Chapter 5 deals with the seriation of the Milazzese ceramic assemblage. Chapter 6 describes the Milazzese ceramic repertoire's development and attempts to read this phenomenon in a cultural perspective. Three appendices and catalogue are provided.

Pascale François, *Les styles céramiques du Chasséen de Villeneuve-Tolosane: Évolution et comparaison*, BAR S1711, 2007, ISBN 9781407301556, £36.00. 189 pp., illustrated throughout with figures, maps, plans, drawings and photographs (in French with an English abstract). The author has written a stylistic analysis of Chassey Culture (4th-5th millennium BCE) ceramics from the famous settlement of Villeneuve-Tolosane, located near Toulouse, south-western France.

S. Y. Waksman (editor), *Archaeometric and Archaeological Approaches to Ceramics: Papers Presented at EMAC '05, 8th European Meeting on Ancient Ceramics, Lyon 2005*, BAR S1691, 2007, ISBN 9781407301297, £35.00. 204 pp., illustrated throughout with figures, maps, plans, drawings and photographs. The EMAC series of conferences, initiated in Rome in 1991, meets every two years in a European city and brings together specialists carrying out research on ancient ceramics using archaeological sciences. EMAC provides the opportunity to present and debate recent advances in this field of research, from methodological aspects to archaeological studies with fully integrated laboratory approaches. This volume contains 27 papers presented at the 8th European Meeting on Ancient Ceramics (EMAC) which took place in Lyon, France, in 2005. The titles and authors are: 1) Assessment of ancient vessel design with the Finite Element Method (FEM) (A. Hein, V. Kilikoglou); 2) Contribution for a mineralogical thermometer to be applied to low fired and/or non-carbonate ceramics (P. Ricciardi, L. Nodari, B. Fabbri, S. Gualtieri, U. Russo); 3) Investigating the substrate-glaze interface of ceramics with SEM-EDS and Raman spectroscopy (C. Pacheco, R. Chapoulie, F. Daniel); 4) Ceramic sequence of 7000 years: archaeometrical study of pottery finds from Vörs, Máriaasszonyisziget (SW Hungary) (K. T. Biró, K. Gherdán, G. Szakmány); 5) Production and use: temper as a marker of domestic production: the case of two Middle Neolithic villages in Concise (VD, CH) (E. Burri); 6) Early and Middle/Late Neolithic pottery production in Northern Calabria (Italy): raw material provenance, paste preparation and firing techniques (I. M. Muntoni, P. Acquafredda, R. Laviano); 7) Pottery production in the Neolithic and Copper Age village of Maddalena di Muccia (Marche, Central Italy): raw material provenance and manufacturing technology (R. Laviano, I.M. Muntoni); 8) Black-on-red painted pottery production and distribution in Late Neolithic Macedonia (Z. Tsirtsoni, D. Malamidou, V. Kilikoglou, I. Karatasios, L. Lespez); 9) Bell Beakers bone based decorations from Guadiana River Middle Basin (Badajoz, Spain) (C. Odriozola, A. Justo Erbez, V. Hurtado Pérez); 10) Archaeometrical investigations of Impasto pottery from Terramara of Gorzano (Modena, Italy) (A. Cardarelli, G.

Carpenito, S.T. Levi, S. Lugli, S. Marchetti Dori, G. Vezzalini); 11) Exploring patterns of intra regional pottery distribution in Late Minoan IIIA-B East Crete: the evidence the petrographic analysis of three ceramic assemblages (E. Nodarou); 12) Preliminary results of archaeometric analysis of amphorae and Gnathia-type pottery from Risan (M. Daszkiewicz, P. Dyczek, G. Schneider, E. Bobryk); 13) Tiles from the Lyon area in the 2nd century BC: local products or imports? (N. Cantin, A. Desbat, A. Schmitt); 14) Lyon amphorae in the North: studies in distribution, chronology, typology and petrology (P. Monsieur, P. De Paepe, C. Braet); 15) Archaeometric characterisation of Roman wine amphorae from Barcelona (Spain) (V. Martínez Ferreras, J. Buxeda i Garrigós, J.M. Gurt i Esparraguera, V. Kilikoglou); 16) A late Roman pottery and brick factory in Sicily (Santa Venera al Pozzo) (S. Amari); 17) The first Byzantine "Glazed White Wares" in the early medieval technological context (S. Y. Waksman, A. Bouquillon, N. Cantin, I. Katona); 18) The "polished yellow" ceramics of the Carolingian Period (9th century AD): samples from Zalavár, South-West Hungary (H. Herold); 19) Lead-glazed slipware of 10th -11th century Akhsiket, Uzbekistan (C. Henshaw, Th. Rehren, O. Papachristou, A.A. Anarbaev); 20) Archaeometric investigation on 13th century glazed and slipped pottery found in Liguria and Provence (C. Capelli, R. Cabella, S.Y. Waksman); 21) The archaeometric study of white slips: a contribution to the characterisation of the Medieval Mediterranean productions (C. Capelli, R. Cabella); 22) From furnace to casting moulds: an exceptional 14th century copper-metallurgy workshop studied in the light of refractory ceramic materials (I. Katona, D. Bourgarit, N. Thomas, A. Bouquillon); 23) The decorative and architectural terracottas in Ferrara (R. Fabbri, S. Ciliani, M. Bagatin, F. Bevilacqua); 24) Archaeometric characterization of Middle Age and Renaissance tin lead glazed pottery from Barcelona (J. Garcia-Iñáñez, J. Buxeda i Garrigós, M. Madrid i Fernández, J. M. Gurt i Esparraguera, J. A. Cerdà i Mellado); 25) Compositional studies on Iznik ceramics pigments (R. Bugoi, A. Climent-Font, B. Constantinescu, A. D'Alessandro, P. Prati, A. Zucchiatti); 26) Turkish ceramics in the Crimea on the eve of the Porta invasion (problems of chronology of a certain group of vessels) (I. Teslenko); 27) Preliminary archaeometric results on Inka and Colonial ceramics from Paria (Oruro, Bolivia) (V. Szilágyi, J. Gyarmati, G. Szakmány, M. Tóth).

Previous Meetings

The 12th International Conference of the European Association of Southeast Asian Archaeologists (EurASEAA12) was held 1-5 September 2008 at the Faculty of Arts, Leiden University (Lipsius Building, Cleveringaplaats 1 2311 BD, Leiden). EurASEAA was established as a parallel association of the already existing South Asian Archaeology Association. Additional information is available on the association's website: <http://www.ias.nl/euraseaa12>. Eleven presentations concerned ceramics; these are reported below.

Mercedes Murillo, Thomas Oliver Pryce, and Marcos Martínón-Torres (all at the Institute of Archaeology, University College London, United Kingdom), "Khao Sam Kaeo: An

Archaeometallurgical Crossroad for Trans-Asiatic Technological Styles.” The peninsular site of Khao Sam Kaeo has provided evidence for the production and consumption of a range of metals: gold, lead/tin, copper/bronze, and iron. An in-depth study of metals, technical ceramics, and slags, carried out as part of the lead author’s UCL Institute of Archaeology MSc programme, has identified technological trends suggesting that a combination of South Asian and Southeast Asian production techniques were represented on site. The distribution of these activities around Khao Sam Kaeo is considered with regard to the other craft productions found.

Sophie Peronnet (Paris IV-Sorbonne University, France), “Overview of Han Artefacts in Southeast Asia with Special Reference to the Recently Excavated Material from Khao Sam Kaeo in Southern Thailand.” Recent excavations in Khao Sam Kaeo, Southern Thailand, document new evidence for exchange between China and the Southeast Asian Countries in late centuries BC-early centuries AD. This paper examines different pieces of evidence such as metallic artefacts (bronze mirrors, arrow heads, axes, etc), ceramic, seals, tiles and ornaments, some unearthed from this site others from contemporary Southeast Asian sites, in particular in Thailand and Vietnam. This survey will enable us to draw inferences on the role of Han China in the development of early trans-Asiatic exchange.

Yvette Balbaligo (Institute of Archaeology, University College London, United Kingdom), “Earthenware Pottery from Ille Cave, the Philippines.” Ille Cave is a multi-period burial and occupation site and one of several cave complexes in El Nido, northern Palawan in the Philippines. Excavations have been ongoing at the site since 1998 and it is currently excavated by the Archaeological Studies Program, University of the Philippines. The burials and artefacts supply evidence for the intensive use of Ille Cave from Palaeolithic times and radiocarbon dates have indicated the use of the cave as a burial and habitation site from at least 11,000 Cal. BP. Earthenware, stoneware and porcelain pottery sherds have been found at the site. The majority of the pottery is undecorated earthenware. The decorated pottery has a variety of surface treatments and some of the designs can be traced back to time depths of 4500 to 3000 years ago. Pottery forms show vessels for food preparation and storage, as well as possible ritual use such as human jar burials. This paper will discuss the earthenware pottery found at the site and the implications for the study of pottery in the Philippines and wider Southeast Asia.

Nancy Beavan Athfield (Institute of Geological and Nuclear Sciences, New Zealand), John Miksic (National University of Singapore, Singapore), K. Rethy Chhem (University of Western Ontario, Canada), Kyle Latinus (Pannasastra University of Cambodia, Phnom Penh, Cambodia), Louise Shewan (University of Sydney, Australia) and Dougald O’Reilly (University of Sydney, Australia), “15th to 17th Century Jar Burials in the Cardamom Mountains, Cambodia: Preliminary Results.” In March 2003 an initial investigation was made of secondary burials of human bone packed into stoneware jars at four rock ledge sites in the

Cardamom Mountains, Kingdom of Cambodia. It was ascertained that the stoneware burial jars and other ceramics consisted of 15th-century Chinese, Thai, and Cambodian wares, with associated artifacts including glass beads and copper ornaments. Radiocarbon dating and stable isotope analysis has been completed on three bone samples (one rib bone and two separate skulls) representing three individuals from one stoneware jar at Site 4. A Ward & Wilson T’ test (Ward and Wilson 1978) indicates that all three dates are not significantly different (df 2, T’=1.7). If the assumption is made that the individuals all died and their remains were placed in the jar at the same time, then the dates can be combined (Combine function, OXCAL v3.10; Bronk Ramsey 2001, 2005) to give a combined calibrated radiocarbon age of 374±18 years BP. Due to the wiggle in the calibration curve at this time, the calendar age ranges diverge into two possible periods of 1440 to 1530 AD plus 1570 to 1630 AD. The associated 15th century Chinese and Sisatchanalai porcelains in the site support the conclusion that the radiocarbon ages give an accurate range for the deposition of the objects in the overhangs where they were found. Stable isotope evidence also suggests the radiocarbon ages are not affected by marine influences. We also report EDXRF analysis of glass beads found within the jars, and micro-computed tomography (micro-CT) of the skeletal remains. There are outstanding questions about the funerary practice, the selection of these remote sites, and the cultural affinity of the remains, as the sites are unique in the Cambodian cultural-historical context.

Leedom Lefferts and Louise Cort (both Smithsonian Institution, Washington, DC, United States), “Jars in the Highlands of Mainland Southeast Asia.” Since the early 1900s, scholars have documented the use and connoisseurship of stoneware jars in the highlands of insular Southeast Asia. Little attention has been paid to a corresponding tradition of jar acquisition, use, and transmission in the mainland Southeast Asian highlands. This paper, based on recent field work in the highlands encompassing central Vietnam, northeastern Cambodia, and southern Laos, outlines the complex roles of jars in trade, wealth and inheritance, prestige, ritual, and aesthetic systems for this region. A key feature of these jars is that they are not locally produced but exotic-manufactured in southern China, coastal Vietnam, northern Cambodia, lowland Laos, central Thailand, and Burma and imported into the highlands. Some jars excavated from graveyard sites or still in use in highland households date to the 12th-13th centuries, suggesting that the complex system of acquiring, evaluating, using, and inheriting such jars developed over centuries. A key contribution is the extension of our findings beyond the national borders that have typically created boundaries to scholarship. By looking at jar holdings in highland communities within all three nations, we can outline nuanced variations based on such factors as access to trade routes and disruption caused by conflicts.

Sureeratana Bubpha (Thammasat University, Bangkok, Thailand) and Sittisak Runghcharoensuksri (Princess Maha Chakri Sirindhorn Anthropology Centre, Bangkok, Thailand), “Ceramic Technology in Bang Chiang Cultural Tradition Sites,

Northeast Thailand.” This paper presents a comparative petrographic study of ceramic samples from fourteen sites. These potsherd samples are collections of Princess Maha Chakri Sirindhorn Anthropology Centre (SAC), Bangkok, Thailand, that were collected for a survey of archaeological sites in the last 10 years. This research was supported by SAC and conducted by the authors and colleagues during 2006-2007. These fourteen archaeological sites located in geographically similar environments in northeastern Thailand: (1) Ban Nong Saepla, (2) Ban Nong Wang, (3) Ban Nong Wang (Wat Pa Maew), (4) Ban Pong Sung, (5) Ban Sieb, (6) Ban Sieb (Non Wat Rang), (7) Ban Lao, (8) Ban Siang Ware (1), (9) Ban Siang Ware (2), (10) Ban Siang Ware (Wat Pa Don Yang), (11) Ban That (Wat Srimahathat), (12) Ban Na Di, (13) Ban Na Sang, and (14) Ban Pak Tob. Based on a typological study of pottery vessels, potsherds, and other classes of artifacts, it is believed that these fourteen archaeological sites belong to the Ban Chiang Cultural Tradition Sites. However, the first phase of our research has been focused on petrographic study of ceramic samples which belong to the late period of Ban Chiang Culture. This paper will be discussed about ceramic technology in the late period of Ban Chiang Culture in terms of texture, fabric, firing temperature, clay resource, and temper. Additionally, the comparative study with Ban Chiang and Ban Don Thong Chai will also be discussed in this paper.

Judith Cameron (Australian National University, Canberra, Australia), “The Spinners from Ban Son Ta Phet: Some New Insights into Gender in Southeast Asia.” Glover’s (Glover 1980, 1983, 1990; Glover et al. 1981) excavations of the site of Ban Don Ta Phet with the Fine Arts Department of Thailand produced the earliest unequivocal evidence for Indian contact in Southeast Asia. While Ban Do Ta Phet is better known in prehistory for its superb examples of craftsmanship (carnelian, agate, bronze, iron and jade), the site also produced 11 fragments of archaeological textiles and 87 pottery spindle whorls. In her analysis of the archaeological textiles, Chiraporn Aranayank’s (1991) identified *Bombyx mori* (silk), *Gossypium* spp. (cotton), *Musa textilis* (abaca) and *Cannabis sativa* (hemp) fibres. As Glover (1990) points out, the thread of *Gossypium* is the earliest cotton from a Thai site. However, the Ban Don Ta Phet fragment is of greater significance; it is the earliest Old World cotton out of its origin centre. It is generally held (Barber 1991; Singer 1994) that a small mordanted fragment from the port of Fostat (13th-17th century) is the earliest cotton out of India whereas Ban Don Ta Phet’s cotton predates the Fostat material by at least 1600 years. It remains unclear if the cotton fragment was the remains of an Indian trade cloth, or if cotton was actually spun and woven at the site. This paper has two objectives. It re-examines the prehistoric fibres in the textile assemblage in the light of current information about plant dispersals. It then presents the results of my recent analysis of the spinning tools from Ban Don Ta Phet which provides some new insights into craft production, women and the early textile trade in Southeast Asia.

Anne-Sophie Coupey (University of Rennes, France), “Infants’ Lying Jars Burials in Upper Burma.” Jar burials for

infants are well known in Southeast Asia during Bronze and Iron Age; the first use of earthenware jars as coffins dates back to the Neolithic. Among communities which bury their deceased in primary burials (in opposition to secondary burials where deceased of every age can be laid down in jars), jars are specific containers for infants. Is the use of this type of coffin connected to a practical common sense or to a real symbol - a wish of higher protection of very young deceased in a permanent material? Following the discoveries in Ywa Htin (2003) and Myo Hla (2004), excavation in Nyaung Gon (2007, Pyaw Bwe Township) has revealed many infant’s jars burials, made up of two to four vases laid-out and touching each other. These funereal urns face the same East-West direction as the other inhumations and contain the same kind of grave goods. Nevertheless, the lengths of the jars grouped together are often almost as long as a human adult body and every baby wasn’t buried in Jars (sometimes in containers leaving no visible remains). So, we can wonder which criteria, biological or social, is deciding the inhumation in such ceramic coffins?

Nils C. Ritter (Free University Berlin, Germany), “Sasanian Impact on Southeast Asian Cultures?” The present paper offers a review of sources in support of a pre-Islamic Persian impact on Southeast Asian cultures, with the general aim of bringing into focus the role of ancient maritime trade routes in long-distance exchange processes within Southeast Asia. Some archaeological remains dating to the earlier first millennium from mainland Southeast Asia bear distinct foreign reminiscences, mostly derived from the Indian subcontinent. Spectacular finds traded over long-distance routes attest further the participation of the coastal Southeast Asian chiefdoms in the greater maritime commerce. Roman coins and a Gandhara relief from U Thong, a Roman terracotta lamp from Nakhon Pathom or a Byzantine oil-lamp from Pong Thuk, are well-known instances of evidence in this sense. But what about a pre-Islamic, distinctly Western Asian impact on Southeast Asian cultures? From AD 224 to 652 the Sasanian dynasty created the vastest and most powerful empire of pre-Islamic Middle East. Centered in Persia the dynasty ruled from the Euphrates to the Indus and beyond. The Sasanian Empire was a political, cultural and economical great power, exerting a direct influence on adjacent India and connected with China via the silkroad. The overland trade and its spectacular itineraries have been amply discussed. Yet the Sasanians were also a substantial maritime power, dominating the Persian Gulf and holding commercial interests in India, Sri Lanka and beyond. In spite of that, pre-Islamic evidence for maritime contact is scarce, a fact that has discouraged most scholars to pursue this avenue of research any further. Nonetheless, literary sources as well as Sasanian finds in Oc Eo and a distinctly Sasanian impact on the imagery of Dvaravati Thailand and the Malay Peninsula do suggest that the Sasanians had maritime trade connections with the cultures of mainland Southeast Asia well before the advent of Islam.

Ali Akbar (University of Indonesia, Jakarta, Indonesia), “The Buni Complex: Its Development from the Prehistoric to the Historic Period.” Complex or related sites from Prehistoric

Period until Historic Period which is rich of archaeological findings are very rare found in Indonesia. One of them is Buni Complex which consists of several sites such as Buni, Kedungringin, Bulaktemu, Kebon Kelapa, Batujaya, Puloglatik, and Rengasdengklok. This complex is located in the north coastal of west part of Java Island. Buni Complex was developed from Prehistoric Period particularly Bronze-Iron Age around 500 BC. The archaeological finding from this Prehistoric Period include pottery, stone adze, stone bracelet, golden jewelry, beads, and fragments of skull. This complex continually developed until Historic Period around 500 AD. The archaeological findings from this historical period, particularly in Batujaya are dominated with building structure such as temple. At least ten Buddhist temples were found in Batujaya. The other findings are inscription, statue, golden bracelet, and man's skeleton. Buni Complex can give information about man and his past culture which consist of: language, knowledge system, organization system, subsistence, technology, religion, and art. This paper will also explain the reasons why this complex can develop and survive in the long period.

Mariko Yamagata (Waseda University, Tokyo, Japan), Bui Chi Hoang (Institute of Social Sciences in South Vietnam, Ho Chi Minh, Vietnam), "Revisiting Sa Huynh-Kalanay Pottery Tradition." In January 2007, a collaborative team consisting of archaeologists and anthropologists from Vietnam and Japan carried out an excavation at the Hoa Diem site, Cam Ranh city, Khanh Hoa province in central Vietnam. The mortuary accessory pottery associated with burial jars shows a striking resemblance to pottery of the Kalanay cave, Masbate island in central Philippines. Based on new archaeological information recently obtained at Hoa Diem, "Sa Huynh - Kalanay Pottery Tradition" that Prof. Solheim proposed almost fifty years ago will be re-examined.

Making Stoneware Jars in Northeast Thailand was the title of an illustrated lecture presented by Daniel Johnston at the Smithsonian Institution's Freer Gallery of Art, Washington, DC on 13 September 2008. After finishing his pottery apprenticeship and "turning" pots in Seagrove, North Carolina, potter Daniel Johnston wanted the perspective of working with potters in another part of the world. In a village in rural Northeast Thailand, he spent two months training with men who specialize in making large jars and firing them in wood-burning kilns. He recounted his experiences living in the community of Phon Bok and learning the local traditions of forming and firing jars-and his reunion with his two teachers when they brought their skills to the Mall for the 2007 Smithsonian Folklife Festival. His lecture celebrated the exhibition "Taking Shape: Ceramics in Southeast Asia" and the launch of the museum's first online catalogue, *Ceramics in Mainland Southeast Asia: Collections in the Freer Gallery of Art and Arthur M. Sackler Gallery*.

Forthcoming Meetings

Ceramic Ecology XXII: Current Research on Ceramics 2008 is scheduled to be held at the annual meeting of the American Anthropological Association Annual Meeting, 19-23

November 2008 in San Francisco, California. The session will take place on Wednesday evening, 6:00-9:45 p.m. 19 November. The Symposium Organizer and Chair is Charles C. Kolb (National Endowment for the Humanities). The symposium abstract is followed by abstracts of the papers.

Symposium Abstract: The papers in this international and interdisciplinary symposium, the 22nd in the annual series, reflect a number of approaches within the framework of Matson's concept of Ceramic Ecology, set forth in his volume, *Ceramics and Man* (1965). In this work Matson a ceramic engineer, archeometrician, ceramic ethnoarchaeologist, and ethnographer stated that "unless ceramic studies lead to a better understanding of the cultural context in which ceramic materials were made and used, they form a sterile record of limited worth." Ceramic Ecology as a methodological and theoretical approach has as its paramount goal a better understanding of the peoples who made and used pottery and seeks to redefine our comprehension about the significance of these materials in human societies. The concept of Ceramic Ecology is contextual, multi and interdisciplinary, and analytical. 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. The concept of Ceramic Ecology forms an implicit or explicit basis of the investigations reported by archaeologists, ethnographers, and others in this symposium in which emphasis is placed upon the technological and socioeconomic aspects of ceramic materials regardless of chronology or geography. It also demonstrates the value of the cross fertilization which results when investigators ranging from art historians and professional potters to ethnoarchaeologists and archeometricians come together in a forum devoted to a topical consideration: ceramics. 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.

Charles C. Kolb (National Endowment for the Humanities) "Introduction to Ceramic Ecology XXII: Current Research on Ceramics 2008."

Anabel Ford (Exploring Solutions Past ~ The Maya Forest Alliance and Director ISBER/MesoAmerican Research Center University of California at Santa Barbara) "The Implications of Volcanic Ash in Late Classic Maya Pottery at El Pilar, Belize." The use of volcanic ash as temper in Late Classic Maya pottery (AD 600-900) is well known, but volcanic ash source(s) have not been identified. This study seeks to determine source(s) of the ash by geochemical fingerprinting, specifically comparing major, minor, and trace elements of ash shards found

in archeological pottery with possible volcanic sources. The pottery in this study comes from El Pilar, a site in the Maya carbonate lowlands. One hypothesis is that the Maya transported the ash from a distant source (roughly 450 km SE); this is unlikely based on the volume of ash needed for everyday pottery over a protracted time period (three centuries), the terrain, and the lack of draft animals. The ash found in pottery has a cusped morphology (bubble-wall shards) consistent with collection during, or shortly after, an airfall event. Geochemical analysis of $n=333$ ash shards from 18 sherds was conducted by electron microprobe for major and LA-ICPMS for trace elements to use for source fingerprint verification. It has been suggested that the ceramic firing process can alter the chemical composition of the ash. Preliminary experiments where volcanic ash is fired with clay from El Pilar according to heating schedules used by Maya show that changes in the ratio of Si/Ca and Na/K occur during firing. A systematic experimental investigation is currently underway and is expected to shed additional light on the mystery of the volcanic sources for ash used by the Maya to make pottery.

Marcie Venter (University of Kentucky) "Feasting and Solidarity: Ceramic Evidence from the Late Postclassic Tuxtla Mountains, Veracruz, Mexico." Ceramic attribute data are assessed that derive from the Late Postclassic settlement of Totogal, located near the eastern boundary of the Aztec empire in the Mesoamerican Gulf lowlands. Totogal, a center in Toztlan, an Aztec tributary, yielded considerable evidence for the local adoption of imperial-style ritual censers that were used alongside locally produced, elaborately decorated serving vessels produced using elements characteristic of Postclassic International styles. In this paper, I examine one of the mechanisms that could have resulted in the widespread use of imperial censers throughout Totogal: a strategy whereby elites sponsored feasts meant to promote solidarity and acquiescence to imperial goals of tribute payment. The use of imperial style censers at public feasts and community rituals, along with the serving of food and drink in vessels usually associated with elites, would have instilled a sense of camaraderie or obligatory reciprocity between local non-elites, elites and imperial agents at Totogal.

Dean E. Arnold (Wheaton College, IL), Hector Neff (California State University at Long Beach), and Bruce Bohor (United States Geological Survey, retired) "Maya Blue: Where Did Its Palygorskite Constituent Originate?" Maya blue is a turquoise paint used by the ancient Maya for pottery, murals, sculpture and for covering human victims before they were sacrificed. In the 1960s, its composition was identified as indigo and the clay mineral palygorskite. The resistance of Maya Blue to acids, solvents and other reagents, and its persistent color over centuries in one of the world's harshest climates has captured the attention of many scholars. Since the 1960s, however, the cultural context of the constituents of the paint, the cultural significance of the pigment, and the discovery of how the Maya made the pigment have been possible because of the collaboration of anthropologists with those who have expertise in the physical sciences. This collaboration was also

responsible for the discovery of palygorskite in Yucatan in 1965, its cultural significance among the contemporary Maya, and for identifying the way in which the ancient Maya made the Maya Blue. This paper presents the preliminary results of the analyses of palygorskite samples recently obtained in Yucatan and underscores the importance of collaborative research between anthropologists and physical scientists for find a source for the ancient palygorskite that was used in the production of Maya Blue. Research on Maya Blue also raises questions of intellectual property rights: Who owns the rights to make Maya Blue for economic gain, and who should benefit from a sale of a synthetic Maya Blue for modern commercial purposes?

Ana Lucia Gonzalez (University of Hawaii at Manoa) and Samuel Connell (Foothill College) "Revealing Variations on Ceramic Technology in the Northern Andes of Ecuador." This paper describes Early Intermediate Period pottery recovered from a habitation site in the northern highlands of the equatorial Andes. The site of Oroloma lies amongst the Late and Inka Period fortresses of Pambamarca. Radiocarbon tests and tephrochronology place the site in the 8th century A.D. Detailed paste, form and stylistic analysis of the large assemblage suggests a number of important results from this uninvestigated time period, including a lack of *chicha* making vessels, suggesting that *chicha* drinking may not have been a common practice. Contrary to models for the Late Intermediate and Late/Inka Period (700-1505 AD), incipient elites were not using feasting as a primary source of competition for followers. Interestingly, the Oroloma ceramic assemblage had a small percentage of imported Panzaleo pottery which appears to have originated in the eastern lowlands which clearly links both regions economically through trade. Few sites such as this one exist in the northern Andes thus making this site important in terms of developing a ceramic sequence preceding the well known Chochasqui phases.

Brenda J. Bowser (California State University at Fullerton) "Archaeological Evidence of Children's Craft Production: Testing Methodological Approaches to Learning in Pottery-Making Societies." Recognizing that children are marginalized as subjects in archaeological anthropology, a growing number of studies of childhood suggest that the ability to recognize the work of children in material culture is essential to understanding craft-making in archaeological societies. For example, we may better reconstruct the ages at which children begin to learn, the extent to which children are engaged in production, the contexts of learning and apprenticeship, and whether learning to make a craft is highly valued as a signifier of social personhood, rather than a transition to economic productivity in a low status occupation. Concomitantly, we may comprehend more fully how the appropriation of children's labor was involved in the development of inequality and the transformations of production and reproduction that occurred when craft-making becomes an occupational specialization rather than a ubiquitous component of domestic production for domestic consumption. Recent approaches to craft production led by Patricia Crown and Jill Minar suggest that archaeologists may discern the work of children in archaeological contexts by

understanding the ontological stages in which children develop and master skills, including motor and cognitive skills. This study tests the methodological principles developed and applied in archaeological pottery-producing societies by analyzing an ethnoarchaeological sample of children's polychrome pottery bowls collected in 2006 in Conambo, a contemporary village of Achuar, Quichua, and Zaparo-speaking peoples in the Ecuadorian Amazon, where girls begin playing with clay and learning to make pottery at a very young age, and all adult women produce their own pottery for their own domestic use.

Alexandre Livingstone Smith (Royal Museum for Central Africa – Bruxelles, Belgium) "Archaeology and Linguistics: A Comparative Overview of Pottery Traditions in Central Africa." Central Katanga (DRC) has been the focus of scholarly attention since the arrival of the first explorers up until today. Thanks to extensive archaeological surveys and excavations, the archaeological sequence goes back to the 9th century. This region is also home to one of the most famous ancient savannah kingdom of south central Africa, that of the Luba. According to historians, based on oral historical data, the Luba Kingdom goes back to at least the 18th Century. However, the connection between the people living in the area today and those who inhabited central Katanga in the past is not clear. Indeed, the material culture uncovered during the excavations displays both elements of continuity and dramatic changes throughout the sequence, particularly as regards ceramic morphological and ornamental styles. To explore the recent history of the area and the cultural variations observed in the archaeological sequence, we are developing an approach based on the integration of archaeology and historical linguistics. To do so we have decided to study the spatial distribution of contemporary ceramic traditions, pottery manufacturing processes and vocabulary, as an interface between the present and the past. This paper presents the first results of our project. I will first outline the distribution of technical traditions in the area. I will then show how some of the primary shaping technology were identified on archaeological vessels going back to the 10th century. Finally, I will consider the connections between the Upemba depression and the broader framework of south central Africa.

Claire Corniquet (Université Libre de Bruxelles) "The Social Life of Pottery: Context and Scales of Practice." Pottery is an activity supposedly practiced alone: the potter possesses her own workshop in the village, makes her own pots and the sales are totally for her. Nevertheless, the fields enquiries led in the area of Arewa (central-southern Niger) reveal that at each stage of the "operating chain" (or "chaîne opératoire"), the craftswoman is in more or less close contact with others practitioners (as apprentices; craftswomen from her locality and from others localities). Whether these contacts are organised or informal, the gatherings take usually place in the context of some operating chain's stage situated at different scales: village scale (as the cooking site) and micro-regional scale (as the clay source and the market). The practice space's sharing generates collective actions, knowledge exchanges and craftswoman's collaboration. When a potter makes a pot, she

is not isolated but inscribes her practice in a known and lived world. Her technique is as much marked by her apprenticeship than by her familial, linguistic and villager identity as well as her interactions with others practitioners from her village or from elsewhere. If we admit that every practice is situated and that the situation gives meaning to practice, it becomes imperative to examine the situations of practice as far as the frameworks in which these situations take place. This paper proposes a study of the contacts' points and degrees which link and interconnect the potters from different localities of this area, and the impact of the shared space of practice on the technical ceramics' distribution. Analysing the "context of practice," we would explain the technical configurations of this area.

Tara Tarault (Montgomery College) "Akan Matrilineal Pottery Practice in Ghana, West Africa." This study uses ethnoarchaeological techniques to interpret pottery manufacturing, vessel shape and use among the contemporary coastal Akan. While local Fante pottery case studies were compared to vessels from the Elmina Archaeological assemblage (DeCorse 1987), pottery from the town of Elmina and from several contemporary Fante villages indicate strong matrilineal ties and associations with the Ashanti and Ewe cultures. This paper also discusses outside influences that shape contemporary Akan pottery traditions. While arranged marriages may be formed to promote alliances between villages and cultures, important matrilineal continuities exist in pottery production technique and vessel form suggesting that people perpetuate traditions that reinforce their own cultural identity. Comparing these cases promotes one of the few tools we have to help interpret artifacts and is necessary to augment the lack of available archival data in this region. Ethnography and historical ethnographies provide evidence that even within one pottery type, there are distinct differences in how individual villages manufactured ceramics. This study attests to the continued value of integrating archaeology and ethnographies. Since objects and traditions migrate due to marriage, there is a need for more detailed data on specific cultures, artifacts and alliances.

Kostalena Michelaki (McMaster University) "Stentinello, Impressed and Buff Wares of Middle Neolithic SW Calabria, Italy: Exploring the Co-Existence of Multiple Operational Sequences." At the Middle Neolithic site of Penitenzeria in Southwestern Calabria, Italy, between ca. 5,500 and 5,000 BC cal. three visually distinct wares were produced. The "Stentinello", thought by archaeologists to be the fine-ware, were primarily small and medium sized, thin walled bowls and flasks, made with gritty pastes in colours that varied from orange to black. Their decoration consisted of stamped designs that were elaborate and syntactically organized. The "Impressed", thought of as the coarse-ware, were larger sized jars with thicker walls, made with gritty pastes primarily in light orange and brown colours. Their decoration involved impressed lines, often randomly covering the surface of the vessels. At the same time, a different ware, known as "Buff," exists on the site in very small quantities (ca. 4%) and looks

strikingly different: it is buff coloured with occasional red slip or red paint on the exterior, reminiscent of the fine-wares produced normally in the remaining of Southern Italy. Chemical and mineralogical evidence suggests that it is also locally produced. The present paper will explore the operational sequences of these three co-existing wares, their interrelations and what they may have meant in the lives of the Neolithic villagers of Penitenzeria.

Julie A. Woods and Elizabeth S. Chilton (both, University of Massachusetts at Amherst) "Continuities and Changes in Native Ceramic Technologies in the Middle Connecticut River Valley, Massachusetts." Native Americans from the middle Connecticut River Valley of New England experienced massive social disruptions during the 17th century, but not much is known about their cultural continuities or their response and resistance during this crucial period. The analysis of ceramic artifacts can provide a view into the daily lives, social networks, technology, and economy of Native peoples. This paper presents research on Native ceramic assemblages from two Connecticut River Valley sites in Deerfield, Massachusetts. The first site, Pine Hill is a multi-component Late Woodland period site dating to the 15th and 16th centuries AD. The second site, Area D, is located 2 km east of Pine Hill, and dates to the middle of the 17th C, just prior to the settlement of the area by English colonists. A minimal vessel lot and technical attribute analysis reveals variation and co-variation within and between these sites. Differences can be seen in added aplastic materials, indicating local variation in technical choice regarding resource acquisition and paste preparation. Understanding the sources of these ceramic changes between the pre- and post-Contact periods will help inform our understanding of the movement of peoples, changes in settlement patterns, and technological knowledge and traditions in the Northeast during the 17th century.

Charles C. Kolb (National Endowment for the Humanities) "News from the Field and Laboratory." Marilyn Beaudry Corbett (University of California Los Angeles, Cotsen Institute of Archaeology) "Discussant." An "Open Discussion" follows.

Ancient Khmer and Southeast Asian Ceramics: New Archaeological Findings, Production and the Revival of Techniques is the title of a conference to be held at the National Center for Khmer Ceramics Revival, Center for Khmer Studies and Heritage Watch, Siem Reap, Cambodia, 10-12 December 2008. The Conference Advisory Committee includes Janet Mansfield, Chair; Dawn Rooney; Chhay Rachna, Philippe Peycam, Dougald O'Reilly, Serge Rega, and Suzanne Freilich. The conference topics include: 1) Economics of ceramics in ancient Khmer Empire, 2) conservation of ancient Khmer ceramics, 3) ancient and contemporary Khmer kiln sites, 4) revitalization of ceramic production in Cambodia, and 5) contemporary ceramic production and slowing the illicit trade of antiquities. The conference aims to bring together Cambodian and international scholars specialized in ancient Khmer ceramics, with contemporary potters and craftsmen working in the revival of ancient production techniques. The objective

is to raise awareness of the archaeological importance of ancient Cambodian ceramics and the new opportunities for sustainable economic development in the region through ceramic technology. Scholars based in Southeast Asia are especially encouraged to participate. Titles and 300-word abstracts were due by 15 October 2008. (300 words maximum); for details please visit the web site at <http://www.khmerstudies.org>. For additional information, please contact Mr. Serge Rega at info@khmerceramics.com or conference@khmerstudies.org.

Book Reviews

Deborah L. Huntley, Associate Editor

Laser Ablation-ICP-MS in Archaeological Research. Robert Speakman and Hector Neff (eds.), University of New Mexico Press: Albuquerque, 2005. viii + 264 pp., 120 halftones, index. Price: \$75.00 (cloth). ISBN: 978-0-8263-3254-7.

Reviewed by Judith A. Habicht-Mauche, Department of Anthropology, University of California, 1156 High Street, Santa Cruz, CA 95064, USA

This edited volume reports on fourteen preliminary studies using laser ablation in conjunction with inductively coupled mass spectroscopy (LA-ICP-MS) to chemically characterize a variety of archaeological materials, including obsidian, cherts, jade, turquoise, glass beads, volcanic tephra, human skeletal remains and ceramic pastes and pigments in order to define sources of craft production and trace patterns of migration, transhumance and exchange. The volume includes case studies from Africa (Popelka et al.), Turkey (Diebold, Speakman and Glascock), Montana (Roll et al.) and Andean South America (Zedeño, Neff and Nielsen; Vaughn et al.), but focuses primarily on studies from Mesoamerica (Tabares et al.; Glascock, Speakman and Pollard; Kovacevich, Neff and Bishop; Neff and Sheets; Cucina, Neff and Blos) and the North American Southwest (Larson, Sakai and Neff; Cogswell et al.; Sall, Zedeño and Speakman; Speakman).

ICP-MS has been around for a long time, but it has only been with the recent advent of higher resolution instruments, which now produce results comparable to thermal ionization mass spectroscopy (TIMS) and instrumental neutron activation analysis (INAA), that the technique has begun to be used more widely in archaeological applications. Standard sample preparation and induction techniques involve dissolving a solid sample in a strong acid, such as nitric or hydrofluoric acid, often with the assistance of a microwave oven. The resulting digestion is then aspirated into the plasma chamber of the spectrometer where it undergoes ionization. This sample preparation method can be time consuming, somewhat dangerous and difficult, especially when preparing silicon-based materials, such as obsidian, chert or pottery, for bulk chemical analysis. An alternative induction technique involves attaching

the ICP-MS to a laser, which ablates or vaporizes a small spot on the surface of the specimen. The vaporized material is then transported directly to the plasma chamber. The advantages of this induction technique for archaeological and museum applications are quite obvious. Sample preparation is negligible, making it possible to process more samples quickly and cost effectively, and since the ablated area of the specimen is rarely visible with the unaided eye, the technique is virtually non-destructive in most cases.

However there have been problems with laser ablation. The most significant of these problems have been issues of standardization for quantitative analysis, matrix-induced spectral interference and fractionation. The fractionation problem, in particular, has greatly compromised the accuracy of LA-ICP-MS relative to digestion methods of induction and other techniques, such as XRF and INAA. The introductory chapter by Speakman and Neff clearly outlines the basic methods involved in LA-ICP-MS and provides an excellent critical discussion of some of the problems that have plagued the technique and how they have been dealt with relatively effectively by the researchers whose work is highlighted in this volume. This chapter is an excellent introductory primer on the basics of LA-ICP-MS and would be a valuable addition to reading lists in advanced undergraduate or graduate courses on laboratory methods in Archaeology. Several of the chapters in this volume, most notably the contributions by Larson, Sakai and Neff and by Cogswell and his colleagues, use LA-ICP-MS in conjunction with other mineralogical or chemical characterization techniques or present the results of controlled comparisons of LA-ICP-MS with the standard digestion method of ICP-MS and other chemical characterization techniques such as INAA. These more comparative and methodologically sophisticated papers do suggest that there have been significant improvements in LA-ICP-MS, especially in the areas of standardization and accuracy, making it a viable and reliable archaeometric technique.

One of my problems with many of the papers in this volume, which are all methodologically sound efforts, is that they report extremely preliminary results of projects that are in the very early stages of development. Thus, even though the authors lay out interesting and important anthropological or behavioral objectives for their studies, these objectives are minimally addressed, if at all, by the limited results presented. This is particularly true of the papers that focus on the analysis of cherts, jade, turquoise and other greenstone minerals. I suspect that these more chemically and mineralogically complex materials will require the use of multiple analytic techniques, including isotopic analyses, to effectively and accurately characterize and source.

The pottery papers point out both the wonderful possibilities and the significant limitations of LA-ICP-MS as a spot, as opposed to bulk, chemical technique. While LA-ICP-MS may prove to be an excellent tool, complementing SEM and the electron microprobe, for looking at specific, well-targeted aspects of pottery, such as characterizing specific temper grains,

analyzing the differences in composition between the plastic and non-plastic fractions of pastes or examining the composition of slips, paint or glazes, it may be less useful as a general tool for the overall chemical characterization and sourcing of pottery, for which bulk chemical techniques such as XRF, INAA and digestion ICP-MS may continue to be more appropriate. The most successful and valuable papers in the volume are the four that focus on the analysis of ceramic pigments. These particular case studies use LA-ICP-MS to its best advantage as a spot analysis technique able to target small spots and thin surfaces, thus matching this analytical technique most appropriately to the specific technological and anthropological questions being posed.

This volume is targeted toward a fairly sophisticated audience of professional and academic archaeologists with at least some basic familiarity with the principles and methods of geochemical sourcing. While the quality of the work presented here is uniformly high and there is some very useful discussion of LA-ICP-MS as an archaeological research tool, the lack of significant results in many papers and the high price tag set by the publisher may discourage many professional and avocational archaeologists who are not specialists in geochemical sourcing from adding this volume to their library.

Ancient Objects and Sacred Realms: Interpretations of Mississippian Iconography. F. Kent Reilly III and James F. Garber, Editors. University of Texas Press: Austin, 2007. X + 299 pp., 81 figures, 4 tables, references, index. Price: \$50.00 (cloth). ISBN: 978-0-292-71347-5.

Reviewed by Thomas E. Emerson, University of Illinois, ITARP, 23 East Stadium Drive, Champaign, IL 61820 USA

The editors, Kent Riley and James Garber, contend this volume will transform our understanding of Mississippian ideology. In recognition of this sea change, they believe the "Southeastern Ceremonial Complex" should be rechristened the "Mississippian Ideology Interaction Sphere". But this semantic sleight of hand hides the volume's unevenness. Contained herein are both productive new thinking and problematic ethnographic analogies.

On the one hand, both substantively and qualitatively, George E. Lankford's three chapters are a significant contribution of lasting worth. His analyses continue the research traditions of James Howard, Charles Hudson, and Robert Hall. Lankford's in-depth and expansive explorations of native folklore to identify contextually-meaningful ethnographic linkages to pre-contact symbols represents a model to emulate. In a discipline increasingly marked by the questionable application of ethnographic analogy, his insights are a breath of fresh air.

Lankford's initial contribution is "cosmic" in scale as he relates New World cosmology to Mississippian iconography. Here he asserts that "Mississippian" symbolism represents

widely shared beliefs by people with varying linguistic and cultural patterns and environmental adaptations – a fact too often overlooked. A shared primal concept is the layered cosmos, whose cosmic references are identified in shell gorget styles. Lankford shows they represent different graphic perspectives of a layered cosmos. He is careful to limit his interpretations to denotative aspects, noting that we have little idea what role the gorgets played in the lives of the people who crafted and wore them.

In his “Path of Souls” contribution Lankford considers a cluster of icons (eye-in-hand, winged serpent, bones, skulls and raptor) once associated with a Mississippian “death cult”. They represent, he contends “the Milky Way as the path on which souls of deceased must walk.” Weaving together native beliefs in dual souls, accounts of soul journeys, a portal to heaven through the Hand Constellation (a.k.a. Orion’s Belt), and the correlation of the “path of souls” with the great serpent he brings the reader full-circle to Moundville “death” motifs as icons of a cosmic death journey of the soul. Lankford’s intellectual journey is of supreme importance in illustrating the value of using diverse ethnographic evidence.

There may be no more striking or universal symbol of New World native beliefs than the great serpent. In his “Great Serpent” chapter, Lankford identifies its many guises; numerous underworld creatures with a wide range of powers subsumed into the master narrative of the “great serpent”. This does much to explain an otherwise inexplicable phantasmagoria of apparently unrelated creatures. Lankford also connects the great serpent with the summer constellation Scorpio giving it a celestial aspect.

James Brown’s two chapters, on “Birdmen” and the “Braden style”, differ significantly in their use of the ethnographic record and methodological approach from that of Lankford. It is useful to examine that difference. In his “Birdman” chapter, Brown acknowledges (pp. 56-66) the difficulties in interpreting iconography in pre-contact and historic native societies. These challenges include the problem of cultural continuity, the dilemma of ethnographic analogy, the instability of ritual and meaning, and the effect of uncertain oral transmission and social, political, and cultural changes on iconography. However, he dismisses these issues and employs Winnebago, Ioway, and Osage literature to create a Red Horn mythology he projects as pan-regional. With a rich recounting of these myths and rituals, he hypothesizes a pre-contact Red Horn/falcon ideological complex – an interesting idea. However, whether the icons that Brown describes carry the meanings he ascribes to them is questionable given the multivocality of native symbols, especially in a changing social and political milieu, aptly demonstrated by Robert Hall’s seminal works.

But there is another problem – that is Brown’s desire to trace the historic Red Horn stories, a disparate set of Osage rituals and myths, and the classic SECC copper Birdman plates to Cahokia. This link is not convincing. The evidence, consisting primarily of scraps of copper and engraved shell excavated

from Md. 34 at Cahokia by Perino, has not been significantly increased by nine years of excavations in that same mound by Brown and colleagues. Cahokia, in fact, has been remarkable in its lack of SECC-related icons. The only iconographic materials of note are the flint clay Cahokia figures that likely spread across the Southeast and Caddoan regions in the 12th century. If there is a Cahokian “origin point” for what becomes the SECC, these statutes are its harbinger. Brown, however, is generally silent on that evidence. It is as likely that late 13th century Cahokia is the recipient as the originator of the Birdman copper horizon art.

Brown’s “Braden Style” chapter is the most detailed presentation available and will no doubt serve as the preeminent art historical statement on this Mississippian style. Done in the classic art history tradition, it is rich in artistic, geographical, and chronological details but says little about the role of the actual objects in late prehistory societies. But then again, that was likely not the goal of the piece.

The contributions by David Dye on war ritual icons, Kent Reilly on “petaloid motifs” as “celestial locatives”, and Vernon Knight and Judith Franke on the identification of “supernatural” Lepidoptera are brief but choice nuggets of iconographic interpretations that will generate additional thought and discussion among readers. They address important issues, and are less dependent on problematic uses of ethnographic analogy, like that which underwrites the Brown chapters and a final contribution by Alice Kehoe. Of course, the issue of the applicability of ethnographic information is faced by anyone who studies prehistoric iconography. In this volume, Lankford follows the conservative but sensible approach of looking for broad patterns among regionally interacting groups as guides to the past. Others such as Brown eschew the approach of using multiple sources in favor of extracting information from limited, but attractively exhaustive and detailed ethnographic sources. And then, there are those who see ethnographic texts as road maps to the past – Alice Kehoe’s contribution is one of those. To give Kehoe credit – she attacks (as usual, with great enthusiasm) the analogy issue head on, does some quick asides on science, positivism, and nationalistic ideology, and then takes us on a whirlwind ride to Cahokia as seen in the sacred texts of the late 19th-century Osage priests. I disagree with her but greatly enjoyed reading her chapter nonetheless.

So where does this volume stand in regard to its claims? I conclude that, rather than new theory or methodology, the authors approach their subject using the traditional methods of analogical reasoning, structural and stylistic analysis, and large doses of art history. It is these proven approaches, combined with new and innovative interpretations, that give this volume its value. I do not see that burying the SECC while announcing the birth of MIIS is productive. Both models obscure what should be our real goal – understanding iconography within the context of people’s lives. However, if one is interested in the prospects and pitfalls of the intellectual process of interpretation in a particularly rich archaeological and ethnohistorical context, then this book is definitely worth the time to read and consider.

Upcoming Conferences

Rachel S. Popelka-Filcoff, Associate Editor

2008

7-11 December. 6th Conference on Science and Technology in Archaeology & Conservation; Rome, Italy. General information: <http://conference.legadoandalusi.es/en>.

15-19 December. American Geophysical Union Fall Meeting; San Francisco, California, USA. General information: www.agu.org/meetings.

2009

5-7 January. Sustainability: Fifth International Conference on Environmental, Cultural, Economic and Social Stability; University of Technology, Mauritius. General information: <http://s09.cgpublisher.com>.

5-7 January. QRA Annual Discussion Meeting: The Human Dimension in Rapid Environmental Change; University of Oxford, UK. General information: <http://qra.org.uk>.

6-11 January. Society for Historic Archaeology Conference on Historical and Underwater Archaeology; Toronto, Ontario, Canada. General information: <http://www.sha.org>.

8-11 January. 110th Joint AIA/APA Annual Meeting; Philadelphia, Pennsylvania, USA. General information: <http://www.archaeological.org/webinfo.php?page=10096>.

8-12 January. The International Biogeography Society 4th International Conference; Merida, Mexico. General information: <http://www.biogeography.org/html/Meetings/index.html>.

10-16 February. World of Iron (WIC); London, UK. General information: <http://www.ironsmelting.net/WIC2009>.

10-12 March. Climate Change: Global Risks, Challenges and Decisions; Copenhagen, Denmark. Special session: "Informing the Future by Understanding the Past." General information: www.climatecongress.ku.dk.

22-26 March. Annual Conference on Computer Applications and Quantitative Methods in Archaeology: "Making History Interactive;" Williamsburg, Virginia, USA. General information: <http://www.caa2009.org>.

22-26 March. 237th National Meeting and Exposition, American Chemical Society; Salt Lake City, Utah, USA. General information: <http://www.acs.org>.

22-27 March. Association of American Geographers; Las Vegas, Nevada, USA. Special session: "Soils, Sediments and Geoarchaeology." General information: <http://www.aag.org>.

31 March - 4 April. American Association of Physical Anthropologists Annual Meeting; Chicago, Illinois, USA. General information: <http://physanth.org/annmeet>.

31 March - 4 April. Paleoanthropology Society Meetings, to be held in conjunction/association with the Annual Meeting of the American Association of Physical Anthropologists; Chicago, Illinois, USA. General information: <http://www.paleoanthro.org/meeting.htm>.

15-17 April. Geoarchaeology 2009: "Landscape to Laboratory and Back Again;" Sheffield, UK. General information: <http://www.shaf.ac.uk/scidr/geoarchaeology2009>.

22-26 April. Society for American Archaeology 74th Annual Meeting; Atlanta, Georgia, USA. General information: <http://www.saa.org/meetings/index.html>.

11-13 May. AURUM: Authentication and Analysis of Gold Work; Paris, France. General information: <http://www.aurum.cnrs.fr>.

25-29 May. DIG: Developing International Geoarchaeology Conference and Instrumental Neutron Activation Analysis Workshop; McMaster University, Hamilton, Ontario, Canada. General information: <http://socserv.mcmaster.ca/dig>.

6-11 June. 46th Annual meeting of the Clay Minerals Society "Clays of the Big Sky;" Billings, Montana, USA. General information: <http://www.clays.org>.

21-26 June. Goldschmidt 2009: "Challenges to Our Volatile Planet;" Davos, Switzerland. General information: <http://www.goldschmidt2009.org>.

23-26 June. 11th International Paleolimnology Symposium; Guadalajara, Jalisco, Mexico. General information: <http://www.paleolim.org/index.php/symposia>.

6-11 July. 7th International Conference on Geomorphology (ANZIAG): Ancient Landscapes, Modern Perspectives; Melbourne, Australia. Special session on the topic of "Geoarchaeology." General information: <http://www.geomorphology2009.com>.

27-31 July. 58th Annual Denver X-ray Conference; Colorado Springs, Colorado, USA. General information: <http://www.dxcicdd.com>.

2-7 August. Heritage Science Symposium - 42nd IUPAC Congress; Glasgow, Scotland, UK. General information: http://www.rsc.org/images/Heritage_Science_Publicity_tcm18-127442.pdf.

6-11 September. 24th International Meeting on Organic Geochemistry; Bremen, Germany. General information: <http://www.marum.de/imog2009>.

14-19 September. 5th International Congress on the Application of Raman Spectroscopy in Art and Archaeology (RAA2009-Bilbao); Bilbao, Spain. General information: <http://www.quimica-analitica.ehu.es/RAA2009>.

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Newsletter of the Society for Archaeological Sciences

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