



SAS Bulletin

Society for Archaeological Sciences

Volume 20 number 1/2

January-June 1997



From the President

The Society for Archaeological Sciences held its annual executive board and business meetings during the Society for American Archaeology Annual Meeting in Opryland, Nashville, Tennessee, April 2-5, 1997. Our modest (embarrassing?) attendance of 14 out of a total membership of 354 was no doubt due to the scheduling of our meeting opposite several symposia. Votes were tallied for the election of officers. Twenty ballots were cast by e-mail, and 24 by snail-mail. The vote was unanimous in favor of Chris Prior for President-elect and Felicia Beardsley for Secretary-Treasurer. They will join me (as I move from President-elect to President) as members of the executive board. In addition, the desktop publishing baton was passed on to our new *Bulletin* editor, Rob Tykot.

The income and expenditure summary for 1996 was presented, and the proposed budget for 1997 was presented and accepted. These documents were included in a previous issue of the *Bulletin*. The agreement with Plenum Press for the book series on Advances in Archaeological and Museum Science was discussed. This contract called for five books over a ten year period. So far, four books have been accepted by SAS. The phytolith book (*Phytolith Systematics: Emerging Issues*; Rapp and Mulholland, editors) is already published; books on dating methods (*Chronometric and Allied Dating in Archaeology*; Martin Aitken and R.E. Taylor, editors) and obsidian (*Archaeological Obsidian Studies: Method and Theory*; M. Steven Shackley, editor) are due out in 1997; and a volume on historic preservation technology (Ray Williamson, editor) is expected in 1998. Other high-quality proposals are invited.

Next year will mark the 20th anniversary of the SAS. Suggestions were made as to how this event might be marked, such as an award to someone who has served the organization. Visibility of the organization might also be promoted in several ways, from a more concerted effort to distribute our membership leaflet to a student award for a paper presented on an archaeometric topic.

Future Archaeometry Symposia were discussed. Both the University of California at Berkeley and Mexico have expressed interest in hosting the next North American

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From the Editor

The feedback that I have received from my first issue of the *SAS Bulletin* was mostly positive, so I will continue with this format at least for the near future. Another double-issue (1997 no. 3/4) is scheduled for production in December (and arrival in your mailbox in January). After that, we will return to quarterly issues with production deadlines of March, June, September and December.

In addition to the new editors that I welcomed last issue, I would like to announce that Mike Waters is the new Associate Editor for Geoarchaeology. Some of our new Associate Editors have columns in this issue; they all need your help in providing material for future issues, so please send them your news. I am especially interested in reviews of conferences which include papers or sessions on archaeological science. If you attend one and would be willing to write a review (even a very brief one), please contact me before you start in order to avoid duplicating someone else's efforts. Unsolicited book reviews or notes are also welcome, but again, please check with the Book Review Editor (Michael Glascock) first.

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meeting. The SAS would still be interested in collaborating with the Standing Committee of the Archaeometry Symposia to co-sponsor the symposia, help organize North American meetings, help with the publication of symposia proceedings or theme session papers, or re-publish hard-to-get proceedings from previous symposia. The suggestion was also made that SAS might sponsor a hands-on workshop at the 1998 Archaeometry Symposium in Hungary.

Incoming President Sternberg expressed his hope that at least one SAS-sponsored symposium could be held at each SAA meeting. There are always a number of SAA symposia that, by topic, could certainly be sponsored by SAS. As examples, several sessions that I was able to attend on this year's program appealed to my personal interest in archaeomagnetism and archaeomagnetic dating: Geoaerchaeology, Paleoenvironmental Research, and Absolute Dating (general session, #16); Learning from Once-Hot Rocks (symposium organized by Alston Thomas, Jeff D. Leach and Michael B. Collins, #72); Time After Time: A History of Archaeological Dating in North America (organized by Stephen E. Nash, #134). There were a number of other symposia relevant to the SAS mission: Paleosubsistence and Paleoenvironmental research (organized by Jennifer Falk and Irwin Rovner, #45); Prehistoric Quarries and Chert Exploitation in the Southeastern and Mid-Atlantic States (organized by Meeks Etchieson, #53); Ancient Landscape Reconstruction: New Approaches and Technologies (organized by Robert H. Brunswig, Jr. and Lawrence Conyers, #54); Fryxell Symposium 1997: Molecular to Synthetic Research in Southwestern Archaeobotany. Papers in Honor of Vorsila L. Bohrer (symposium sponsored by SAA Executive board, organized by Karen R. Adams and Mollie S. Toll, #69); Advanced Technologies: Archaeology for the Twenty-First Century (general session, #101); Chemical Sourcing of Ceramics in the Greater Southwest (organized by Donna M. Glowacki); Phytolith Analysis for Archaeologists (organized by Terry B. Ball and Linda Scott Cummings, #126). For a society to sponsor a symposium involves no additional work, and gives the symposium a bit more visibility in the SAA program. However, sponsorship by an organization does not guarantee acceptance of the symposium for the SAA program.

Back to our meeting, it was mentioned that John Yellen at the National Science Foundation is looking for feedback on NSF's Archaeometry Program (see announcement at www.nsf.gov/sbe/sber/arch/old8752.htm). Members were reminded to peruse the excellent SAS web site set up by Jim Burton, located at: www.wisc.edu/anthropology/sas/sas.htm.

Jim has also kept SAS-Net, the e-mail redistribution service started by Foss Leach, active. Traffic has increased with notices of general interest to the SAS community.

We closed with a round of applause for Pat Martin, who has served the SAS well as President, and before that as President-elect and Editor of the *Bulletin*. Thanks, Pat. We hope we can draw on your experience as you become Past-President.

Rob Sternberg

May 5, 1997

Editor (continued from page 1)

Announcements of employment and fellowship opportunities, research grants, etc. can now be published in the *SAS Bulletin* in a timely manner, so please forward this information to us. Subscriptions to the *Bulletin* are available in exchange for newsletters and publications of other organizations; advertising space may also be exchangeable.

Lastly, we intend to publish reviews or updates on archaeological science within certain political or geographic regions. Suggestions for both reviewers (self-nominations accepted) and regions are welcome.

Robert H. Tykot

September 15, 1997

Vice-Presidents' Annual Reports 1996-97*Vice President for Intersociety Relations*

The 1996/1997 year brought a new direction for the Inter-Society Relations committee. In concert with Arleyn Simon and the Membership Committee, we have begun the planning stages for more intensive contact with other organizations to encourage membership, and internet/web based outreach with the SAS Webmaster. The first step was an internet mailing to the International Association for Obsidian Studies (IAOS) membership pointing to the number of obsidian studies articles in JAS and the reduction in price to full SAS members. This included a letter to the current President, Jon Ericson.

Along this line, IAOS is planning to present a workshop at the 1998 SAA meetings in Seattle focusing on archaeological obsidian studies for archaeologists. In the above letter I noted that a number of SAS members will probably be participating, and cross-advertising between the organizations, as well as sponsorship may be mutually beneficial. I have yet to receive an answer, but will be following up shortly.

I continue to send our meeting dates to various newsletters, but am surprised to see how few actually list it. I will continue to do so, and persistence will eventually pay.

Probably most important, is the proposal by my lab, the Phoebe Hearst Museum of Anthropology, in association with SAS, to host the 2000 Archaeometry Symposium at Berkeley. The lab and particularly the museum frequently host conferences of the size typical of the Archaeometry Symposium, and the campus and Bay Area are a particularly pleasant and functional area for this type of conference. Mexico City and Beijing have also tenured proposals, but we are confident ours will be given serious consideration. The lab, the Archaeological Research Facility, and museum recently brought Mike Tite, the standing committee chair, to Berkeley to show off the facilities. We hope that he was impressed. As usual, any member that has inter-society type news, please forward it, and I'll act on it appropriately.

M. Steven Shackley

Vice President for Membership Development

SAS Seeks To Renew and Add New Members “*Join our quest to understand the past, using the tools of tomorrow!*”

The Society for Archaeological Sciences is launching a membership campaign to build the society for the next century. In the most recent *SAS Bulletin*, SAS President Rob Sternberg emphasized that SAS members share the common goal of encouraging interdisciplinary collaboration and cooperation among scientists in archaeology and in the physical and natural sciences. SAS members represent an international cross-section of disciplines including anthropology, biology, botany, chemistry, classics, geochemistry, geochronology, geography, geology, metallurgy, and zoology. Approximately 25% of the membership is non-North American and we want to continue this growth of SAS as a truly international archaeometric community.

The Society for Archaeological Sciences strives to highlight the contributions of archaeometry to archaeological research and education. Through its activities, SAS endeavors to enhance funding and research opportunities for interdisciplinary archaeometric research. The Society is instrumental in the publication of the refereed series: *Advances in Archaeological and Museum Science* (Plenum Press); the sponsorship of conferences and conference sessions that encourage data-sharing within archaeometry and explain those of allied fields; the publication of *SAS Bulletin*, a substantial, indexed quarterly with research updates, laboratory profiles, conference summaries, book reviews, job announcements, and extensive calendars of meetings.

One of the best ways we can highlight and promote the contributions of archaeometry to archaeology is by increasing our membership and the corresponding readership of the *SAS Bulletin* and the *Journal of Archaeological Science*. The SAS web site (<http://www.wisc.edu/anthropology/sas/sas.htm>) as well as the moderated discussion group *SASnet* provide instant access to information on the society, meetings, conferences, and participation and queries into topics of research interest.

There are currently 354 active SAS members. We believe that membership in SAS will increase and exceed the previous high (of 500+ members) by launching a proactive membership program which will benefit current and new members of the Society. Several steps are included in this program: 1) The SAS executive board has undertaken the reactivation of the *SAS Bulletin* under the editorship of Rob Tykot; 2) The *SASnet* and the *SAS web site* are continuously active and updated by webmaster Jim Burton; 3) The SAS will have *increased visibility at national and international meetings* through membership booths in exhibit halls, well advertized general meetings, SAS sponsored symposia; awards for best archaeometric poster and paper by students. The SAS is planning these activities for the upcoming 63rd Annual Meeting of the Society for American Archaeology, March 25-29, 1998, Seattle, Washington, USA (<http://www.saa.org>) and the 31st International Symposium on Archaeometry, April 27-May 1, 1998, Hungarian National Museum, Budapest, Hungary (<http://origo.hnm.hu/amestry98/>).

We are sending a mailing to all SAS members asking them to update their mailing address, email, phone, and fax numbers. These must be regularly updated to ensure that members receive the publications (*Bulletin and JAS*) and communications (*SASnet*) to which they are entitled. We are also including new member brochures in this mailing and encourage you to recruit other full members and student members among your colleagues.

Inquiries regarding membership status should be addressed to the Secretary/Treasurer, Felicia Beardsley, Department of Anthropology, University of California-Riverside, Riverside, CA 92521-0418 USA, tel 909-787-5524; fax 909-787-5409; e-mail beards@citrus.ucr.edu; beardsley@qnet.com.

Arleyn W. Simon

Report from the Webmanager/VP for Electronic Communications

SASnet. In contrast to the explosively exponential growth of the Internet this year, *SASnet* has increased its subscriber base slowly and steadily, from approximately 100 subscribers at the beginning of 1996 to an easily-managed, moderately-sized list of 437 by June 1997. This is partly the result of the new open-door policy, intended to increase interaction between archaeometrists and those not trained in physical sciences but who need access to archaeometric expertise and to increase the visibility of the SAS among those who are not currently members. The average number of messages has increased accordingly from approximately 6 messages a month to nearly two-dozen per month...still a relatively quiet list for its size. To avoid typical list problems such as ‘spams’ and ‘flame wars’, *SASnet* was configured as a moderated list. Fortunately I have not ever had to decline posting any message because it was abusive or inflammatory. *SASnet* has remained a most civil and informative list that has been a real pleasure to manage - kudos to the current subscribers!

SASweb. The SAS now has a home on the Internet (<http://www.wisc.edu/anthropology/sas/sas.htm>) through the courtesy of the University of Wisconsin’s Department of Anthropology. Web pages, on-line since April 1996, include society information, Bulletin contents, email addresses of the SAS membership, and extensive links to archaeometric facilities, publications, meetings, and other resources. Visitors to the SAS home pages have slowly increased from approximately 100/month in May 1996 to about 360/month in May 1997. A majority of these visitors are from the U.S., the U.K., and Canada, but a significant percentage each month, usually in the lower double digits, are from other countries in Europe, South America, Australia and Asia. The most popular document, by far, is the compilation of abstracts from the 1996 International Archaeometry Conference. Suggestions for additional content, including relevant on-line links, are invited.

James Burton

The Wiener Laboratory

Contributed by Scott Pike, Acting Director 1995-97

Since its inauguration on 2 June 1992, the Wiener Laboratory of the American School of Classical Studies at Athens has gained recognition as a promising research facility supporting scholars applying a wide variety of analytical techniques from the natural, physical and biological sciences to archaeology and history. Through fellowships, consultations, lectures, seminars and workshops, the Lab plays an integral role in encouraging more scientific work and enlarging the scholarship base and scope of research in Aegean archaeology by providing resources and opportunities for scholars working in Greece. In September, Dr. Vanda Vitali became the new Director of the Wiener Laboratory.

Fellowships

Each year the Wiener Laboratory offers three fellowships to specialists in the fields of human skeletal studies, faunal studies and geoarchaeology. The fellowships are open to scholars with a Ph.D. and those working on a doctoral dissertation; a stipend of approximately \$13,000 to \$25,000 will be awarded depending on seniority and experience. Applicants must have a well-defined project addressing significant archaeological questions which can be undertaken in the Wiener Laboratory within the academic year. The J. Lawrence Angel Fellowship in Human Skeletal Studies is specifically for the study of human skeletal remains from archaeological contexts in Greece; similarly, the Research Fellowship in Faunal Studies is for the study of faunal remains from archaeological contexts in Greece. The Research Fellowship in Geoarchaeology is for individuals whose projects address significant archaeological questions in areas of study which may include quarried stone, lithics, building materials, ceramics, soil and sediment studies.

In addition to the proposed research, the Fellow will be expected to contribute to the development of the Lab's comparative or other collections, assist with queries from excavators, offer a lecture on the work undertaken while at the Lab, participate in one school trip, and contribute to seminars on aspects of archaeological science as part of the American School's annual curriculum. The deadline for applications for 1998-99 is 5 February 1998; further details are available from the Director at the address below.

Reference Collections

The Wiener Laboratory houses a growing specialist library and seven developing reference collections, resources that support its members' research and are available to other interested scholars and excavators.

The specialist library contains 26 journals and newsletters and over 1,150 books, dissertations and monographs including advanced texts in the fields of faunal, human skeletal and geoarchaeological studies as well as general reference and introductory texts in various areas of archaeology and the natural sciences. The library is intended not only to support

the Lab's work, but also to serve as a starting point for multidisciplinary research.

The Lab's first reference collection, the Modern Animal Bone Comparative Collection, was initiated in 1992 by Dr. Walter Klippel (University of Tennessee) and Dr. Lynn Snyder (Smithsonian Institution) and was developed by Dr. Yiannis Hamilakis (University of Wales Lampeter), Justine Lev-Tov (University of Tennessee), Deborah Ruscillo (University College London), and Dr. Ekaterina Trantalidou (Ephoreia of Palaeoanthropology and Speleology, Greece). This growing collection now has over 150 specimens.

The Mollusk Study Collection, which contains primary marine mollusk shells found in Aegean archaeological contexts, was started by Michele Miller (Boston University) and will be expanded by 1996-7 Faunal Fellow Deborah Ruscillo (University College London).

The Lithic Collection contains hand-samples, thin-sections, and a computerized catalogue of over 200 specimens donated to the Lab. Dr. Ruth Siddall (University College London) has curated the collection and provided complete petrographic and hand-sample descriptions for each of the lithic specimens. The collection has grown with the addition of thin-sections, hand-samples and a stable isotope database for Aegean marbles contributed by Dr. Norman Herz (University of Georgia); and will be further expanded by samples of oolithic limestone from Greek and Roman quarries at Corinth from a study by Dr. Chris Hayward (London Natural History Museum); as well as by marble samples from Mount Pentelikon, and other quarry regions, from various studies conducted by Scott Pike (University of Georgia).

An Anthropological Archive is being created by 1996-1998 J. Lawrence Angel Fellow Anna Lagia (University of Chicago). It will comprise of well-documented human skeletons of known age, sex, occupation, place of birth, death and cause of death. Endorsed by the Department of Human and Animal Physiology of the University of Athens and the Ephoreia of Palaeoanthropology and Speleology in Greece, this collection will be invaluable to anthropological and medical research.

An Ethnobotanical Collection has been initiated by Research Associate Harriet Blitzer as part of her National Geographic Society-sponsored project on the environmental and cultural contexts of olive cultivation and the relationship of olive cultivation to other aspects of Aegean culture. Her contribution of plant and seed samples from wild and domesticated olives, as well as samples of associated flora, will open this collection.

A Ceramic/Clay, Building Material Collection is in the planning stages with material anticipated from the following projects and researchers: [1] ceramic and raw material samples from a study of ceramic technology at Lerna in the Third Millennium B.C. by Christine Shriner (Indiana University); [2] clay samples from a preliminary petrographic analysis of Epirote coarsewares by Melissa Moore (Boston University); [3] samples from a study of the production and distribution of Canaanite storage jars in the Late Bronze Age East Mediterranean by Michael Sugerman (Harvard University);

and [4] lime cement, mortar and concrete samples from Dr. Ruth Siddall's research on building materials at the site of Ancient Corinth.

A Sediment Collection is also in its planning stage with thin sections and micromorphological descriptions anticipated from the following projects and researchers: [1] a preliminary study of lithostratigraphy and micromorphology of Theopetra cave deposits, Thessaly, Greece by Dr. Panajotis Karkanas (Ephoreia of Palaeoanthropology and Speleology, Greece); and [2] a micromorphological study of sediments from the Late Minoan site of Halasmenos, Crete by Scott Pike.

Current Anthropological Research

Research Associate Dr. Ethne Barnes (Wichita State University) continues her analysis of developmental defects and pathology of human skeletal material from Petras, Crete and the excavations of a Frankish cemetery at Ancient Corinth.

1996-97 J. Lawrence Angel Fellow Sandra J. Garvie Lok (University of Calgary) is collecting samples and examining Byzantine and post-Byzantine materials from the Church of Agios Nikolaos at the Athenian Agora, the 13th Byzantine Ephoreia on Crete, the 11th Byzantine Ephoreia in Servia, and from Agia Triada, Thebes as part of her dissertation (*An Examination of Diet, Health and Gender in Byzantine and Ottoman Greece*).

1996-98 J. Lawrence Angel Fellow Anna Lagia (University of Chicago) continues her dissertation research (*The Biological Imprint of Major Historical Processes that Occurred during the Twentieth Century in Northern Greece*).

Research Associate Lisa M. Little's (Indiana University) dissertation research (*A Biological Distance Study of Mycenaean Populations on the Greek Mainland*) utilizes the results of epigenetic skeletal analysis in an effort to address questions of social interaction within and between communities during the Mycenaean period. Some of the populations to be included in this research are from the Athenian Agora, Galatas and Mycenae's Grave Circle B. In addition to work on her dissertation, Lisa is also involved in the analysis and publication of a number of other skeletal collections from a wide range of archaeological periods: [1] the Late Minoan III Mochlos, Crete with Jeffery Soles (University of North Carolina); [2] Kritsa, Crete with Metaxia Tsipopoulou (Archaeological Museum, Agios Nikolaos, Crete); [3] the Early Iron Age collection from the Athenian Agora with John Papadopoulos (The Getty Museum); [4] the Medieval period burials from within the Hephaisteion, Athenian Agora with Eric Ivison; and [5] human remains from a Hellenistic well in the Athenian Agora with Susan Rotroff (Washington University) and Lynn Snyder (Smithsonian Institute).

Research Associate Sevasti Triantaphyllou (University of Sheffield) is carrying out mortuary data analysis of Prehistoric cemetery populations from Northern Greece.

Current Zooarchaeological Research

1996-97 Faunal Fellow Deborah Ruscillo (University College London) is collecting data for her dissertation (*Sexual Dimorphism in Mammalian Skeletons for Applicability in Archaeology*).

Research Associate Dr. Lynn Snyder (Smithsonian Institution) is examining faunal materials from the Frankish Complex and Demeter Sanctuary in Corinth as well as material from the Athenian Agora and two sites on Crete - Halasmenos and Kavousi.

Research Associate Dr. Ekaterini Trantalidou (Ephoreia of Palaeoanthropology and Speleology, Greece) is analyzing Late Bronze Age animal bones from several sites including: [1] Akrotiri, Thera; [2] the sanctuary of Hermes and Aphrodite in Sympy, Crete; [3] Kalamakia, Areopolis Cave; and [4] Maara cave.

Current Geoarchaeological Research

1996-98 Geoarchaeology Fellow Richard K. Dunn (University of Delaware) is working on the mid to late Holocene evolution of the alluvial-coastal plain at Marathon, the site of the 490 B.C. battle between the Athenian and Persian armies. Mycenaean to Hellenistic cemeteries and a Roman villa are also situated on the plain. Subsurface studies are determining the past shifts in alluvial, lagoonal, coastal, and shallow marine environments, and paleoenvironmental maps place the battle and other sites in their proper environmental framework. In September, Rick will begin a study of the alluvial-coastal plain at Itea, on the northern Gulf of Corinth. Situated below the site of the oracle at Delphi, the area is the probable harbor site of the sacred center. Subsurface studies will determine the extent and duration of a former marine embayment and the potential for existence of a natural harbor.

Research Associate Dr. Panajotis Karkanas (Ephoreia of Palaeoanthropology and Speleology) carries out the petrographic component of his study on diagenetic changes in the Theopetra Prehistoric cave deposits.

Former Acting Director Scott Pike (University of Georgia) continues the fieldwork and petrographic component of his dissertation research (*Archaeological Geology and Geochemistry of the Ancient Marble Quarries on Mount Pentelikon, Attica, Greece*), as well as the following projects: [1] a petrographic characterization study of Minoan calcium cemented sandstone (beachrock) quarries, East Crete with Jeffrey Soles (University of North Carolina); [2] a soil micromorphological study of selected archaeological sediment profiles from Halasmenos, Crete with Paul Goldberg (Boston University); [3] a petrographic and stable isotopic characterization study of marble quarry regions from Amorgos, Naxos, Paros and Kea Islands, Greece with Sarah J. Vaughan (University of Bristol) and Norman Herz (University of Georgia); [4] a study of stable isotope fractionation of marble temper in experimental ceramic briquettes with Vaughan and Herz; [5] the petrographic, stable isotopic and geochemical characterization of marble samples from the prow of the Athena Nike victory monument, Samothrace, Greece and the presumed marble source quarries near Lartos, Greece with Ira Mark (ISM Designs); [6] a characterization study of marble quarries from the Cycladic island of Siphnos, Greece with Herz; [7] a marble characterization project of Attic statuary from the Archaic, Classical, Hellenistic and Roman periods to determine the importation history of marble used for fine sculpture with Herz and Olga Palagia (University of Athens, Greece); [8] a marble

characterization study of the Colossal Apollo statue at Delos with Ken Sheedy (Australian Archaeological Institute); [9] the marble identification of roof tiles from Perachora with Blanche Menadier (Royal Holloway).

Research Associate Christine Shriner (Indiana University) is completing a material and technological study of Late Neolithic and Early Bronze Age ceramic products from the site of Lerna in the Argolid.

Research Associate Dr. Ruth Siddall (University College London) is working on a study of the compositions and technology of varieties of building materials used at ancient Corinth with Dr. Charles Williams (Corinth Excavations).

Ethnobotany Research

Research Associate Harriet Blitzer is working on her National Geographic Society sponsored study, "Regional Variation in Traditional Aegean Olive Cultivation - The Environmental and Cultural Contexts of Olive Cultivation and the Relationship of Olive Cultivation to Other Aspects of Aegean Culture."

Forthcoming Wiener Laboratory Publications

Vaughan, Sarah J. and William D.E. Coulson (eds.), *Paleodiet in the Aegean*, Wiener Laboratory Publication Number 1, Oxbow Books (in press).

Vaughan, Sarah J. (ed.), *The Proceedings of a Workshop on The Practical Impact of Science on Field Archaeology: Maintaining Long-term Analytical Options held in Nicosia, Cyprus on 22-23 July 1995*, Wiener Laboratory Publication Number 2 (in preparation). Contributors: Ethne Barnes, Della Cook, Richard Evershed, Paul Goldberg, G.A. Wagner, Paul Croft, Andreas Georgiades, Julie Hansen, Chris Hayward, Vasiliki Kassianidou, Walter Klippel, John F. Merkel, Rip Rapp, Jessica Johnson, Vasilis Kilikoglou, Yannis Maniatis, Alice Paterakis, Sarah J. Vaughan.

Pike, Scott with Seymour Gitin (eds.), *The Practical Impact of Science on Near Eastern and Aegean Archaeology*, Wiener Laboratory Publication Number 3, Archetype Press (in preparation). Contributors include: Magen Broshi, Tamar Dayan, Erv Garrison, Yuval Goren, Azriel Gorski, Liora Horwitz, Anne Killebrew, Mordechai Kislef, Nili Liphshitz, Arie Nissenbaum, Naomi Porat, Arlene Miller Rosen, Patricia Smith, Steven Weiner, Scott Woodward, Joseph Yellin.

Pike, Scott (ed.), *Selected Papers from a Workshop on Excavation Techniques and Treatment of Finds: Balancing the Constraints of Excavation with Conservation and Analytical Potential*, Wiener Laboratory Publication Number 4 (in preparation). Contributors include: Jane E. Buikstra, Linda Scott Cummings, Hector Neff, Arthur Rohn, Henry Schwarcz, Ruth Siddall, Ekaterini Triantalidou, Noreen Tuross, Ian Whitbread.

For additional information about the Wiener Laboratory, please contact the Director, Dr. Vanda Vitali: The Wiener Laboratory, American School of Classical Studies at Athens, 54 Souidias, Athens 106 76, Greece. Tel: (301) 723-6313; fax: (301) 729-4047; e-mail: vitali@leon.nrcps.ariadne-t.gr

Archaeological Ceramics

Charles C. Kolb, Associate Editor

Meetings

Archaeological Sciences '97 Durham was convened 2-4 September 1997 at the Department of Archaeology, University of Durham, South Road, Durham, DH1 3LE, UK. Conference information is available at the URL: www.dur.ac.uk/Archaeology/confs/ArchSci97.html. Six sessions were held: Technology, Materials Analysis and Provenance; Biochemical Studies; Environmental Studies; Poster Session; Geoarchaeology; and Chronological Studies. Based upon the preliminary program, among the 53 presentations were seven which concerned ceramic materials: "Analytical Investigation of Thermic Changes of Medieval Ceramics" (Yu. Ivachenko); "The Characterisation of Degraded Milk Fats Found in Association with Archaeological Pottery" (Stephanie N. Dudd, Lucinda M. Dudd, and Richard P. Evershed); "Retrieving Biomolecular Information from Organic Residues in Neolithic Vessels: Complementary Investigations of Both Solvent Extractable and Insoluble Polymeric Components" (Martine Regert, Stephanie N. Dudd, Pim F. van Bergen, Pierre Petrequin, and Richard P. Evershed); "Protein Screening of the Ancient Potsherd" (O. E. Craig, M. Collins, R. Stacey, C. P. Heron, R. J. Sokol, and K. Gelsthorpe); "Micromorphology of Thin Sections of Medieval Pottery from Kelso Abbey" [poster] (Emrys Phillips, Katherine Eremin, and David Caldwell); "Prehistoric Pottery-making of Japan Sea Basin (Space-temporal Context)" [poster] (Irina S. Zhushchikhovskysya); and "Luminescence Dating of Medieval Brick from Newcastle-upon-Tyne" (I. K. Bailiff and D. Holland).

The Joint Conference of the SPMA/SHA-London (Society for Post-Medieval Archaeology/Society for Historical Archaeology) will be held at the Museum of London and at the British Museum in London, England, from 3-7 November 1997. This was the second 30th anniversary joint conference (the initial SHA/SPMA-Williamsburg Joint Conference was convened in Williamsburg, Virginia, in April 1997). The London meeting featured 27 papers by British and American speakers, two of which focus upon ceramic materials: "Redwares, Borderwares & Tinglazed Wares," Beverley Nenck (British Museum), Jacqui Pearce and Roy Stephenson (Museum of London Archaeological Service); and "Excavations at the Donyaot Potteries, Somerset," Richard Coleman Smith (Director, Sonyatt Research Group). Additional information about the conference, registration and tour fees, and suggested hotels are available on the SHA website: www.azstarnet.com/~sha/spma97.htm. Questions may be directed to Geoff Eagan, SPMA-SHA, MOLAS, Walker House, 87 Queen Victoria Street, London EC4V 4AB, UK; FAX +44 171 410 2201.

A conference, "Explaining Archaeological Distribution: Production and Consumption of Mycenaean and Greek Pottery (ca. 1600-500 B.C.," will be held at the University of Amsterdam, The Netherlands, from 8-9 November 1997. For additional information, contact: Vakgroep Mediterraane

Archeologie, c/o Dr. J. P. Crieland, V. Stissi, G. J. van Wijngaarden, Oude Turfmarkt 129, 1012 GC Amsterdam, The Netherlands; telephone 31 20 5252566; FAX 31 20 5252544, e-mail: Med.Archeologie@let.uva.nl.

The Department of Scientific Research, The British Museum, London, is the sponsor of a conference entitled "Ceramic Technology and Production" scheduled for 20-22 November 1997. The conference organizers, Andrew Middleton and Ian Freestone, have issued a preliminary program that includes nine sessions with 37 oral presentations and a poster session with 50 participant. The sessions scheduled over the three days include: "The Organisation of Production" (Parts I and II, a total of nine papers), "Raw Materials and Resources" (Parts I and II, eight papers), "Interpreting Technological Processes" (Parts I and II, eight papers), "Technological Innovation and Change" (Parts I and II, eight papers), and "Social and Cultural Factors" (four papers). Thursday evening a reception and view of the exhibition "Pottery in the Making," demonstrations of pottery manufacture, and a gallery talk by Ian Freestone are scheduled. The 37 presentations include at least eight topical papers, six from Western Europe, five from the Americas, five from East Asia, four from the Mediterranean/North Africa, four from Sub-Saharan Africa, three from the British Isles, and three from Southwestern Asia. Among the 50 posters, 30 geographical/cultural areas or topics are represented, with seven topical papers, seven from England, and three from Greece among those being presented. A post-conference summary will appear in a subsequent column in the Bulletin. In addition to the conference delegates, the number of attendees that can be accommodated is extremely limited. The conference fee is 75.00 Pounds Sterling and must be paid prior to 24 October 1997. Payment may be made by credit card (Visa, Mastercard, Eurocard, JCB, etc.), Eurocheques, sterling cheques, or U.S. dollar cheques (with an additional \$5.00 to cover bank charges). For further information about the conference please contact: Mrs. Mena Williams, Department of Scientific Research, British Museum, Great Russell Street, London WC1B 3DG; Telephone +44 171 323 8279, FAX +44 171 323 8276; e-mail: M.Williams@british-museum.ac.uk.

The eleventh annual symposium "Ceramic Ecology '97: Current Research on Ceramics," co-organized and co-chaired by Charles C. Kolb and Louana M. Lackey, has been scheduled for the 96th Annual Meeting of the American Anthropological Association and will be held on Sunday, 23 November 1997 from 8:00-11:45 a.m. in the Jackson Room at the Hilton Hotel in Washington, D.C. Following an "Introduction" by Kolb there are ten papers: "A Chemical Analysis of Late Classic Pottery from the Northern Maya Lowlands," George J. Bey (Millsaps College); "Color Development in San Martin Orange Ceramics: Implications for Production, Exchange, and Consumption," James J. Sheehy (Pennsylvania State University); "Tradition and Continuity of Ceramic Production and Utilization of Clay Sources in the Vicinity of Santa Maria Atzompa from the Late Formative to the Present," Mary S. Thieme (Vanderbilt University) and Donald M. Thieme (University of Georgia); "Pottery Use Life and Discard in the

Lake Patzcuaro Region, Michoacan, Mexico: A Preliminary Ethnoarchaeological Report," Michael Shott (Northern Iowa) and Eduardo Williams (Colegio de Michoacan, Mexico); "Female Pottery Merchants in Korea: Gender, Status, and the Construction of Identity," Robert Sayers (National Endowment for the Humanities); "Persistence of Memory: The Mediterranean Slip Trailing Tradition," Marcia Selsor (Montana State University-Billings); "Early Islamic Lead Glazes and Long Distance Exchange," Peter Grave (University of New England, NSW, Australia) and Lisa Kealhofer (College of William and Mary); "White Clay Smoking Pipes: Provenance and a Critique of 'Pipe Stem Dating' as a Technique Applied to a Homogeneous Collection from Barcelona, New York," Charles C. Kolb (National Endowment for the Humanities); and "Sherds and Patches: Recent Research in Ceramic Studies," Louana M. Lackey (Maryland Institute College of Art). The discussant is Christopher Pool (University of Kentucky). The symposium series honors Fred Matson, Emeritus Professor of Archaeology and Emeritus Professor of Ceramic Engineering at The Pennsylvania State University, for his contributions to ceramic studies.

The 31st International Symposium on Archaeometry will be held in Budapest, Hungary, 27 April-1 May 1998, organized by the Hungarian National Museum and 15 other distinguished institutes of Hungarian culture and sciences. The organizers are soliciting abstracts (oral presentations and poster sessions) for four scientific sessions: 1) Biomaterials (osteology, plant remains, residues, etc.); 2) Dating (organic and inorganic materials); 3) Field Archaeology (prospection and geoarchaeology); and 4) Technology and Provenance of: a) metals, b) ceramics/glass, c) stone/pigments/plaster. Abstracts are due 1 November. Downloadable forms and further details are available from their website: <http://origo.hnm.hu/ametry98/homep1.html>. Contact: Katalin T. Biró, Hungarian National Museum, Department of Information, H-1450 Budapest Pf. 124, Hungary; tel/fax 36-1-210-1338; email H5852tbi@ella.hu.

The 14th International Congress of Anthropology and Ethnological Sciences (IUAES) will be hosted by The College of William and Mary, Williamsburg, Virginia, from 26 July-1 August 1998. The IUAES theme is "The 21st Century: The Century of Anthropology." Twenty-two symposia have been organized and announced; archaeological materials will be included in a "Symposium on Museums and Cultural Heritage." This symposium will be chaired by Dr. Mohan K. Gautam, Kern Institute, University of Leiden, Box 9515, 2300 RA Leiden, The Netherlands. Telephone: 31-71-272-620, fax: 31-71-273-118, email: gautam@rullet.leidenuniv.nl. The deadline for the receipt of abstracts is 15 October 1997. For information about the programs, contact: Dr. Tokomo Hamada, 14th Congress Executive Secretary and Program Chair, Department of Anthropology, The College of William and Mary, Williamsburg, VA 23187-8795. Telephone: 757/221-1060, fax 757/221-1066, e-mail: thamad@facstaff.wm.edu. Other inquiries should be directed to Ms. Oriana Casadei, The 14th Congress Logistics Coordinator, The College of William and Mary, Williamsburg, VA 23187-8795. Telephone: 757/221-1870, fax 757/221-1734, e-mail: oxcasa@facstaff.wm.edu

Newsletters

ACRO Update: *Quarterly Newsletter of the Asian Ceramic Research Organization*, edited by Chuimei Ho, has a new, preferred, mailing address: ACRO, P.O. Box 595, Chicago, IL 606090-0595. Fax: 773/296-6298. The latest issue, May 1997(1), has just been mailed to subscribers.

Jim Corbin, editor of *La Tinaja A Newsletter of Archaeological Ceramics*, has a new e-mail address: JCORBIN@SFASU.EDU Volume 10(1) has been mailed and 10(2) is in press.

Art and Archaeology Technical Abstracts

A very important finding aid, *Cumulative Index to AATA Volumes 11-25*, has just been published by the Getty Trust. This two-volume subject and author index covers 15 years of *Art and Archaeology Technical Abstracts* (1974-1988) and includes approximately 29,000 abstracts. Volume One, 1174 pages (ISBN: 0-89236-407-6), and Volume Two, 1234 pages (ISBN: 0-89236-408-4), are sold as a set to individuals for \$70.00 or to institutions for \$135.00 (plus postage and handling). For additional information, please contact: Getty Trust Publications, P.O. Box 49659, Los Angeles, CA 90049-0659. Telephone: 800/223-3431 or 818/778-6943, fax: 818/779-0051.

AIA Awards

In December 1996 the Archaeological Institute of America presented the 16th Pomerance Award for Scientific Contributions to Archaeology to W. David Kingery, Regents Professor of Anthropology and Materials Science and Engineering at the University of Arizona. This award, which also celebrated his seventieth birthday, was made in recognition of his "pathbreaking studies in the history of ceramics and his notable contributions as a writer and an editor to our understanding of technological innovation and the social context of technology in the past." He was recognized for his many articles, book chapters, and books, including *Ceramic Masterpieces* (1986), co-authored with Pamela Vandiver, *History from Things* (1993), co-edited with Steven Lubar, and *Learning from Things* (1996). Professor Kingery has also edited six volumes to date in the series *Ceramics and Civilization*, published by the American Ceramic Society. He is currently editing the seventh volume in the series entitled *History and Prehistory of Ceramic Kilns* which documents a symposium on this subject, co-organized by Kingery and Prudence Rice, which was held at the annual meeting of the American Ceramic Society in Indianapolis in 1996. The full text of the award may be found in the column to the right.

The Archaeological Institute of America Fellowships Committee awarded the 1997-1998 Harriet and Leon Pomerance Fellowship to Robert Angus K. Smith, a doctoral candidate at Bryn Mawr College, for "Regionalism and Pottery in Late Minoan III A-B Crete."

P. Roger S. Moorey was the recipient of the Archaeological Institute of America's James R. Wiseman Book Award for 1996 for his volume *Ancient Mesopotamian Materials and Industries: The Archaeological Evidence* (Oxford: Clarendon

Press, 1994). The book is a revision and emendation of Moorey's 1985 publication, *Materials and Manufacture in Ancient Mesopotamia: The Evidence of Archaeology and Art* (Oxford: British Archaeological Reports International Series 237). The text of the Book Award notes that this 1994 magnum opus takes its place beside Alfred Lucas's *Ancient Egyptian Materials and Industries* (in its 4th and last edition, 1962, with J.R. Harris) as "one of the most useful and long-lasting reference works...." Moorey's newest volume is an essential resource on Southwest Asian clays and ceramic technologies, as well as other raw materials forms of material culture, including residues, for the period 8000-300 B.C.E.

I look forward to receiving information from you for the next issue of the *SAS Bulletin*.

AIA Pomerance Award for Scientific Contributions to Archaeology

W. David Kingery

This year's Pomerance Medal winner, like those before him, has contributed a lifetime of experience and scientific knowledge to the needs of the archaeological community. The Pomerance Award honors a professional or amateur scientist, or a team of scientists, whose interdisciplinary work with archaeologists merits recognition.

From the citation:

The Pomerance Award is made to W. David Kingery, Regents Professor of Anthropology and of Materials Science and Engineering at the University of Arizona in recognition of his pathbreaking studies in the history of ceramics and his notable contributions as a writer and an editor to our understanding of technology innovation and the social context of technology in the past.

Dr. Kingery received his Ph.D. from Massachusetts Institute of Technology in 1949 and rapidly became the leading figure in the development of high-performance ceramics for modern technology. Dr. Kingery and the British archaeometrist Michael Tite, working independently, were largely responsible for applying electron microscopy to the study of ancient ceramics, plasters, refractories, glasses, and glazes. His work has transformed our understanding of the origins of pyrotechnology in the Neolithic of the Near East, while his many publications have enhanced our understanding of, and pleasure in, the fine ceramics of Classical Greece, China, and the Renaissance.

Professor Kingery's accomplishments have enriched archaeology, art history, and the history of technology, and have profound implications for our understanding of the role of technology, technological innovation, and technology transfer in past societies.

Archaeometallurgy

Martha Goodway, Associate Editor

Meetings

The 31st International Symposium on Archaeometry at the Hungarian National Museum has been announced for 27 April-1 May 1998. The conference fee will be about US\$200, US\$80 for students. Abstracts are due November 1, 1997. Write Katalin T. Biró, Hungarian National Museum, Department of Information, H-1450 Budapest Pf. 124, Hungary; tel/fax 36-1-210-1338; email H5852tbi@ella.hu. Downloadable forms and the latest information on Archaeometry '98 is available on the World Wide Web at <http://origo.hnm.hu/ametry98/homep1.html>.

The Fourth International Conference on the Beginning of the Use of Metals and Alloys - BUMA IV - has been announced by the Japan Institute of Metals for 25-27 May 1998 in Matsue, Shimane, Japan. There will be a field tour on May 28 and 29. Preliminary registration can be made immediately to: BUMA IV Secretariat, Prof. Hiroyuki Katayama, Faculty of Science and Engineering, Shimane University, Nishi Kawazucho 1060, Matsue, 690 Japan; telephone 81-852-32-6517, fax 81-852-32-6598, email: kata@riko.shimane-u.ac.jp. Do not forget to include your address and fax number. One-hundred-word abstracts are due 30 June 1997. Registration will be Y40,000 reduced to Y30,000 if received by March 1998. Complete information is posted on the World Wide Web at: <http://wwwsoc.nacsis.ac.jp/jim/06-17.html>.

The 1997 Archaeological Sciences conference, Archaeological Sciences '97, has been announced by the Department of Archaeology of the University of Durham for the 2nd to 4th of September. The subject matter is quite broad, ranging from human evolution and biochemical analysis to geoarchaeology. The address for further information is: South Road, Durham DH1 3LE UK; telephone 44-191-3743625; fax 44-191-3743619; email A.R.Millard@Durham.ac.uk.

Publications

The proceedings of the previous meeting, held at Liverpool, *Archaeological Sciences 1995*, edited by A.G.M. Sinclair, E.A. Slater, and J.A.J. Gowlett, was published last November in two volumes; each volume is priced at £35.00 and can be obtained from Oxbow Books, Park End Place, Oxford OX1 1HN, UK; fax 44-1865-794449.

Donald B. Wagner's new book is *The Traditional Chinese Iron Industry and its Modern Fate*, which explores the economic history of the Chinese traditional iron industry in the 19th and 20th centuries. It includes a discussion of the results of traditional methods of iron production during the Great Leap Forward of 1958-9 and the author points out some of partial successes in what is generally conceded to have been a massive failure. A version can be seen on World Wide Web at <http://coco.ihl.ku.dk/~dbwagner/Fate/Fate.html>. The book (ISBN 0-7007-0951-7) is in hardcover, has 128 pages and is published by the Nordic Institute of Asian Studies in Copenhagen and Curzon Press, London. Limited quantities are available until August at half price, £17.50, from the Nordic

Institute. They accept American Express, Visa and MasterCard. Orders can be sent to books@nias.ku.dk.

A monograph on the archaeological corrosion of bronze has been published by the The Central Board of National Antiquities and the National Historical Museums in Sweden as *Konserveringstekniska Studier Rapport RIK 10: Deterioration of Archaeological Material in Soil: Results on Bronze Artefacts*, by Einar Mattson, Anders G. Nord, Kate Tronner, Moniker Fjåstad, Agneta Lagerlöf, Inga Ullén and Gunnar Ch. Borg. They have examined artefacts and the soil from which they were excavated as well and subjected their data to multivariate statistical analysis. There is also a section on deterioration of objects in collections. The book is in English and is available (ISBN 91-7209-014-6, ISSN 1101-4725) for 300SeK from Riksantikvarieämbetet Informationsavdelningen Förlagsenheten, Box 5405, S-114 84 Stockholm, Sweden.

The Archaeotechnology section in the *JOM, the Journal of the Mining, Metals, and Materials Society* conducted by Robert Ehrenreich presented "Mining communities in history: an Industrial legacy" in the December 1996 issue (pp. 54-56). This is his report of the conference in July on the social, spacial and ideological foundations of mining that was organized by Bernard Knapp, Vincent C. Pigott and David Killick in Bellagio, Italy.

In the March 1997 issue Carol Meyer of the Oriental Institute of the University of Chicago presented "Bir Umm Fawakhir: insights into ancient Egyptian mining" (pp. 64-67.) The site is located in the desert east of Luxor and is (for Egypt) rather late, dating to the 4th and 5th centuries AD in the Coptic (Byzantine) period, though there is evidence of earlier exploitation. Meyer's survey shows a mining settlement estimated to have supported as many as a thousand workers, and gold values well below mines of the pharaonic period, strongly suggesting that these had already been mined out. A hypertext-enhanced version of her article can be found at <http://www.tms.org/pubs/journals/JOM/9703/Meyer-9703.html>.

In the May issue (pp. 61-65) Thomas L. Sanders reports in "Manufacturing the American ax: radical technological change" on blacksmithing experiments that shed light on the development in the early 19th century of the wedge axe from its European antecedents. It is based on his master's thesis at the University of Minnesota, and includes measurements of time, material and fuel consumption that have the surprising result that a Merovingian axe used the least amount of fuel but was the most wasteful of iron, while the American wedge axe required significantly more time and fuel, but was the most economical of iron of the three types forged. Their efficiency was measured in cm/min of standing Siberian elms cut, with the wedge axe 46 percent more efficient than the European axe. Saunders is at Historic Fort Snelling, Fort Snelling History Center, St Paul MN 55111; telephone 612-726-1171; fax 612-726-2429; email snd0114@gold.umn.tc.edu.

The Archaeotechnology section is now available on the web at: <http://www.tms.org/pubs/journals/JOM>. If you have questions or wish to contribute you can reach the series coordinator at: rehrenre@nas.edu.

"Science and art converge at the National Gallery of Art" by L. Glinsman and D. Barbour was the cover story of the

January 1997 issue of *JOM* (pp. 14-17.) It included several brief case studies, including radiography of the Gallery's cast of *The Thinker* by Auguste Rodin, which revealed the placement inside the sculpture of the lead weight used to counterbalance the figures's pronounced forward lean. Further information is available from L. Glinsman, National Gallery of Art, Conservation Department, Washington DC 20565 USA; telephone 202-842-6217; fax 202-842-6886. (There is also an article by Ole J. Kleppa in this issue, "The Institute for the Study of Metals: the first 15 years" (pp.18-20), that mentions the late Cyril Stanley Smith.)

News and Announcements

Colleagues of W. Thomas Chase, III, the long time Director of the Conservation Laboratory of the Freer Gallery of Art and later of the Arthur M. Sackler Gallery as well, were taken by surprise by his sudden decision to retire after thirty years at the Smithsonian Institution. He continues at the Freer and Sackler Galleries as a research associate and plans to devote himself full time to research and consultation. He can be reached at 4621 Norwood Drive, Chevy Chase MD 20815 USA, telephone 301-656-9416, email: TChase4921@aol.com.us.

In Austria there are many metallurgical sites worthy of a visit. Among them is the Radwerk IV Blast Furnace, dating to 1846, in Vordernberg. For information about this furnace and other exhibits and remnants of charcoal iron smelting in Vordernberg, call 43/3849-283. Nearby at Eisenerz mountain there is a mine for iron ore that can be visited both above and below ground. Eisenerz also offers one- to five-day forging courses. For information call 43/3848-3200 or 43/4531-370.

Atalaya Tours has postponed the 1997 Mining Study Tour to India to January 1998. To the other Mining Study Tours such as Western Britain in September has been added one to Mexico, from Real del Monte to Durango, in late September/early October. For further information write Atalaya Tours Ltd., Ceinionfa, Capel Dewi, Aberystwyth SY23 3HR, UK; telephone and fax 44-1970-828989.

Brookgreen Gardens at Murrell's Inlet, South Carolina, hosted a sculpture workshop August 21-23 sponsored by National Center for Preservation Technology and Training of the National Park Service, SOS(Save Our Sculpture), the Southeastern Museums Conference, the North Carolina Museums Council and the South Carolina Federation of Museums. If you have any information about this meeting, or any other news to share or comments to make, please write or call: Martha Goodway, Smithsonian Institution MRC 534, Washington DC 20560 USA; tel. 301-238-3700 x164; fax 301-238-3709; e-mail cal.meg@cal.si.edu.

4th Meeting of the World Archaeology Congress

January 10-14, 1999
Cape Town, South Africa

<http://www.uct.ac.za/depts/age/wac>

Remote Sensing and GIS

Apostolos Sarris, Associate Editor

First Congress of the Balkan Geophysical Society, Athens, Greece, 23-27 September 1996

The first Congress of the Balkan Geophysical Society was the result of the efforts of the Geophysical Unions of the Balkan states to establish a platform of communication and co-operation among the various institutions that are involved in the area of geophysical research in the wider Balkan region. The organizing committee was drawn from members of the Hellenic Geophysical Union, which hosted the Congress at Zappeion Conference Centre. The forum attracted a large number of scientists from all over the world with main research interests in the area of the Balkans. About 25 companies were also present in the exhibition halls of the conference centre. Among the variety of subjects, archaeological prospection was one of the areas that attracted the interest of the participants, capturing the status of research in this particular field of geophysical surveying. The presentations included: Drahor, M. G., "A Large Scale Geophysical Prospection on the Acemhoyuk and Magnetic Research on the Amphorae Workshop Sites at the Sinop Region-Turkey"; Ercan, E., Baysal, H. & Yildiz, H., "Archaeogeophysical Investigations at Egmir Hellenistic Tomb; Denizli, Turkey"; Ercan, A., Temizsoy, I. & Kaya, V., "Archaeogeophysical Investigations of Kulhoyuk Ancient Settlement Hill (Hittite and Hattie Periods), in Anatolia, Turkiye"; Georgiev, M., Stoev, D., Velkovski, K. & Georgieva, K., "Prospecting of a Prehistoric Settlement Using Geophysical Methods"; Kavaja, V., Nacuci, I., Drini, F., Reci, H. & Vincani, F., "Some Results of Geophysical Prospecting in Archaeological Sites of Butrinti and Apollonia"; Kovacheva, M., "Geomagnetic Palaeosecular Variations and Archaeology"; Sarris, A., Tsokas, Gr., Vargemezis, G., Sideris, G., Tokmakidis, C., Avxhiu, R., "Geophysical Surveying and Photogrammetry at the Acropolis of Bouthrotos, S. Albania"; Sayin, N., "Determination of Archaeological Sites in Menekse Gatagi Region by Geophysical Methods"; Spatharas, V., Jordanova, N. & Karloukovski, V., "Magnetic Anisotropy Studies on Greek Pottery and Bricks"; Tonkov, N. H., "Geophysical Prospecting of Thracian Funeral Tumuli in "The Valley of Kings"; Tsokas, Gr., Sarris, A., Tsourlos, P., Papazachos, C. & Giannopoulos, A., "A large Geophysical Survey in Makrygialos (Pieria), Greece"; Tsokas, Gr., Savvaidis, A. S., Stabolidis, A., Liritzis, Y. & Apostolou, M. "The Location and Mapping of Ancient Ruins on the Castle of Lefkas (Greece) by Resistivity and GPR Methods"; Vafidis, A., Sarris, A., Oikonomou, N. & Kalpaxis, A., "Geophysical Survey in the Archaeological Site of Itanos, Lasithi, Greece".

Third Symposium on Archaeometry of the G.S.A., Athens, Greece, 6-10 November 1996

The Greek Society for Archaeometry (G.S.A.) hold its 3rd Symposium on Archaeometry in Athens, Greece. The organizing committee was drawn from the Archaeometry Laboratory of the N.R.C.P.S. "Demokritus", Ministry of

Culture, Technical Educational Institute, Institute of Archaeology of Crete and Thetis Hellas, Ltd. The oral presentations and posters covered a wide range of subjects attracting more than 180 participants from 10 countries.

The conference included a session on the *Dating of Organic and Inorganic Materials* covering the areas of Radiocarbon Dating, Optical Dating and Thermoluminance. The involvement of physical sciences in the study of the caves "Kalamakia" Areopolis in Mani and Theopetra in Thessaly, the prehistoric settlement of Archontiko in Giannitsa, the port of Nestor and the wider area of Diros in Laconia was discussed in the session entitled *Paleoenvironment and Geoarchaeology*. The first day of the Symposium concluded with a session on *Geophysical Prospection* that reflected the most current research in the Greek territory, including the underwater survey in Eliki and Pylos, geoelectric tomography in Europos, GPR surveys in Cyprus and Santorini and soil resistance and magnetic surveys in Epanomi, Makrygialos and Panakton.

Characterization-Technology and Provenance Studies was the main topic of the second day of the symposium. The 20 oral presentations of this session were focused on the ancient marble quarries, the study of glass materials, the archaeometric analysis of pottery and the technology of wall paintings. The papers in the session reflected the results of the analysis of finds from the wider Mediterranean region, including Aegean, Balkans and Cyprus. A number of techniques (XRF, petrographic analysis, X-ray Tube Imaging, Neutron activation, 3-D imaging, atomic absorption, SEM, a.o.) used in the characterization and provenance studies was also presented in the discussion of the corresponding studies. The oral presentations in the session on *Organic Residues Studies* discussed the origin of Iron Age amber artifacts from Bulgaria, the implication of paleo-odontologic and trace mineral analysis in paleodiet, the usage of bone aminoacids, the experimental carbonization of vineyard products and the importance of conservation of organic residues. Archaeometallurgy was also one of the topics that attracted a large number of participants. In the session entitled *Ancient Metals* participants addressed a variety of topics such as ancient quarries, silver vessels, post-Byzantine metallic threads, coins, plasters, etc.

The thematic session of the conference was devoted to the *Technology and Trade of Lithic Materials and Metals in the Eastern Mediterranean during Prehistory*. The six presentations of the session covered an overview of the provenance and trade of obsidian in Aegean, the exchange obsidian models in Neolithic Thessaly, the raw materials used for the production of polished lithic tools from Thrace, the chipped stone provenance from Neolithic sites in Northern Greece, the acquisition and distribution of copper and tin on mainland Greece in LBA and the Bronze Age woodworking industry. The final day of the symposium was concluded with a session on the *Mathematical and Statistic Methods*. In this session, talks addressed specific topics such as the application of Markov Chain Monte Carlo methodologies to archaeological classification problems, the qualitative analysis of scenes on classical Attic gravestones, the Mycenaean mathematics and the ancient social accounting.

The *poster session* hosted 33 posters covering the whole range of topics discussed in the oral sessions. In the closing remarks of the symposium a few issues were stressed including the need of controlled conditions in geophysical prospection surveys, the cultural implications in the study of the production and exchange models and the future of mathematical and statistical methods in archaeological research. The symposium was concluded with a lecture at the Italian Archaeological School of Athens by prof. F. Lombardi and Dr. M. Vidale on "The casting cores of Large Bronze Statues: New evidence and research perspectives".

The abstracts of the symposium have been already published with the support of the journal "Archaologia & Technes" and the proceedings of the symposium are expected to be published in 1997.

Other Symposia

International Workshop "Electric, Magnetic and Electromagnetic Methods Applied to Cultural Heritage", Sept. 29-Oct. 1, 1997. Organizing Secretariat: Centro Italiano Congressi cic sud, tel. 0039-80-5043737, fax. 0039-80-5043736, e-mail:cicsud@pangeanet.it. Scientific Secretariat: Antonella Argentero, tel. 0039-6-90625274, fax. 0039-6-90672373, e-mail:argent@milib.cnr.it

A WEB site on the Archaeology of Malta.

A new WEB site (<http://www.tourism.org.mt/specials/archaeology>) has been established featuring the archaeology in Malta, while *Archaeology* magazine's July/August issue focuses on the island's cultural heritage. The archaeological content of the site has been written by Anthony Bonnano, Professor of Archaeology and Head of the Department of Classics and Archaeology at the University of Malta. Visitors to the WEB site will find information on the megalithic temples, Phoenician influence, Roman times, and even the latest discoveries and archaeological campaigns.

Geometrics Acquires Blackhawk Geosciences

Blackhawk Geosciences, a geophysical service provider, was acquired by Geometrics, manufacturer of geophysical instruments. Address: 395 Java Drive, PO Box 3497, Sunnyvale, CA 94089. Tel 408-734-4616; fax 408-745-6131.

About the Associate Editor

Dr. A. Sarris received his Ph.D. in Physics/Geophysics at the University of Nebraska-Lincoln (1992). He has been involved in archaeological prospection and remote sensing for 10 years, working in the U.S., Greece, Cyprus and Albania on more than 30 projects. He is currently a researcher at the Laboratory of Geophysical-Satellite Remote Sensing at the Institute of Mediterranean Studies, Foundation of Research & Technology. He teaches Space Science and Satellite Remote Sensing at the National Airforce Academy and has been a lecturer at the European Division of the University of Maryland. Dr. A. Sarris is a member of the Society of Greek Physicists, the Society of Greek Geophysicists, the European Geophysical Society and the Geological Society of America.

Archaeological Dating

W. Jack Rink, Associate Editor

It is a great pleasure to join in the activities of the *SAS Bulletin*. I hope to contribute in a variety of ways, with a view to keep you informed on developments in dating technology, to comment on interesting and controversial findings, and to suggest where to find great reading. This issue, I'll introduce myself and then whet your appetite for the dating game with some recent developments in the field. My work is focused on the use of electron spin resonance (ESR), luminescence and uranium-series dating, and aspects of the development of the former two methods. I began my Ph.D. work in geology in 1985 at Florida State University on ESR in quartz as old as one billion years. I rapidly moved up the geological timescale when I realized I could contribute to problems in Palaeolithic archaeology within Quaternary time, which encompasses the last two million years of earth history. Since beginning my work on "things archaeological" while on a postdoctoral fellowship at the University of Cambridge (UK) in the Godwin Lab, Subdepartment of Quaternary Research, I moved to Canada in 1992 to continue this work at McMaster University Department of Geology.

Being the skeptic that I am, my work with ESR dating of tooth enamel has involved a great deal of dating intercomparison and fundamental study, and this has taken me into the field to a large number of sites in contexts ranging from desert environments to open river valleys and karstic caves in humid climates. This range of field experiences has been broadened since I built a luminescence dating laboratory, where I work on burned flint with thermoluminescence and windblown and waterlain sediments using optically stimulated luminescence dating techniques. With these approaches, I am currently dating the stone tool assemblages at Rosh Ein Mor and Boker Tachtit in the dry wadis of the Negev desert of Israel through a grant from the L.S.B. Leakey Foundation. Beyond the archaeological realm, I use these dating techniques in problems of dating faults and for studying questions of ancient sea level and regional tectonic motion. I also use mass spectroscopy for high precision U-series dating of archaeological calcite, teeth and ostrich egg shell.

Beyond dating, I recently began a collaboration with Dr. Kevin Smith of the Buffalo Museum of Science on using ESR to determine the geological age of jaspers used in stone tools in the Arctic. In particular, we are working on the provenance of a jasper microblade core which unexpectedly turned up in an Icelandic site dated to circa AD 870. The identity of the source material for this object is critical to long established ideas about the Norse as the earliest inhabitants of Iceland. Our preliminary results, supported by neutron activation analysis, suggest that the source is a local Icelandic jasper of young geological age, raising the possibility of an earlier Arctic Palaeoindian presence in Iceland. This work has been exciting and quite different from the dating research.

Recent important publications for the ESR and Luminescence dating community and the end users of these technologies are the latest issues of *Radiation Measurements*

(v. 27, 1997) and Quaternary Science Reviews (*Quaternary Geochronology* v. 16, 1997). These are the conference proceedings of the 8th International Conference on ESR and Luminescence Dating, held in Canberra, Australia from 22-26 April, 1996. In these volumes readers will find the most recent technical discussions on the dating methodologies, and some exciting new dating results, as well as important developments in instrumentation. In addition, a special edition of *Radiation Measurements* was organized by Ann Wintle (Institute of Earth Studies, Aberystwyth, Wales) and Steve McKeever (Department of Physics, Oklahoma State University, USA). Publication is scheduled for late 1997 and it will contain a series of invited review articles of specific applications in these fields of dating research. My own contribution is entitled Electron Spin Resonance Dating in Quaternary Science and Archaeometry, and there will also be a review article from Dr. Bert Roberts of La Trobe University on Luminescence Dating in Archaeology.

Radiocarbon update: Internet Resources

Contributed by Dr. Thomas Higham, Radiocarbon Dating Laboratory, University of Waikato, Hamilton, New Zealand (Thigham@waikato.ac.nz)

In the past two years, some of the world's ^{14}C laboratories have developed an Internet presence via World Wide Web (WWW) based servers. This article describes briefly some interesting stops in the ^{14}C world on the web.

At least 22 radiocarbon laboratories now offer WWW pages illustrating their services and providing information on their analytical techniques, prices, turnaround times, pretreatment and sample preparation methods and laboratory research. At Oxford University in England, the AMS Unit provides WWW pages which include a background on research into the use of radiocarbon in archaeology by AMS, as well as downloadable versions of their Windows-based calibration programme OxCal (<http://units.ox.ac.uk/departments/rlaha/>). This program allows Bayesian statistical analysis of radiocarbon determinations and their stratigraphic sequences and phases. The Quaternary Isotope Laboratory at the University of Washington in Seattle also provides click and download access to their computer programme CALIB 3.0.3 for radiocarbon age calibration (<http://weber.u.washington.edu/~qil/>).

Beta Analytic Inc. (Miami, Florida) present a useful page explaining their calibration printout which they provide for each radiocarbon determination from their facility (<http://www.win.net/~analytic/>). US laboratories NOSAMS (National Ocean Sciences AMS) at Woods Hole, and PRIME laboratory at Purdue University in Indiana, offer WWW-based search engines which enable submitters to check on the status of their samples within the laboratory. At PRIME, the accelerator schedule is updated weekly online to allow submitters to ascertain the position of their samples in the queue. The

respective URLs for these laboratories are ams245.who.edu/nosams.html and primelab.physics.purdue.edu/web/primelab/

Many radiocarbon facilities offer sample submission forms to download off the internet but at the Waikato University Laboratory in New Zealand, submitters can complete a WWW forms-based document which can be filled out and submitted online, and from there transferred simply onto the lab database (<http://www2.waikato.ac.nz/c14/>). The Radiocarbon Laboratory at the University of Texas has prepared an extensive list of information regarding sample preparation and pretreatment protocols in their laboratory, many of which are applicable in other labs (http://www.utexas.edu/research/vprl/rc_lab/index.html). At the Desert Research Institute ^{14}C facility in Las Vegas, there is useful background information provided regarding the pathway of ^{14}C in the global reservoirs (http://www.maxey.dri.edu/WRC/Radiocarbon_Lab.html).

At the home page for the journal *Radiocarbon* (<http://packrat.aml.arizona.edu/>), related ^{14}C information is available including access to radiocarbon databases and abstract lists, details of *Radiocarbon* publications and abstracts from the journal itself. You can also find contact details for the 130 known active radiocarbon facilities around the world. Assistant Editor David Sewell, the person responsible for the journal's internet presence, has also made available an online version of the key 1977 ^{14}C paper by Minze Stuiver and Henry Polach concerned with radiocarbon conventions. In 1995, Radiocarbon developed an online journal called *Radiocarbon Date Lists* (<http://packrat.aml.arizona.edu/datelist.html>). Lists of dates were formerly published in the journal itself but this was discontinued recently. The online version is fully refereed and has been developed to fill the gap left and ensure that there is a suitable place to publish laboratory lists which often are not released from laboratory databases. *Radiocarbon* also operates the C14-Listserv, an unmoderated email discussion group for radiocarbon specialists and other individuals interested in scientific dating generally. At <http://listserv.arizona.edu/lsv/www/c14-l.html> an archive of previous listserv mail is available for perusal. To subscribe to C14-L, consult <http://packrat.aml.arizona.edu/announcements/c14-l.html>.

The Centre for Isotope Research in Groningen, Netherlands hosted the 16th International Radiocarbon conference in June 1997. The conference programme is online at <http://www.cio.phys.rug.nl/16proc-2.html>.

All URLs for the laboratories and pages described above are available at Radiocarbon WEB-info, a WWW resource containing information brought online by the Radiocarbon Laboratories at Waikato (NZ) and Oxford (UK) (<http://www2.waikato.ac.nz/c14/webinfo/index.html>). This site contains information regarding the basis of the ^{14}C method of dating, methods of measuring ^{14}C , radiocarbon calibration, links to other laboratory pages and a list of references. In addition, it provides links to WWW pages which illustrate the application of radiocarbon dating to archaeology. Some pages include the recent online report and dating program from Stonehenge (by Ancient Monuments Laboratory and English Heritage Scientific Dating Service, UK), the Origins of Angkor Archaeological Project (University of Otago, NZ) and the radiocarbon dating of rock art sites from the Ardeche in France.

The internet resources provided by radiocarbon specialists thus far have been dominated by laboratories providing material of interest to submitters of radiocarbon samples. At present, this is its most common use. Developments in user-friendly web based servers provides the opportunity

for archaeologists to literally "shop around" for information regarding prices and turnaround time, and obtain rapid contact with radiocarbon specialists, but little in the way of laboratory Quality Assurance program performance and details of reproducibility have appeared yet.

Databases of radiocarbon determinations will probably find their most useful location on internet servers. Presentation of information and reports of radiocarbon determinations from different contexts are usually not peer reviewed and it goes without saying that caution is required in their uncritical use.

Special issue of *Israel Journal of Chemistry*

Vol. 35, no. 2, 1995, "Archaeological Chemistry"

Guest editors: Arie Nissenbaum & Stephen Weiner

Articles include: Metals in ancient Israel: archaeological interpretation of chemical analysis (S. Shalev); High-performance liquid chromatographic analysis of an ancient Tyrian purple dyeing vat from Israel (Z.C. Koren); New heavy isotope studies in archaeology (P. Budd, R. Haggerty, A.M. Pollard, B. Scaife & R.G. Thomas); Stable isotopes of carbon and oxygen as a possible new tool for estimating firing temperatures of ancient pottery (A. Nissenbaum & A. Killebrew); Thermoluminescence dating and the problem of geochemical evolution of sediments - a case study: the Mousterian levels at Hayonim (N. Mercier, H. Valladas, J.L. Joron, S. Schiegl, O. Bar-Yosef & S. Weiner); Mineral assemblages in Kebara and Hayonim Caves, Israel: excavation strategies, bone preservation, and wood ash remnants (S. Weiner, S. Schiegl, P. Goldberg & O. Bar-Yosef); On early myths and formative technologies: a study of Pre-Potter Neolithic B sculptures and modeled skulls from Jericho (Y. Goren & I. Segal); A multi-disciplinary contribution to the provenance determination of ancient Greek and Roman marble artifacts (L. Moens, P. de Paepe & M. Waelkens); Trace element characteristics of central Anatolian obsidian flows and their relevance to prehistory (J. Yellin).

Available for purchase from Laser Pages Publishing, POB 50257, Jerusalem 91502, Israel. Fax 972-2-370625; e-mail laserpages@netmedia.co.il

New Email Lists for XRF and Plasma Chemistry

To join, email [separately] the following messages as the only text to listserv@listserv.syr.edu:

subscribe PlasmaChem-L [first name] [last name]

subscribe XRF-L [first name] [last name]

Bioarchaeology

David B. Landon, Associate Editor

International Council for Archaeozoology - Meeting Announcement and Call for Papers

The International Council for Archaeozoology and the University of Victoria Department of Anthropology would like to invite you to attend the 8th International Congress at the University of Victoria, Victoria, British Columbia, Canada on August 23-29, 1998.

The Organizing Committee of the Eighth International Congress of the International Council for Archaeozoology invites proposals for sessions and workshops, and abstracts for papers and posters to be delivered as part of the conference programme. Sessions already proposed are shown below. Authors should indicate which session is desired, if possible, but the final decision on categorization is reserved to the Organising Committee as part of its acceptance decision.

Proposed Sessions

1. Dogs: Origins, regional variation and breed development in dogs. Chair: Susan Crockford; 2. High Resolution Faunas at the Pleistocene/Holocene Boundary. Chair: Jon Driver; 3. Reassessing Evidence for Mousterian Hunting Patterns. Chair: Ariane Burke; 4. Introductions and Extinctions on Oceanic Islands: Evidence, Issues and Theory. Chair: Atholl Anderson; 5. Archaeozoology of Oceanic Marine Taxa: The State of the Art; 6. Oceanic Midden Analysis: Problems, Methods and Results; 7. Patterns of Faunal Exploitation in Pacific Prehistory: From Observation to Explanation.

Queries and session proposals may be directed to: Rebecca Wigen rjwigen@uvvm.uvic.ca or Quentin Mackie qxm@uvic.ca

Format

The abstract should be 300-500 words long in English, the conference language. Use 12 point Times Roman plain throughout. Use standard 21x29.7 cm paper with 4 cm top and bottom margins and 3 cm side margins, or use 8.5x11 inch paper with 1.5 inch top and bottom margins and 1.25 inch side margins. Center the title in bold capital letters as the first item, followed by a vertical space and then the names(s) of the author(s). Type the affiliation address (typed as it should appear on a mailing envelope) immediately below each author's name. After skipping two lines, the body of the abstract should be typed with single spacing and no indentation for paragraphs. After the body of the abstract leave four (4) lines. Add information about conference theme most suited to your presentation and whether you are willing to chair a session.

Method of Submission

Abstracts will be accepted in a variety of formats, although electronic mail is preferred.

1. Electronic Mail: File format must be MS Word 7.0 for IBM-PC or MAC, or WP 5.1. Please send to ICAZ98@uvcs.uvic.ca as an un-encoded or BinHex attachment, or as ASCII text in the message body.

2. Regular mail: on 3.5 inch disk DOS or MAC, plus a hard copy sent to ICAZ98, Conference Management, Division of Continuing Studies, University of Victoria, University Centre 2nd. Floor, Room A277, Box 3030, Victoria, BC, Canada, V8W 3N6. 3. Fax: Abstracts can be faxed to 1-250-721-8774.

Schedule and Deadlines

Submission of Sessions and Workshop Proposals: September 15, 1997; Submission of Abstracts: January 30, 1998; Long Papers deadline: August 23, 1998 (submitted at Conference)

Communications

The Organizing Committee will correspond with the contact author only.

General Information

Details and 1998 housing rates will be included in the Preliminary Program. You will receive a copy in April 1998. Information about excursions and workshops will be included.

Accommodation

University of Victoria Housing - 1997 Rates: Single: \$38.00 CDN (includes breakfast and tax); Twin: \$50.00 CDN (includes breakfast and tax). Single and Twin rates for rooms include breakfast, linen, soap and towel. Map available at: <http://Kafka.uvic.ca/prelatio/www/map/map/html>

Conference Fees

Full Fee: \$275.00 plus taxes; Student Fee: \$175.00 plus taxes.

Victoria Information

For site information contact: Tourism Victoria 812 Wharf Street Victoria, B.C. Canada, V8W 1T3 Fax: 250-382-6539 Toll free (North America): (800) 663-3883 Victoria Telephone: 250-953-2033 Web site: <http://travel.bc.ca>

About the Associate Editor

David Landon is an Associate Professor in the Department of Social Sciences, Michigan Technological University. He is a zooarchaeologist with particular interests in taphonomy, butchery, and seasonality. Recent publications include "Interpreting Urban Food Supply and Distribution Systems from Faunal Assemblages: An Example from Colonial Massachusetts," *International Journal of Osteoarchaeology* 7: 51-64 (1997).

Announcing Ancient Biomolecules

Terry Brown, Editor-in-Chief, Department of Biochemistry and Applied Molecular Biology, UMIST, Manchester, M60 1QD, UK. fax 44-(0)-161-2360409; e-mail terry.brown@umist.ac.uk. Richard P. Evershed & Noreen Tuross, Associate Editors. Volume 1, no.1 issued in 1996, includes instructions for contributors. Issued quarterly by Harwood Academic Publishers.

Book Reviews

Learning from Things: Method and Theory of Material Culture Studies. W. David Kingery (ed.). Smithsonian Institution Press, Washington and London, 1996. x + 262 pp., 15 b&w photographs, 36 line drawings. \$39.00 (cloth). ISBN 1-56098-607-7.

Reviewed by Felicia Rounds Beardsley, Department of Anthropology, University of California-Riverside, Riverside, CA 92521 USA

The papers in this volume represent the results of a conference on material culture held at the Smithsonian Institution. As the title suggests, and Kingery states in the preface and introduction, the goal of the conference and this volume, as well as its predecessor *History from Things: Essays on Material Culture* (Steven Lubar & W. David Kingery eds., Smithsonian Press, 1993), is to establish a common ground for discussion and introduce a relatively new and distinct multi-field discipline—material culture studies. This particular volume was intended to bring forward the methods and theories common to material culture studies in a variety of specialist fields, and legitimize the appellation material culturalist. The book is divided into four parts: part one, Paradigms for Material Culture Studies (chapter 2); part two, Material Culture in the History of Technology (chapters 3 to 5); part three, Formation Processes (chapters 6 to 11); and part four, Materials Science in Material Culture Studies (chapters 12 to 15).

In the first part, Jules Prown focuses on material culture studies in art history. He examines the division of materialists (systematic scholars interested in object attributes introduced by the maker) and culturalists (humanists concerned with aesthetics and cultural belief systems unconsciously introduced by the maker), and their common focus, the object as evidence for interpretation. By recognizing the two opposing camps of 'hard' and 'soft' material culture studies, Prown suggests that the gap between the two can be bridged, and that in combination and through collaborative undertakings these two perspectives would interact synergistically, producing results that would far outweigh those from individual and separate studies.

Part two presents three essays concerned with the application of material culture studies to the history of technology. In chapter 3, Steven Lubar suggests that historians of technology must go beyond the classificatory aspect of material culture and its embodiment of technological knowledge, change and achievement. They must also see and examine the larger issues embedded in technology, what he calls the 'big questions of American history,' which encompass the conscious and unconscious contributions of the makers and users of material culture and technological things. These include culture change, social change, class, ethnicity, gender, and race. Joseph Corn, in chapter 4, presents an empirical study of journal articles by and for historians of technology. He notes that only 30 percent or so of the scholarly papers offer any

evidence of the actual study of artifacts, that the majority of historians rely on secondary evidence of those whom they consider more technically competent than themselves (engineers and others who have primary hands-on experience with objects). Corn hypothesizes that this lack of personal experience or for that matter, the limited or practically non-existent testimony of personal interest and interaction with artifacts by these authors, has contributed to the current poor regard of material culture studies by many scholars. Ruth Oldenziel brings a feminist perspective to technology studies in chapter 5. She suggests the concentration on material artifacts and devices in technological histories is the result of social and cultural trends established in the nineteenth and early twentieth centuries, and that these studies, by extension are gender-oriented and male-dominated. But, with the rise of information systems and the shift to technology as the 'configuration of knowledge, things, organizations and people,' gender-biased interpretations diminish and the role of women as active participants in the 'creation of technical artifacts' becomes evident.

In the third section of the book, Michael Schiffer leads the discussion of formation processes that culminate in object collections and render such collections available for study. He begins by establishing a theoretical context for the discussion of formation processes in chapter 6, and brings to bear much of his own work in this area. One of the first steps in the interpretation of past behaviors through artifacts, according to Schiffer, is to understand 'the pathways that link past activities to their surviving traces in material entities extant today.' Schiffer then illustrates his point in the succeeding chapter with an example of shirt-pocket radios with subminiature tubes. He demonstrates the importance of the radios themselves as well as the biases inherent in their survival. Kristian Kristiansen in chapter 8 looks at the historical processes by which archaeological collections come to be included in the Danish museum collections. He discusses both the destruction of archaeological sites and the formation of museum collections, and their direct connection to social and economic development over the last two centuries. In chapter 9, Marjorie Akin illustrates her discussion of small private collections with coins. She examines how and why private collections are assembled and kept, and then how these same collections are subsequently dispersed and reformed. Catherine and Don Fowler discuss the formation of ethnographic museum collections in chapter 10. They illustrate their case study with artifacts collected from Native Americans in the Great Basin. Nancy Parezo, in chapter 11, concentrates on the formation processes in the archival records surrounding ethnographic collections. She points out that documentation (field notes, photographs and such) and the objects themselves are treated differently; the former are often considered personal possessions, the latter are treated as institutional property. As a consequence, the two rarely end up at the same place. She argues that this separation of documentation from the collections themselves often means that undocumented collections are of limited value in answering many research questions.

The final part of the book contains four essays which examine the ways in which materials science contributes to material culture studies. David Kingery, in chapters 12 and 13, establishes a context for materials science in the study and interpretation of material culture. By examining material structure and properties, one can more easily discuss performance effectiveness and production activities, and draw inferences on the human activities of design, creation and manufacture as well as use and function. David Killick's essay in chapter 14 focuses on a realm of human experience which is poorly recorded in written texts - the development and growth of technology, the processing of raw materials, and the production of material artifacts. His method of analysis is microscopy, in particular high magnification studies, which takes the investigator into a whole new realm of analysis. Such techniques, he goes on to say, have revolutionized studies on ceramics, glass, glazes, and metals. Michael Tite, in chapter 15, shows how dating methods have revolutionized archaeology, the difficulties of provenance studies, and the analytical approaches to examine organic residues and use-wear patterns on tools and cooking vessels.

The book promises much to those interested in the study of material culture, in particular it attempts to set forth a solid theoretical and methodological foundation from which future material culture studies can proceed. Yet, there is nothing new in this volume except the particularistic case studies that were presented. The continuing dialogue and florescence of material culture studies that should be generated by a book such as this are left with little direction and a less than solid foundation from which to move forward. If, on the other hand, one is looking for guidance and recipes with which to examine specific material culture elements, this book is a near panoply of examples.

Archaeological Chemistry: Organic, Inorganic, and Biochemical Analysis. Mary Virginia Orna (ed.) American Chemical Society Symposium Series #625, Washington, DC, 1996. xi + 459 pp., \$109.95 (cloth). ISBN 0-8412-3395-0.

Reviewed by George (Rip) Rapp, Jr., Archaeometry Laboratory, University of Minnesota, Duluth MN 55812 USA

This book was developed from a symposium sponsored by the Divisions of the History of Chemistry, Chemical Education, and Analytical Chemistry, and the ACS Committees on Education and on Science at the 1995 National Meeting of the American Chemical Society. This volume is the fifth in the ACS series that is devoted to archaeological chemistry. The first was volume 138 (1974) followed by 171 (1978), 205 (1984), 220 (1981/1989) and now 625 (1996). Most members of the Society for Archaeological Sciences should be familiar with these volumes.

There are 31 chapters/papers representing a broad range of analytical techniques in archaeological chemistry, beginning with an introductory chapter by volume editor Mary Virginia

Orna and Joseph B Lambert (who edited the earlier #205). This introduction, entitled "New Directions in Archaeological Chemistry" succinctly lays out what this volume contains and why the symposium was organized. Anyone wondering about the necessity of reading this book should first read these eight pages.

Orna and Lambert rightly point out (in my view) that "molecular archaeology is making great strides by utilization of sophisticated instrumentation." The editors indicate that a major thrust of the symposium was devoted to papers dealing with gaining information about the peopling of the New World — an area of research where molecular biochemistry is playing an increasing, if not dominant, role. However, other methodologies and research areas were not neglected. The introductory chapter makes it clear that the symposium and volume are organized around four themes: inorganic materials; archaeological soils; organic materials [fibers and dyes]; and biological materials [archaeological bone, connective tissue, DNA, radiocarbon measurements].

To express the breadth of this volume one is tempted to list the 31 papers but that would preclude any review. Suffice it to say that topics range from the analysis and chemical chronology of glass; through ESR, ICP, XRD, TL, C-14, stable isotope, and INNA applications; two papers on the Shroud of Turin; four papers on bone; six papers on fibers and textiles; and four papers that utilized biomolecular techniques. Parenthetically, I am a bit surprised that so few of the papers in this volume are from the "hot topics" in biomolecular/biochemical archaeometry. Major arguments are raging about DNA versus linguistic groups and a very good paper highlighting the status of analytical problems would have been very valuable.

The biochemical/biomolecular papers were devoted to the application of multimolecular/biomarker techniques to the identification of fecal material in archaeological soils and sediments (Evershed and Bethell); historico-chemical analysis of plant dyestuffs used in textiles from ancient Israel (Koren); ancient DNA in Texas rock paintings (Reese et al); and ancient nucleic acids in prehispanic Mexican populations (Vargas-Sanders et al). Although all were interesting and informative only the last of these papers relates to peopling of the New World. The paper by Batt and Pollard on radiocarbon calibration and the peopling of North America is the only paper directly addressing critical issues in the peopling of the New World. Perhaps other papers presented did not make it into the symposium volume.

This criticism aside I have found all five of the volumes in this American Chemical Society series to be quite valuable. The paper by Evershed and co-workers on means of analyzing for characteristic steroidal marker compounds allows us to obtain here to fore unavailable information. I teach a broad-based archaeological science graduate course on the Duluth and the Twin Cities campuses of the University of Minnesota and the range of papers in these volumes provides an insight into the spectrum of applications in chemical analysis based archaeology. I have found few "potboilers" among the offerings. This volume continues this fine tradition with important papers that perhaps I would not otherwise see.

Archaeological Chemistry. A. Mark Pollard & Carl Heron. The Royal Society of Chemistry, RSC Paperbacks, Cambridge, UK, 1996. xv + 375 pp. £ 22.50, \$46.00 (paper). ISBN 0-85404-523-6.

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

Pollard, Professor and Head of the Department of Archaeological Sciences at the University of Bradford, is a recognized authority on the application of chemical techniques to archaeological problems. Heron, Lecturer in Archaeological Sciences at Bradford, specializes in organic analysis, gas chromatography and mass spectrometry, and chemical and geophysical prospection. They have the appropriate credentials and expertise to prepare this eloquent, highly informative and current synthesis in which they consider some of the major techniques employed in archaeological chemistry. This compelling and unique volume is designed as a treatise for archaeologists who need current information about chemical techniques and procedures and for physical scientists who are asked to analyze archaeological materials.

The book provides essential background on the procedures and the applicability of those techniques of particular value to provenance studies of obsidian, ceramics, glass, metals, and organic materials such as resins and amino acids. The reader should not confuse the book's title, organization, or contents with Goffe's *Archaeological Chemistry* (1980), and the volume is dissimilar in scope to Henderson's (1989) edited compendium. Pollard and Heron's work is based upon the premise that archaeological chemistry requires a thorough understanding of chemistry and archaeology, and often related disciplines such as biochemistry and geochemistry. Published only in a 390-page paperback edition by The Royal Society of Chemistry, it contains ten chapters, five appendices, and a twelve-page subject index. Each chapter has its own references (560 total entries), and the illuminating narrative is supplemented by 97 figures and 21 tables. Chapters 3 through 9 focus upon specific categories of material culture and integrate raw material occurrences, historic background on fabrication, and analytical methods, accompanied by valuable case studies demonstrating that science has and can play a significant role in archaeological studies.

In the "Foreward" Colin Renfrew points out that archaeological science is a discipline which is growing rapidly in scope and maturity because of an advancements in scientific procedures and an increased awareness of the problems of interpretation. The initial chapter, entitled "The Development of Archaeological Chemistry" (19 pp., 63 references), provides a brief historical context for the subsequent chapter, "Analytical Techniques Applied to Archaeology" (61 pp., 92 references), a largely non-mathematical summary of some of the many analytical techniques used in modern archaeological chemistry. Each subsequent chapter presents an historical perspective and some of the underlying science of the techniques selected.

In Chapter 2, the authors consider atomic structure, analytical spectroscopy, procedures, considerations (multi-elemental analyses, quantitative versus qualitative uses), alternative analyses, and problems (detection limits, element enrichment by the burial environment, etc.). Optical Emission Spectroscopy (OES), now largely outmoded, older and newer instrumentation in Atomic Absorption Spectrometry (AAS), and Inductively Coupled Plasma Emission Spectrometry (ICP-AES), which has begun to replace AAS for multi-element analyses, are detailed. They also characterize Inductively Coupled Plasma Mass Spectrometry (ICP-MS) and Laser Ablation Inductively Coupled Plasma Mass Spectrometry (LA-ICP-MS).

Techniques using X-rays, including Auger Electron Microscopy (AES), X-ray Fluorescence (XRF), X-ray Photoelectron Spectroscopy (XPS or ESCA [Electron Spectroscopy for Chemical Analysis]), and Energy Dispersive X-ray Fluorescence (EDXRF) are delineated. The authors report that Wavelength Dispersive X-ray Fluorescence (WDXRF) has relatively little applicability to archaeological materials except ceramics. Analytical Electron Microscopy (AEM), Transmission Electron Microscopy (TEM), and Particle- or Proton-induced X-ray Emission (PIXE) analyses are defined.

Although Neutron Activation Analysis (NAA) was developed during the 1950s, it had by the 1980s become the standard analytical method used for producing multi-element analysis at the ppm level and has major applications in the study of coins and ceramics. Hyphenated techniques such as Inductively Coupled Plasma Mass Spectrometry (ICP-MS) are seen as especially useful in environmental applications to measure isotopes of heavy elements in plant materials and body fluids. Thermal Ionization Mass Spectrometry (TIMS) is only mentioned.

Chromatographic techniques - gas or liquid chromatographic (GC or LC) for organic and biological material - developed rapidly over the past several years. There is also a wide range of hyphenated techniques, including CG-MS and LC-MS; High Performance or High Pressure Liquid Chromatography (HPLC) is the most commonly used form of the latter. Other techniques include infrared and resonance procedures such as Infrared Microspectroscopy (IR), Electron Spin Resonance (ESR), Nuclear Magnetic Resonance (NMR), Thermogravimetry (TGA), Differential Thermal Analysis (DTA), and Differential Scanning Calorimetry (DSC).

Chapter 3, "Obsidian Characterization in the Eastern Mediterranean" (23 pp., 56 references), elucidates how source attribution of archaeological materials might be confirmed on the basis of chemical composition. The origin and formation of several forms of obsidian (trachitic obsidian is not discussed), and classifications (peralkaline, calcalkaline, calcic, and alkaline) are elaborated. A case study concerns the sources located in the eastern Mediterranean and neighboring regions, and employing petrographic thin section studies, trace element analyses, wet chemistry, OES, and NAA. Although a wide array of other analytical, geochemical, dating, and magnetic approaches have been used, NAA and XRF are by far the

methods of choice, although Fission Track Dating may be used to determine the age of the flows. There is a critical need for additional research on the intensity of magnetization, saturation magnetization, and low field susceptibility in order to delineate parent obsidian flows. The primary aim of obsidian provenance studies is to assess economic and social factors underling the movement of materials. The authors demonstrate clearly why obsidian characterization has been one of the most successful applications of archaeological chemistry.

In Chapter 4, "The Geochemistry of Clays and the Provenance of Ceramics" (45 pp., 51 references), the authors elucidate the structural chemistry of clays; review the basic structure of silicate minerals, silicate mineral groups and classification, clay minerals and deposits; and firing behavior, dehydration reactions, and phase diagrams. The general principles of trace element geochemistry are considered, and they comment appropriately that the chemical and mineralogical alteration of the ceramic in its burial environment are largely unappreciated in provenance studies. Problems of the natural variability of the clay beds, clay selection and mixing, levigation and processing, the addition of temper, and the firing cycle are noted. The representativeness of samples and assumptions about quality controls employed in antiquity are seen as important variables. NAA, XRF, and ICP-AES or ICP-MS are considered as appropriate analytical techniques. There is an minimal consideration of thin section analysis and ceramic petrology; for a comprehensive elucidation of chemical techniques, readers should consult Jones (1986) and Neff (1992). The case study employs specimens from Roman Britain and Gaul, using AAS and XRF studies to suggest the provenance of Gaulish Rhenish wares and Trier terra sigillata.

Chapter 5, "The Chemistry and Corrosion of Archaeological Glass" (47 pp., 78 references), begins with definitions of glass and the structure and chemistry of archaeological glass. The section on the history and chemistry of glazes is inadequate. The authors comment that "the traditional archaeological view that colour can be simply related to the presence of various 'colouring agents' can only be regarded as a very crude guide" (p. 173). Coordination chemistry, crystal field theory, and redox reactions are important aspects of glass analyses. The decay of Medieval window glass is taken as a case study. IRRS (Infrared Reflection Spectroscopy), Infrared Microspectroscopy, Auger Electron Spectroscopy, and ELS are used to determine the composition of the surface layer, and analyses by XRD, AAA, and electron microscopy are noted. The authors conclude that the weathering behavior of Medieval glass is dictated primarily by chemical composition and that "reasonable agreement" exists between accelerated corrosion studies and the analysis of archaeological specimens (p. 189).

In Chapter 6, "The Chemical Study of Metals - the European Medieval and Later Brass Industry" (43 pp., 61 references), the authors evaluate procedures for tracing metal objects back to their ore source using trace element analysis. Precise chemical provenancing of metal objects is not in general possible due to high temperatures and extreme reduction conditions involved in processing the ores and finished metal. Among the factors considered in trace element

composition are the mineralogical and chemical composition of the ore source(s), the thermodynamics and kinetics of the processes used, and human factors such as the mixing and recycling of metals. Disputed and conclusive archaeological occurrences of brass artifacts and an historical overview of English and German brass and zinc production - calamine (cementation) and direct mixing - are presented. Most work on European Medieval specimens employs AAS and XRF. Case studies concern the "Drake Plate," brass tokens, brass scientific instruments from seven European countries, and British clocks. Three problems are related: 1) the need for the non-destructive analysis, 2) inhomogeneous copper alloys especially in cast objects, and 3) de-zincification from the surface of brass objects due to electrochemical process in water (and burial context) which produces erroneous results.

Chapter 7, "The Chemistry and Use of Resinous Substances" (32 pp., 84 references), introduces major concepts in analytical organic chemistry, focusses upon the higher plant resins and related substances although excluding other plant exudates (latex and gum), and details plant and animal organic molecules (see my review of Biers *et al.*, *Lost Scents ...*, 1994, in *SAS Bulletin* 19(1-2): 4-6, 1996). Direct evidence is difficult to obtain, but preservation is favorable in anaerobic environments because of the protection from atmospheric and photooxidation, and the reduced growth of microorganisms. The chemistry of resins and terpenes (mono- through sesquiterpenoids) is reviewed. GC and GC-MS techniques are seen as valuable for the separation and characterization of individual molecular species, and complementary analytical data is derived from IR and NMR. The analytical goal to identify precise species-specific botanical source(s) is problematical, since heating introduces chemical changes. The case study focuses on birch bark and tar used as a tool-fabricating adhesive by Ötzi, the Alpine "Iceman." There is considerable potential in the use of IR, TLC (Thin Layer Chromatography), NMR, and GC-MS for the analysis of liquids (milk, mead, beer, wine, etc.), plant and animal lipid residues, waxes, resins, waxes, psychoactive substances, alkaloids, and caffeine. Important work by Noreen Tuross at the Smithsonian Institution's Conservation Analytical Laboratory is not cited.

The subsequent Chapter, entitled "Amino Acid Stereochemistry and the First Americans" (31 pp., 52 references), concerns the racemization of amino acids in bones and teeth. Recent studies by Dillehay (1997) supercede some background materials on migration hypotheses and dating and accuracy. Pollard and Heron consider the structure of bone, stereochemistry, AAR (Amino Acid Racemization) of aspartic acid, and the AMS (Accelerator Mass Spectrometry) ¹⁴C dating method which has superceded AAR. The case study includes California Paleo-Indian specimens where initial AAR dates were seriously overestimated versus AMS dates. The degree of organic preservation in bone is a major factor, "depending on the level of collagen surviving in the bone, significantly different ages can be obtained on different amino acid fractions from the same bone" - a variance of 2500-8000 years (p. 290). Readers may wish to assess the statement that "... the age limit of ¹⁴C dating still remains at around 30-40,000 years BP" (p.

297). The authors also consider briefly the forensic use of aspartic acid calibration data on teeth to assist in predicting the age of humans at death.

In Chapter 9, "Lead Isotope Geochemistry and the Trade in Metals" (39 pp., 44 references), the authors state that lead isotope analyses are "fraught with problems — far more than have been encountered with the study of other archaeological materials, with the possible exception of glass" (p. 302). Among these are defining isotopic signatures, and the mixing and recycling of copper resources. The geochemical background to the technique and TIMS (Thermal Ionization Mass Spectrometry) are detailed. Three fundamental assumptions are reviewed: 1) anthropogenic processing produces no isotopic fractionation, 2) the extent of a "lead isotope field," and 3) the interpretation of lead isotope data. Bronze Age Aegean and Cypriot lead isotope analyses are reviewed in the case study, but specialists conclude that it is impossible to subdivide eastern Mediterranean ore deposits into separate fields to resolve questions of provenance.

Chapter 10, "Summary — Wither Archaeological Chemistry" (6 pp., 8 references), includes an historical overview emphasizing nondestructive techniques, considers the archaeological relevance of chemical applications, and predicts the future of archaeological chemistry. The authors state that the analysis of archaeological material has, in general, been regarded as a specialist pursuit (p. 341). Computerization and the need for smaller sample amounts have resulted in major, recent changes in analytical capabilities. The authors also evaluate why, in some cases, the traditional scientific applications of archaeometry have not delivered answers to the questions which are of interest to mainstream archaeologists. Analytical techniques, sampling restrictions, equipment expense, materials conservation, preservation environments (soil/groundwater/object interactions), and political and scientific agendas are considered. Lastly, they state that "the real restrictions to archaeological chemistry are in terms of ideas rather than practicalities" (p. 344).

Although not designed to cover comprehensively the techniques of archaeological chemistry, this well written handbook/textbook written, in the main, for chemists and archaeologists takes its place with the significant writings of Brill, Kingery, Rice, Smith, and Tylecote in any professional library emphasizing archaeological science. The contents are current and accurate although the chapters vary in length and coverage - some are more scientifically oriented (Chapter 7) while others are, in the main, historical in scope (Chapter 6). The majority of the references are to the British literature and there is a lack of citations to important publications and chapters in the multi-volume series of the American Chemical Society's *Archaeological Chemistry*, five volumes to date, or the Materials Research Society's *Materials Issues in Art and Archaeology*, four volumes to date (see Kolb 1996). The volume also addresses issues about the future of archaeological science raised by Renfrew (1992) and Tite (1991). This work is without question a tour de force and is recommended highly to students and professionals in the physical sciences and archaeology.

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Society, Culture and Technology in Africa. S. Terry Childs (editor). MASCA Research Papers in Science and Archaeology, Supplement to Volume 11, 1994. 108 pp. \$22.50 (cloth). ISSN 1048-5325.

Reviewed by Mark Leney, New College, Oxford, OX1 3RH England, UK

This collection of papers seeks to investigate the relationship between culture and technology in Africa since the late Pliocene. In just seven substantive essays and an introduction, the editor has attempted to draw together an extremely disparate array of research to argue the point that technology is the product of "dynamic interaction of social, ideological and technical factors". This seem a rather heavy-handed attempt to reiterate the dogma of post-modern cultural anthropology (that nothing meaningful can be learned from the study of artefacts divorced from their socio-cultural contexts), but the individual papers themselves do not labor this point. Moreover the lack of any overall conclusion to the volume leaves readers free to draw their own conclusions about the interaction of technology and society in a way that is refreshingly free of the veil of verbose deconstruction commonly found padding the work of the more

anthropologically minded archaeologists (a ‘deconstruction’ that reasonably skeptical readers can supply by themselves).

Childs’s unqualified use of the words ‘society’ and ‘culture’ while laying bare the plurality of meaning in the word ‘technology’ goes to the heart of the whole debate. While we find all three words alternately convenient and inadequate, the underlying reality is that there are no independent entities underlying these three terms. There really is no ‘technology’ outside socio-cultural contexts. However, to then say that there is no point in abstracting ‘technology’ from its cultural underpinnings for the purpose of analysis, is to make a grave syllogistic error. The papers on metallurgy that make up the central part of this volume illustrate this point. The imposition of contemporary metallurgical analyses upon the archaeological artefacts defines entirely new fields of knowledge, providing real insights into the mind and milieu of the ancient metalworker. By determining what we can and cannot know about the raw materials and technical processes that contributed to the object of study, the interdisciplinary approach shows that the clash of opinions in the “technology and society” debate stems more from the anthropologists’ failure to engage with the possibilities of technical enquiry than from the insensitivity of specialist analysts to the cultural context of the material studied.

The end of the volume contains three cautionary tales about using fine-grained technical analysis of artifacts to investigate the minds of their makers. Although instructive to undergraduates, one feels that it was unnecessary, in the context of this volume, to expend three papers to illustrate the point that the ancient artisan may have had multiple agendas and multiple skills that are only partially reflected in the material left to posterity; a necessarily fragmented record that is inevitably biased towards the taphonomically stable. To present these points as new and/or important, attacks on positivist methods in the reconstruction of past societies from their material culture is to topple a straw-man. I feel sure that everyone can recall instances where researchers have, understandably considering the investment of time and scholarship, overplayed the importance of conclusions drawn from highly empirical analyses and refused to recognize the implausibility of their inferences in the wider socio-cultural context. But it is wrong to equate such individual errors with the wrong-headedness of the positivist program as a whole. After all, the empirical worker is merely advocating a model to explain some of the patterning observed in material remains. The assumption that there is something to explain is not inherent to the validity of the approach. If there is no order, mechanism or rationale behind a perceived pattern, then the model will not prove a useful one. Nevertheless, the erosion of empirically generated explanations by the weight of contrary observation only vindicates the validity of the positivist, model building paradigm. The perception of intransigence and cultural bias in positivist interpretations of material culture, so heavily criticised over the last quarter of a century, seems to stem more from the technophobia and anti-rationalism of such critics and the fact that empirical analysis appears to allow definite statements (even if wrong), than from any inherent flaw in positivism. The rebuttal of these criticisms has been less effective, but then this is probably because the more extreme

proponents of the anti-positivist position tend to take the view that one can learn nothing about the maker of an artefact outside it’s immediate socio-cultural context, something that might be phrased as a *faux*-paradox; ‘I know that I am wise in that I know that I know nothing.’ Clearly it is difficult to disabuse someone of this notion, or even to provide a focused criticism of such a non-viewpoint, but one does wonder about their position in the discipline in the first place. The solution seems to be for anthropologists of all camps to be a little more mature and sophisticated in their dealings with other (sub-) disciplines. Whilst it would be too much to ask the “technological determinists” to stop viewing their opponents as arm-chair theorists, a compromise of some sorts can be reached by laying aside the idea of culture as an entity. I am not proposing that all aspects of societal development are mediated by technological change; however I do feel that some, perhaps many, changes in social organisation probably are causally linked to shifts in technical capacity. If one disregards the concept of culture as a unit, there is no “technology and society debate”. Some aspects of ‘society’ will be closely bound up with technology and others will be more or less independent. Similarly, technological diversity may be entirely without consequence for the structure of the associated society.

Re-reading the papers, one feels that maybe this is the point that the volume is making, without actually ever articulating it. Given Childs’ closing statement that “technologies *must* be examined in their socio-cultural contexts” (my italics), it is surprising to read in the subsequent papers how much can be learnt from the raw artifacts even when the socio-cultural contexts are almost entirely obscured. This is especially true in the papers on the use of fire and obsidian. There is obviously a need to keep an open mind here, but the majority of these papers impose a framework of empirical analyses to make what appear to be reasonable inferences about the nature of the societies and individuals that produced the material. This apparent paradox, the gulf between the editorial statement and the accounts given in the papers reveals the nature of the “technology and society” issue. It is a debate about misconceptions. What this volume illustrates very clearly is that the debate arises primarily from the reciprocal misconception of research methods rather than the nature of material culture itself.

Arsenic, Nickel et Antimoine. Une approche de la métallurgie du Bronze moyen et final en Suisse par l’analyse spectrométrique, Tomes 1-2. Valentin Rychner & Niklaus Kläntzchi. Cahiers d’Archéologie Romande 63-64, Lausanne, 1995. 112 & 224 pp., 122 tables, figures, & plates. 80 S.Fr. (cloth).

Reviewed by Ervan G. Garrison, Geology and Anthropology, University of Georgia, Athens, GA 30602 USA

This two volume work provides important new insights into the metallurgy of the Middle to Late Bronze Age of TransAlpine Switzerland. The work is written in French and

German depending on the co-authors, Rychner (French) and Kläntschi (German). The bulk of the text is in French. This reflects Rychner's role as the originator of the project and the conceptual organizer of work.

This is not to diminish Kläntschi's role which entailed over three years of chemical analyses of this impressive set (941) of bronze artifacts.

The work is well organized into Volume 1, which contains the eight chapters of text and bibliography and Volume 2 which contains an index of sites, catalog of artifacts, appendices, tables, figures, maps and plates. Of particular importance to international readers are excellent four page summaries in German, English, and Italian at the end of Volume 1. Such summaries have become a standard part of almost every Swiss archeological publication and should be applauded. They provide an in-depth summary of the work that no simple abstract can accomplish.

The principal author, Valentin Rychner, is a faculty member of the Seminar of Prehistory at the University of Neuchâtel as well as a curator at the Museum of Archaeology of Neuchâtel. Many of the artifacts analyzed in this study were excavated by teams lead by Rychner at Auvernier in the 1970's. These excavations, at Auvernier, formed the basis of Rychner's dissertation, Rychner, 1979. Rychner's interest in the chemical study of bronze metallurgy began in the late 70's and early 80's as demonstrated by his publications on copper and its alloys of the Late Bronze Age in western Switzerland (Rychner 1981; 1983).

Kläntschi (1980; 1987; 1990; 1993), along with other European researchers such as Trampuz-Orel (1991; 1993), Pernicka (1984; 1995), Bourhis (1975; 1979; 1984), and Junghans *et al.* (1960; 1968; 1974) have demonstrated the efficacy of instrumental analysis of prehistoric metals. Kläntschi has developed this interest using the multiple-element spectrographic techniques of inductively coupled plasma spectroscopy (ICP).

Combining the sample population of nearly 1000 well-provenanced artifacts with a powerful instrumental technique placed this study on the firmest of methodological grounds. The study's stated objectives are: the compositional classification of bronzes used in Switzerland during the Middle and Late Bronze Ages from Bronze B to Hallstatt B-2. The study attempts to isolate time-dependent (diachronic) changes in the composition of the principal metal-copper-and correlate these changes with the chronological evolution of (the) object topology. The study was carried out from 1984 to 1987 at Kläntschi's laboratory in Dübendorf, Germany.

The bulk of the artifacts examined (774 out of 941/83%) were mostly axes (546/58%), knives (146/15%) and sickles (82/9%). From these specimens, small (30 mg) samples were drilled. ICP analysis lends itself to small samples and thus reduces the requisite damage to an artefact to a minimum.

The analysis centers on the characterization the bronzes using a compositional topology of three principal impurities - arsenic, nickel, and antimony - hence the title of the work.

Beginning with Chapter 2 the study starts by dividing the objects into five chronological groups based on typology. These are: Middle Bronze Age (Bronze moyen); Bronze D - Hallstatt

A 1 (BzD-HaA1); Hallstatt A 2 (HaA2); Hallstatt B 1 (HaB1); and Hallstatt B2 (HaB2). Chapter 3 divides the sample on areal considerations - East, Central, and West Switzerland. The authors point out the bulk of the sample comes from the central area or Swiss Plateau that reaches from Zürich to Geneva. This distribution clearly reflects the historical preponderance of archaeological research in this region since the 19th Century.

Chapters 4 and 5 involve the statistical parsing of the chemical analytical data. The first step is the use of simple histograms which show changes in chemical composition do occur with time. The authors derived seven compositional types (1-7) based on elemental characteristics. These were further sub-divided on the basis of absolute concentration of the elements, e.g. "low", "normal", and "high". This sorting into 20 composition groups immediately demonstrated the correlation of composition to chronology - 84% of the "low" group belonged to the Middle and Early-Late Bronze Age and 83% of the "high" group belonged to the Late Bronze Age phase, HaB1. Chapter 5 details the hierarchical classification of the sample using average link cluster analysis resulting in dendrogram plots. These dendrograms, along with the data sets on which they are based, are given in Volume 2.

Chapter 6 begins the synthesis and discussion of the study results. From the standpoint of the study's objectives, this is the most important discussion. Chapters 7 and 8 continue the discussion of the results but focus on issues ancillary to the principal objectives. Chapter 7 attempts to determine the extent to which copper used in Switzerland circulated in neighboring regions. While pointing out the paucity of comparative work, the authors do propose two conclusions.: (1) The copper of the Middle Bronze Age is probably of Austrian origin and (2) the Late Bronze Age copper originates in the Alps. Chapter 8 discusses the problems in determining sources of copper for the European Bronze Age. Returning to Chapter 6, the efficacy of the author's classificatory scheme is clearly demonstrated. The methodology works best for the Middle Bronze Age bronzes, less-well for the Bronze D-Hallstatt A1 and, again, proves robust in characterizing the Late Bronze Age types of HaA2. Indeed, in this later period, the authors see a dramatic break in compositional patterns. The bronzes of this late period became "standardized" across the Swiss Plateau with nickel compositionally dominant. Some heterogeneity occurs in the Hallstatt B1 phase but the homogeneity returns in the last Bronze Age phase, Hallstatt B2 (ca. 900BC). One final point, in Chapter 8, involves the question of re-smelting of "old" bronze. In general, the data supports the conclusion that Swiss workshops produced bronze using new copper rather than recycling old metal.

From the standpoint of production and editing, it is difficult to find fault. The volumes are attractive and printed on high quality paper. Few, if any, errors in production noticeable. The photographic plates (Volume 2) are exemplary being the results of efforts of Rychner and Yves Andre of the Museum of Archeology of Neuchâtel. Two minor distractions from the overall high quality of the work involve: (1) the decision to allow each author to write in their native language. While the bulk of the text is French, it seems a small thing to have translated Kläntschi's contributions in French and, (2) the

Swiss predilection to publish maps without geographic references or scale. The maps are attractive but to the international reader they present problems in interpretation if one does not have a familiarity with Swiss geography.

These volumes are important contributions to the study of the Bronze Age of Western Europe. The authors have established a benchmark of quality for future studies. Methodologically, the work speaks to metallurgical studies beyond Switzerland. The straightforward analytical approach and its conceptual clarity, from hypothesis to synthesis, is to be applauded.

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Trade and Discovery: The Scientific Study of Artefacts from Post-Medieval Europe and Beyond. Duncan R. Hook & David Gaimster (eds.). British Museum Occasional Paper 109, British Museum Press, London, 1995. v + 326 pp., 131 b&w illustrations, £20.00 (paper). ISBN 0-86159-109-7.

Reviewed by Paul T. Nicholson, School of History and Archaeology, University of Wales, PO Box 909, Cardiff CF1 3XU, Wales, UK

This volume is the result of a conference of the same title held at the British Museum in November 1992, and marking the 500th anniversary of Columbus' voyage to America. This, and similar journeys of discovery, heralded the opening up of hitherto unknown or unexploited areas of the world to European trade, an expansion which sets the Post-Medieval world apart from its forerunners. Not only was this a time for the export of goods from Europe, it also opened the way for the introduction of new raw materials and new ideas inspired by this expanded world view.

The 24 papers presented in this volume fall into two broad groups, three 'contact study' papers dealing with the material evidence for early European trade in North America and the remaining 21 papers examining different classes of material. These classes comprise ceramics, glass, precious metals, copper-based alloys and 'other metals' (steel for armour and lead seals as evidence for the cloth trade). There are however, numerous overlaps between the two broad groupings.

This is a fascinating collection of papers because of its many interconnections. Studies of trade and exchange in prehistory and in early historical times are well established in archaeology, just as they are for later historical times within the discipline of history; the approach however, has tended to be different. For decades now archaeological science has been used to study the materials of earlier periods for which there is little or no written evidence. It has served to reinforce scant historical information on trade in the early civilisations and has won a place in the standard armoury of archaeological techniques.

However, just as archaeology and industrial archaeology were relatively slow to develop in Medieval and Post-Medieval studies so has been the rise of archaeological science. There

have certainly been scientific studies of materials from these periods (cf. papers in Peacock 1977) but they have often been published in volumes dealing only with a single class of material, notably ceramics or metals. This book represents a much broader spectrum of materials and clearly illustrates the scope for scientific studies in all periods. It does not deny the importance of history, but rather facilitates the asking of new or more detailed questions.

In the 'contact studies' section the paper by Auger *et al.* was particularly interesting. Here archaeological excavation of the arctic camp established by Martin Frobisher between 1576 and 1578 was combined with historical research on documentary sources for the expeditions and analytical studies of certain of the finds. Amongst other questions raised is the reasoning behind faulty assays undertaken by Frobisher's expedition which led to the shipping of 1136 tons of worthless ore to England. Contamination of the samples by lead used in separating gold and silver from ore is suggested as a possibility, one which may be answered by further investigation of the assay office located at the Kodlunarn island site.

As might be expected, the largest single group of papers is that dealing with ceramics. Pottery is almost ubiquitous and lends itself to studies of provenance. Here Neutron Activation Analysis (also used in other studies in the volume) and mineralogy/chemistry are represented alongside morphological studies. Unfortunately many of the papers here, as elsewhere in the volume, are too short and although they give an interesting overview of the work many of them present relatively little data.

In the glass section the paper by Gratuze *et al.* is of particular interest not so much in that it examines the sources of cobalt colourant in French glass of the 13th-18th centuries, so much as that this has been undertaken as part of a wider project examining cobalt sources from the Bronze Age to the 19th century. This not only illustrates the relevance of scientific studies for historic periods of time, but also the importance of building up databases on particular materials over long chronological spans so that patterns of exploitation can be established. The paper demonstrates the continuity of certain cobalt sources from prehistory into historical times.

The paper by Redknap *et al.* concerning glass ingots from an East Indian is one of several in the volume examining material from shipwrecks. The link between underwater archaeology and scientific studies has continued to grow in importance in recent years, and this combination is of fundamental importance for studies of trade. This particular paper suggests that the ingots may have been bound for China where European glass was prized in the 18th century, an interesting reversal of the well known trade in oriental porcelain to Europe. An appendix by Vlierman will prove instructive to those faced with deciding whether certain objects are ingots or parts of ships equipment! This same period saw the import of Chinese nickel and brass to Europe, a subject covered in the paper by Gilmour and Worrall.

Papers by Mackay and Barrandon *et al.* look at gold and precious metals from the Americas, not least in relation to the silver mines at Potosi in Bolivia. Not all regions are so rich in historical information to which analytical studies can be related.

This point is well expressed in the paper by Craddock and Hook, attempting to examine the trade in copper to Africa where there are exciting possibilities for further study.

To conclude, this volume will prove of great interest to historians, archaeologists and archaeological scientists interested in trade. The papers are brief, but their number and scope cannot fail to impress upon the reader both the diversity of work taking place in this field and the immense scope for further work. One criticism however, must be the use of notes as a vehicle for references. Genuine notes and footnotes undoubtedly have their place, but with the Harvard referencing system now well established it seems perverse to avoid it here in favour of a numerical system for references.

The volume is an example of the fruitful collaboration between scholars in archaeology, history and science and it is to be hoped that studies of this kind in the post-medieval period will become increasingly common in the future.

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Human Adaptation at Grasshopper Pueblo, Arizona: Social and Ecological Perspectives. Joseph A. Ezzo. International Monographs in Prehistory, Archaeological Series 4, Ann Arbor, Michigan, 1993. vii + 103 pp., 61 figures, 19 tables, references. \$27.50 (cloth); \$13.75 (paper).

Reviewed by Jane E. Buikstra, Department of Anthropology, University of New Mexico, Albuquerque, NM 87131 USA

In this contribution Ezzo adds detailed (human) bone chemistry analyses to the extensive archaeological data sets available for Grasshopper Pueblo, a 14th century masonry pueblo site that was the subject of University of Arizona field schools for three decades (1963-1992). Located in east-central Arizona, on the Fort Apache Indian Reservation, Grasshopper Pueblo lies on the Mogollon Rim, in a transition zone between the Colorado Plateau to the north and the Basin-and-Range province to the south. In this area the northern Evergreen Woodlands grade into the biota of the Sonoran Desert, rendering the landscape diverse and the resource potential varied.

Ezzo's ultimate goal is to investigate human adaptation and social organization at Grasshopper Pueblo. To achieve this, he determines the degree to which dietary variation is structured by biological (age, sex, cranial deformation), social (grave furniture), spatial, and temporal parameters. A number of additional topics are considered, including ecological questions about environmental change and possible depletion of game, diet in relationship to stress, and nutrition. Ezzo is also concerned with social issues, including the relationship of social structure to subsistence change and the emergence of inequality. For analytical purposes, Ezzo combines all pre-AD

1330 remains into an early grouping, with the post-AD 1330 series comprising the later sample. Thus, Establishment (AD 1275-1300) and Expansion (AD 1300-1330) materials are considered together, as are the Dispersion (AD 1330—?) and Abandonment (?—1400) remains.

A major strength of this work lies in the bone chemistry analyses. Ezzo employs both trace elements and stable isotopes, expending considerable effort in an appropriately critical evaluation of elemental models for paleodietary inference. After enjoying an initial popularity during the 1970s and early 1980s, multi-element approaches have undergone careful review and the reality of post-depositional change has been recognized.

To increase the number of burials that can be assigned to the early and late temporal divisions, Ezzo supplements stratigraphic information with relative dating through fluoride analysis. A total of 141 remains were tested, including 18 with known stratigraphic associations. The fluoride technique performed well among the “knowns” and was therefore used to assign the remaining individuals to the early (Total N = 163) and late (Total N = 67) samples selected for further elemental study.

To minimize the effect of diagenesis, a complicated three stage cleaning procedure was followed, including soaking in hydroxylamine hydrochloride and acetic acid to remove metallic oxides and diagenetic carbonates. A vacuum chamber was also employed to draw air out of microscopic pore spaces and thus enhance the efficiency of an acid wash. The samples were then dried, ashed, and the following elements measured, using Inductively Coupled Plasma Emission Spectroscopy: Al, Ba, Ca, Fe, K, Mg, Mn, Na, P, Sr, and Zn. To test the effectiveness of the washes, 24 individuals were sampled a second time, with ICP results generated after the initial water cleaning procedure. This test indicated that carbonates and oxides had been successfully removed by the washes, as indicated by a reduction of Ba, Mg, Sr, and Ca/P. The constancy of Al and Fe was attributed to physical contamination by clay inclusions, which were only partially removed.

Further statistical study of element concentrations, including principal components analysis and a correlation matrix of elemental concentrations indicated that Ba showed little evidence of diagenesis. Sr concentrations, however, were positively associated with F, suggesting a diagenetic component. A strong positive correlation between Sr and Ba argues, however, that the biogenic signal had not been completely lost. Ezzo concludes that of the elements tested here, only Ba and Sr are useful in paleodietary reconstructions. He offers a compelling argument against the use of Zn, erroneously thought by some other workers to reflect meat consumption.

A stratified random sampling procedure was employed to select 54 individuals for stable carbon and nitrogen isotope analyses. Ezzo concludes that his collagen quality is acceptable since its dry weight is always over 5%. He does not report C:N ratios, another standard means for evaluating contamination (Ambrose 1993). The results reported here reflect collagen values only. Ezzo notes, however, that a

subsequent investigation of 11 apatite samples, using the technique and theoretical orientation of Krueger (Krueger and Sullivan 1984), strengthens his conclusions. The fact that $\delta^{13}\text{C}$ values based on bone apatite represent a better estimate of total diet than those of collagen has only recently been appreciated.

Of the variables examined by Ezzo, sex, space, and time appear to structure elemental and isotopic variability at Grasshopper Pueblo. Male diets change very little over time, with late phase men slightly more dependent upon C4 plants than their earlier counterparts. The dietary shift for females, however, is marked. The early female diet contained many collected plant resources and relatively little meat when compared to males. In the more recent samples, however, diets were quite similar for both sexes with women moving from wild resources to maize consumption. Spatial variation in paleodietary signals suggests that decision-making concerning access to food resources occurred at the household level.

The most disappointing feature of this monograph is the lack of attention to volume production. Effective copy editing could have corrected Ezzo's occasional convoluted and thus unclear sentence structure and eliminated unnecessary redundancy. An example of the former is Ezzo's opening statement in Chapter 1, which should be a crisp exposition of his goals. “This study examines the probability of significant dietary change through time and dietary variability across space and in terms of several social and biological variables at Grasshopper Pueblo, and considers how these behavioral developments inform on aspects of human adaptation and social organization at the pueblo” (Ezzo 1993:1). Redundancy is also plentiful: “...an inference that has been previously discussed a number of times” (Ezzo 1993: 55). Even more grating are the failures to proof-read. For example, on page 27 appears the following. “In their comparison of these three regions, Graves, Longacre, and Holbrook (1982) note the general lack of increased social complexity despite population growth process is destructive, special care had to - be taken to inflict as little damage to each specimen as possible. If the femora of an individual badly damaged, nonexistent, or in such pristine condition that I did notation and a shift from horticulture to agriculture.” This is the most extreme of several such lapses. Even more distracting are the many typographical errors, which divert the reader's attention from the volume's important messages. A partial list includes “flouride” (p. 33), “ancient diet” (p. 39), “tendency” (p. 77), “Disepersion” (p. 77), “fiaction” (p. 94), “siet” (p. 94), “Advacned” (p. 95), “Magensium” (p. 96), “malnutirtion” (p. 99), and “measurments” (p. 100). The bibliography is replete with mistakes and varied styles. There are at least three different ways in which the University of Cambridge Press is referenced, for example.

In sum, this volume is important to our knowledge of paleodietary inferences from bone chemistry. Ezzo's discussion of multi-element approaches and post-depositional change is especially acute. Southwestern archaeologists and bioarchaeologists will also find the dietary inferences enlightening, especially those relating to temporal changes by

sex and by household. If more attention had been paid to aspects of volume production, the monograph would be even more effective.

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- Ambrose, S.H. 1993. Isotopic Analysis of Paleodiets: Methodological and Interpretive Considerations. In M.K. Sanford (ed.), *Investigations of Ancient Human Tissue: Chemical Analyses in Anthropology*, 59-130. Gordon and Breach, Langhorne, Pennsylvania.
- Krueger, H.W. & C.H. Sullivan. 1984. Models for carbon isotope fractionation between diet and bone. In J.E. Turnlund & P.E. Johnson (eds.), *Stable Isotopes in Nutrition*, 205-222. American Chemical Society Symposium Series 258, Washington, DC.

Recent Publications

Revue d'Archeometrie 21 (1997). 140 pages and 12 articles. Available for 140 FF from: GMPCA, Laboratoire d'Archeometrie, Université de Rennes 1, 35042 Rennes Cedex, France. Back issues also 140 F each (1993-96); 130 F (1992); 120 F (1990-91); 115 F (1989); 110 F (1988); 100 F (1987); 90 F (1986).

Traces of the Past. Unraveling the Secrets of Archaeology through Chemistry. Joseph B. Lambert. Helix Books/Addison-Wesley, Reading, Massachusetts, 1997. 336 pp., 127 b&w illustrations, 16 color plates, index. \$30.00 (cloth). ISBN 0-201-40928-3.

Elsevier's Dictionary of Archaeological Materials and Archaeometry, by Zvi Goffer, 1996. 464 pages, in English with translations of 1374 terms in German, Spanish, French, Italian and Portuguese. Available from Elsevier Science, PO Box 945, New York, NY 10159-0945, tel 212-633-3730, fax 212-633-3680; e-mail: usinfo-f@elsevier.com. ISBN 0-444-81949-5.

Archaeological Sediments and Soils: Analysis, Interpretation and Management. Anthony J. Barham & Richard I. Macphail (eds.). 239 pp., 37 figures, 29 plates. Institute of Archaeology, University College London, 1995. \$29.60. ISBN 0-905853-31-8.

Multilingual Dictionary of Lithic Technology Terms. Compiled and edited by R. Marois, A.M. Groot de Mahecha, J.E. Almeida, M.C. Mineiro Scatamacchi & E.B. Jelks. A compendium of archaeological terms that refer to the production, usage, and formal description of utilitarian stone artifacts, compiled from published sources with equivalencies in English, French, Portuguese and Spanish. Available for \$36.00 plus shipping from: Instituto Panamericano de Geografia e Historia, Departamento de Distribucion y Ventas, Apartado Postal 18879 - 11870 Mexico. Fax: 525-271-6172; e-mail: ipgh@laneta.apc.org

Ground-Penetrating Radar. An Introduction for Archaeologists. Lawrence B. Conyers & Dean Goodman. AltaMira Press, 1997. 240 pp. \$54.00 (cloth), ISBN 0-7619-8927-7; \$26.95 (paper), ISBN 0-7619-8928-5.

People, Plants, and Landscapes. Studies in Paleoethnobotany. Kristin J. Gremillion (ed.). The University of Alabama Press, 1997. 296 pp. \$29.95 (paper).

Histoire & Mesure 9 no. 3/4 (1994). Special issue on archaeology, with 14 articles, 200 pages. Contents: Introduction à l'archéométrie (A. Hesse); La prospection archéologique: des mesures extensives sur deux dimensions de l'espace (A. Hesse); Le relevé de terrain en archéologie: le système Arkéoplan (K. Gruel & O. Buschsenschutz); Le temps et la chronométrie en archéologie (J. Evin); La caractérisation des archéométaux: résultats, limites et perspectives (J.-N. Barrandon); Réflexions méthodologiques sur les problèmes soulevés par la caractérisation des obsidiennes (C. Chataigner); Pratiques artisanales des briquetiers et archéomagnétisme des matériaux d'argile cuite. Une histoire de positions de cuisson (P. Lanos); Evaluation de l'impact de l'homme sur la végétation: l'apport de la palynologie (H. Richard); Apports récents de l'antracologie à la connaissance des paysages passés: performances et limites (L. Chabal); L'os et sa mesure. Archéozoologie et archéométrie (L. Chaix & J. Desse); L'anthropométrie (C. Simon); La paléodémographie (C. Masset); L'archéologue devant les moyens offerts par l'archéométrie (L. Langouet); Archaeometry in Britain (M. Tite). Available for 125 F from: Centrale des Revues, CDR, 11, rue Gossin, 92543 Montrouge Cedex, France; Tel: 33-1-46-565266. Annual subscriptions 310 F (at least for 1995). First special issue on Archaeology was vol. 5 no. 1/2 (1990).

Book Reviews in Upcoming Issues

Statistics for Archaeologists (R. Drennan), by R. Dewar; *Alluvial Geoarchaeology. Floodplain Archaeology and Environmental Change* (A.G. Brown), by D. Thieme; *Archaeometry: An Australasian Perspective* (W.R. Ambrose & P. Duerden), *Archaeometry: Further Australasian Studies* (W.R. Ambrose & J.M.J. Mummery), and *Archaeometry: Current Australasian Research* (B.L. Fankhauser & J.R. Bird), by S. Young; *The Origins and Ancient History of Wine* (P. McGovern *et al.* eds.), by **R. Evershed**; *Feeding Colonial Boston: A Zooarchaeological Study* (D.B. Landon), by **B. Baker**; *Packrat Middens* (J. Betancourt *et al.*), by **V. Bryant**; *Archaeological Prospecting, Image Processing and Remote Sensing* (I. Scollar *et al.*), and *Moundbuilders of the Amazon* (A. Roosevelt), by **J. Ebert**; *Materials Issues in Art and Archaeology II* (P. Vandiver *et al.*), and *Chemical Characterization of Ceramic Pastes* (H. Neff ed.), by **W. Barnett**; *The Industrial Revolution in Metals* (J. Day & R.F. Tylecote), and *Early Metallurgical Sites in Great Britain* (C.R. Blick ed.), by **D. Killick**; *Paleoethnobotany* (D. Pearsall), by **M. Nesbitt**; *Pottery in Archaeology* (C. Orton *et al.*), *The Art of Stoneworking* (P. Rockwell), and *Vertebrate Taphonomy* (R. Lee Lyman), by **T. Oudemans**; *Materials Issues in Art and Archaeology IV* (P.B. Vandiver *et al.*), by **C. Reedy**

P.S. This is a friendly reminder to the **reviewers!**

Meetings Calendar

Susan Mulholland, Associate Editor

* = new listings; + = new information for previous listings

1997

- Oct. 3-5. 4th Annual Midwest Bioarchaeology and Forensic Anthropology Association. Loyola University, Chicago, USA. Abstracts due June 1. Dr. Anne Grauer, tel: 773-508-3480; email: agrauer@luc.edu
- * Oct. 4-5. 16th Annual Northeast Conference on Andean Archaeology and Ethnohistory. University of Maine, Orono, Maine, USA. Dan Sandweiss, Dept. of Anthropology, S. Stevens Hall, University of Maine, Orono, ME 04469-5773, USA; email: dan_sandweiss@voyager.umeres.maine.edu.
- * Oct. 13-18. XIV Congreso Nacional de Arqueología Chilena. Universidad de Chile, Copiapo, Chile. Miguel Cervellino, Casilla del Correo 134, Copiapo, Chile; tel/fax: 56-52-21-2313.
- * Oct. 14-19. 51st National Preservation Conference - People and Places: Living in Cultural Landscapes. Santa Fe, New Mexico, USA. National Trust for Historic Preservation, 1785 Massachusetts Avenue, NW, Washington D.C., USA 20036; tel: 800-944-6847; fax: 202-588-6223.
- * Oct. 15-18. Museum Computer Network Annual Conference. Union Station Hyatt Regency, St. Louis, Missouri, USA. Michele Devine, Museum Computer Network, 8720 Georgia Ave., Suite 501, Silver Spring, MD 20910, USA; tel: 301-585-4413; email: mcn@mcn.edu.
- Oct. 20-23. Geological Society of America, Annual Meeting. Salt Lake City, Nevada, USA. Vanessa George, Geological Society of America, 3300 Penrose Place, Boulder, CO 80301, USA; tel: 303-447-2020; fax: 303-447-1133.
- * Oct. 24-26. 1997 Joint Symposium, Ontario Archaeological Society and Midwest Archaeological Conference. Theme: Taming the Taxonomy - Toward a New Understanding of Great Lakes Archaeology. Novotel Hotel, North York, Ontario, Canada. Ronald F. Williamson, Archaeological Services, 528 Bathurst St., Toronto, Ontario, M5S 2P9, Canada; tel: 416-966-1069; fax: 416-966-9723; email: archaeology@sympatico.ca.
- Oct. 26-31. Soil Science Society of America Annual Meeting. Anaheim, California, USA. Web: <http://www.agronomy.org/olr/index.html> or <http://www.soils.org/divs/s9/>. Symposium: Magnetic Properties of Soil Minerals - Analysis and Interpretation. Mike Timpson, 2515 North Fort Valley Rd., Apt. 13, Flagstaff, AZ 86001, USA; tel: 520-773-1416; email: miket@infomag.com
- * Nov. 5-9. 54th Annual Meeting of the Southeastern Archaeological Conference. Radisson Hotel, Baton Rouge, Louisiana, USA. David Kelley, Coastal Environments, 1260 Main St., Baton Rouge, LA 70802, USA; email: cei@premier.net
- * Nov. 11. Bill Bishop Research Symposium: Recognizing Responses to Environmental Change. Burlington House, Piccadilly, London, United Kingdom. Mrs. Sheila Bishop, Symposium Secretary, 4, Ashridge Gdns. Pinner, Middx, HA5 1DU, United Kingdom; tel: 0181-868-4966.
- Nov. 13-16. 30th Annual Chacmool Conference: The Entangled Past - Integrating History and Archaeology. University of Calgary, Calgary, Alberta, Canada. Nancy Saxberg, 1997 Conference Committee, Dept. of Archaeology, University of Calgary, 9500 University Dr. NW, Calgary, Alberta, Canada T2N 1N4; tel: 403-220-5227; fax: 403-282-9567; email: njsaxber@acs.ucalgary.ca
- * Nov. 13-16. American Society for Ethnohistory annual meeting. national Museum of Anthropology, Mexico City, Mexico. William O Autry, 1997 ASW Program Cochair, PO Box 917, Goshen IN 46527-0917, USA; tel: 219-535-7402; fax: 219-535-7660; email: billoa@goshen.edu.
- Nov. 16-19. Symposium: Palynostratigraphy at Low Latitudes. Margarita Hilton, Isla Margarita, Porlamar, Venezuela. In association with the 8th Venezuelan Congress of Geology and 1st Latin American Congress of Sedimentology. Laurent de Verteuil, Petrotrin, Trinidad; tel: 809-658-4200/10/20/30, ext. 2317; fax: 809-659-3074; email: devert@petrotrin.com
- * Nov. 17-18. DNA Forensics Science, Evidence, and Future Prospects. McLean, Virginia, USA. Cambridge Healthtech Institute, 1037 Chestnut St., Newton Upper Falls, MA 02164, USA; tel: 617-630-1300; fax: 617-630-1325; email: chi@healthtech.com; web: <http://www.healthtech.com/conferences/>
- Nov. 18-22. 55th Annual Plains Anthropological Conference. Boulder, Colorado, USA. Douglas Bamforth, Dept. of Anthropology, Univ. of Colorado, Boulder., CO 80309; tel: 303-492-1871; email: bamforth@spot.colorado.edu. Field trip: Magic Mountain and the Lamb Springs site.
- * Nov. 19-23. American Anthropological Association 96th Annual Meeting. Washington, D.C., USA. Elizabeth Brumfiel, Archaeology Division program chair, Dept. of Anthropology and Sociology, Albion, MI 49224, USA; tel: 517-629-0432; email: ebrumfiel@alpha.albion.edu; web: <http://www.ameranthassn.org>
- Dec. 1-5. Materials Research Society, Fall Meeting. Boston, Massachusetts, USA. Materials Research Society, 9800 McKnight Road, Pittsburgh, PA 15237, USA; tel: 412-367-3003; fax: 412-367-4373.

1998

- Jan. 5-8. Royal Geographical Society and Institute of British Geographers. University of Surrey, Guildford, UK. Theme: Environmental Change in the Tropics and Subtropics. Dr. Jane Entwistle, School of Geography,

- Kingston University, Penrhyn Road, Kingston-Upon-Tames, Surrey, KT1 2EE, UK; tel: 0181-547-2000, ext. 2552; fax: 0181-547-7497; email: j.entwistle@kingston.ac.uk
- * Jan 7-11. Society for Historical Archaeology annual meeting. Atlanta, Georgia, USA. web: <http://www.mindspring.com-garrowga/sha1998/index.html>.
- * March 1-6. PITTCON '98. The Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy. New Orleans, Louisiana. Among the sessions is a half-day symposium on "Archaeology and Art: Diverse Applications of Analytical Chemistry." Contact: The Pittsburgh Conference, Dept. CFP, 300 Penn Center Boulevard, Pittsburgh, PA 15235-5503 USA; Tel: 412-825-3220; fax: 412-825-3224; e-mail: pittconinfo@pittcon.org
- * March 24-28. 26th Annual meeting, Computer Applications and Quantitative Methods in Archaeology. Barcelona, Spain. J.A. Barcelo, Quantitative Archaeology Lab, Dpt. of Prehistory, Universitat Autònoma de Barcelona, Barcelona, Spain; email: ilphd@blues.uab.es; web: <http://blues.uab.es/~ilphd>.
- * March 25-29. 63rd Annual Meeting of the Society for American Archaeology. Seattle, Washington. Jonathan Driver, Program Chair, Dept. of Archaeology, Simon Fraser University, Burnaby, British Columbia, V5A 1S6, Canada; tel: 604-291-4182; fax: 604-291-5666; email: driver@sfu.ca.
- * April 6-10. 3rd International Symposium on C14 and Archaeology. Lyon, France. Themes will include dating sequences for archaeological sites and culture; chronology of transitional periods; use of the radiocarbon method in historical times; recent methodological advances; and radiocarbon dating contributions to specific archaeological problems. Secretariat, Centre de Datation par le Radiocarbène, Université Claude-Bernard Lyon 1, Bât. 217-43 Boulevard du 11 Novembre, 69622 Villeurbanne, France. Tel 33-4-72448257; fax 33-4-72431317; e-mail cdrc14@cismsun.univ-lyon1.fr
- April 27-May 1. International Symposium on Archaeometry. Hungarian National Museum, Budapest, Hungary. Katalin T. Biro, Hungarian National Museum, Dept. of Information, H-1450 Budapest Pf. 124, Hungary; tel/fax: 36-1-2101/338; email: h5852tbi@ella.hu; <http://origo.hmn.hu/ametry>.
- * June 11-15. ASMOSIA 1998. Association for the Study of Marble and Other Stones in Antiquity Vth International Conference, Museum of Fine Arts, Boston, Massachusetts. Paper sessions June 11-13; tours and field trips June 14-15. Registration \$100 (students \$75.00), deadline January 31. Abstracts due January 3. ASMOSIA, Department of Classical Art, Museum of Fine Arts, Boston, 465 Huntington Avenue, Boston, MA 02115 USA. Tel: 617-369-3259; fax: 617-369-3276; e-mail: p.russell@mfa.org
- July 26-Aug. 1. The 21st Century: The Century of Anthropology. 14th Congress of the International Union of Anthropology and Ethnological Sciences. The College of William and Mary, Williamsburg, Virginia, USA. Tomoko Hamada, 14th ICAES Executive Secretary, Dept. of Anthropology, College of William and Mary, Williamsburg, VA 23187-8795, USA. Tel: 804-221-1055; fax: 804-221-1066; e-mail thamad@mail.wm.edu.
- + Aug. 23-29. 8th International Congress, International Council for Archaeozoology. University of Victoria, Victoria, British Columbia, Canada. Rebecca Wigen, rjwigen@uvvm.uvic.ca or Quentin Mackie, qxm@uvic.ca. Tourism Victoria, 812 Wharf St., Victoria, B.C. Canada, V8w 1T3; tel: 250-382-6539; web: <http://travel.bc.ca=09>; web: <http://home.sprynet.com/sprynet/fdirrigl/metting.htm>.
- * Aug. 27-29. Second International Meeting on Phytolith Research. Aix en Provence, France. 2nd IMPR, J.D. Meunier, CEREGE, Europole Mediterranéen de l'Arbois-BP 80, 13545 Aix en Provence Cecex 04, France; tel: 33-0-4-42-97-15-26; fax: 33-0-4-42-97-15-40; email: phytomeeting@cerege.fr; web: <http://www.cerege.fr>.
- Oct. 26-29. Geological Society of America, Annual Meeting. Toronto, Ontario, Canada. GSA Meetings Department, tel: 1-800-472-1988 or 303-447-2020, ext. 133; email: meetings@geosociety.org; <http://www.geosociety.org>
- * Nov. Inter-Congress Meeting of Commission 4, Union Internationale des Sciences Préhistoriques et Protohistoriques. Phoenix area, Arizona, USA. Keith Kintigh, Dept. Anthropology, Arizona State University, Tempe, AZ 85287-2402, USA; tel: 602-965-6900; fax: 602-965-7671; e-mail kintigh@asu.edu or cowgill@asu.edu; web: <http://archaeology.la.asu.edu/uissp>
- * Nov. 7-11. 2nd International Climate and History Conference. Climatic Research Unit, Norwich, United Kingdom. Trevor D. Davies, Climatic Research Unit, University of East Anglia, Norwich NR4 7TJ, United Kingdom; tel: 44-1603-592721; fax: 44-1603-507784.

1999

- * Jan. 10-14. Fourth Meeting of the World Archaeology Congress, Cape Town, South Africa. Congress Secretariat, PO Box 44503, Claremont 7735, South Africa. Tel: 27-21-762-8600; fax: 72-21-762-8606; e-mail: wac4@globalconf.co.za; web: <http://www.uct.ac.za/depts/age/wac>
- * Aug. 3-11. XV INQUA Congress 1999. Durban, South Africa. Theme: Environmental Background to Hominid Evolution in Africa. Circulars available from Mrs. E. Aucamp, PO Box 798, Silverton, Pretoria 0001, South Africa; fax: 27-12-8411221; email: eaucamp@geoscience.org.za. For further information: Secretary-General, PO Box 61, Cape Town 8000 South Africa. Fax 27-21-246716; e-mail mavery@samuseum.ac.za; web: inqua.geoscience.org.za

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