



SAS Bulletin

Society for Archaeological Sciences

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From the President

The following report is based on the Report given at the SAS Annual Business Meeting, held Thursday, March 26, 1998 at the Society for American Archaeology Annual Meeting in Seattle, Washington.

The Society for Archaeological Sciences had its annual executive board and business meetings during the Annual Meeting of the Society for American Archaeology. We had a modest attendance of 16 at the general meeting. This year marks the 20th anniversary of the founding of SAS. We take this occasion to thank those that have labored long and hard to sustain the organization. R.E. Taylor, currently our General Secretary, deserves special thanks for his involvement over the years.

SAS accomplishments in the last year have been steady. The *SAS Bulletin* is nearly back on track, with three issues out under the auspices of Rob Tykot. *Bulletin* editor Rob Tykot plans to return to the former quarterly schedule as soon as possible.

Membership has remained nearly constant. Felicia Beardsley was successful in maintaining our dues at the current level, although those getting the *Journal of Archaeological Science* will likely see an increase next year.

Jim Burton has done an outstanding job of maintaining our web pages. Links to officers, members, laboratories, and related sites help our dispersed community keep in contact with each other and our interests.

One of my goals as President is to have an SAS-sponsored symposium at each annual SAA. We succeeded this year with the session organized by Arleyn Simon and Nancy Olsen, "From Glass to Ceramics: Archaeometry in Archaeological and Technological Studies." Please contact me with ideas for next year - the deadline for submissions to SAA is September 2. A possibility we discussed at our business meeting was a session on the interface between archaeology and archaeometry.

The next North American Archaeometry Symposium will be in Mexico City in 2000. We are looking to Berkeley as a possible host for Archaeometry 2004. We currently have three SAS members on the Archaeometry Symposium Standing Committee: Michael Tite, Gar Harbottle and Sarah Wisseman.

(continued on page 2)



From the Editor

With this double-issue, the *SAS Bulletin* is back on track, and quarterly issues 21(3) and 21(4) will appear in the fall and winter. In future issues we should be able to publish more time critical material, including job announcements.

Submissions should be sent to the Editor, preferably by email (address on back cover).

In this issue you will find several conference reviews. I had the opportunity this year to attend not only the SAA meeting where I participated in the SAS sponsored symposium (see the Membership Report on p. 5), but also the ¹⁴C and Archaeology conference in Lyon (reviewed here by Tim Jull on p. 21), the

(continued on page 2)

In This Issue

Executive Board Reports

Budget (F. Bearsley)

Membership (A. Simon)

Web/Electronic Communications (J. Burton)

Inter-Society Relations (M.S. Shackley)

AIA, SAA, and Archaeometry Awards

Associate Editors' Columns

Archaeological Ceramics (C. Kolb)

Archaeometallurgy (M. Goodway)

Geoarchaeology (M.R. Waters)

Conference Reports

Early Materials Forum (P. Mills)

Metals in Antiquity (M. Goodway)

Work Group for Palaeoethnobotany (D. Samuel)

¹⁴C and Archaeology (A.J.T. Jull)

Book Reviews (M. Glascock)

Moundbuilders of the Amazon & Archaeological Prospecting and Remote Sensing (J. Ebert)

Ground Penetrating Radar (S. Ball)

Geological Methods for Archaeology (B. Ellwood)

Ancient Mining (F.R. Beardsley)

The Origins of Native Americans (D.L. Browman)

Meetings Calendar (S. Mulholland)

President (continued from page 1)

The second and third volume in the Plenum Press series, *Advances in Archaeological and Museum Science*, came out: *Chronometric Dating in Archaeology*, edited by R.E. Taylor and Martin J. Aitken (1997, 416 pp., ISBN: 0-306-45715-6, \$95.00 in US/Canada, \$114.00 elsewhere), and *Archaeological Obsidian Studies: Method and Theory*, edited by M. Steven Shackley (1998, 262 pp., ISBN: 0-306-45804-7, \$49.50 in US/Canada, \$59.40 elsewhere). A fourth volume on conservation technology is progressing. We hope to sponsor additional volumes that will still satisfy our high standards.

Next year Chris Prior, now down under in New Zealand, will ascend to the Presidency, and we will conduct an election for the next President-elect and Secretary-Treasurer. Nominations or volunteers are welcome.

Thanks to the judging of Steve Shackley, Jim Burton and Rob Tykot, the SAS presented an award for best poster at the recent Archaeometry Symposium in Budapest. The Symposium organizers also presented an award for best student poster. I would like to see these efforts combined in the future, and to include student oral presentations as well.

We also anticipate closer involvement with other societies and SOPA/ROPA in the coming year. Joe Schuldenrein is pursuing discussions with ROPA.

Submitted by Rob Sternberg

6/25/98

Position Open: Head of the NERC Radiocarbon Laboratory

With the imminent retirement of Doug Harkness (October 1998) the University of Glasgow invites applications and nominations for the above position.

The self-contained Laboratory unit (RCL) is hosted at the Scottish Universities Research and Reactor Center (SURRC) in East Kilbride and, as from 1st April 1998, is managed in tandem with the SURRC's other activities under the directorship of Professor A.E. Fallick. At present the RCL is equipped and staffed to match an annual throughput of 1,300 natural C-14 measurements (300 by radiometric counting plus 1,000 via the production of graphite targets that are subsequently monitored by Arizona or Lawrence Livermore). The RCL building is designed to allow a doubling of the AMS target preparation capacity and it also houses an isotope ratio mass spectrometry laboratory geared to ¹³C/¹²C, ¹⁸O/¹⁶O and ¹⁵N/¹⁴N natural abundance measurements.

In terms of its science, the RCL has a primary remit to provide consultative and analytical support for research themes prioritised and funded by the Natural Environment Research Council (NERC). However, the pursuit of in-house research initiatives is regarded as an essential component of the RCL's overall agenda and the Laboratory enjoys an international reputation for its contribution to the general advancement of radiocarbon science. The successful candidate will be expected to provide the appropriate lead in maintaining and building on this level of peer recognition.

Editor (continued from page 1)

Archaeometry Symposium in Budapest, and the ASMOSIA meeting in Boston. This confluence of conferences in spring 1998 alone is testimony to the thriving state of Archaeological Science, and SAS members participated prominently in all of these meetings.

Also on these pages are reports from the Executive Officers, including our estimated and actual budgetary expenditures. The big news is that the subscription rate to *Journal of Archaeological Science* will increase. Since SAS negotiated its discount membership rate with *JAS* in 1992, they have increased the size of each issue and doubled the number of annual issues to 12. The regular individual subscription rate is now about \$650 per year, so SAS members receive a tremendous discount. Felicia Beardsley, our Secretary/Treasurer, managed to stall the price increase for the last two years, but the cost of our Regular Membership will probably rise to \$100-\$115 for 1999. We realize this is a big increase, and SAS is negotiating with Harcourt Brace/Academic Press to see if a compromise can be reached. In the meantime, we remind our readers that several membership options without *JAS* exist, and their prices remain unchanged.

Kudos are due already to Charles Kolb, our Associate Editor for Archaeological Ceramics, who has regularly contributed to each issue of the *Bulletin* (almost enough for a stand-alone newsletter!), and to our Book Review Editor, Michael Glascock, who has done an outstanding job acquiring books to review, soliciting reviewers, and obtaining and editing the reviews.

Lastly, I remind readers that we welcome your contributions to the *Bulletin*. Please continue to send in your announcements, laboratory profiles, conference information, book review requests, etc. Your suggestions and comments are also welcome!

Robert H. Tykot

August 4, 1998

Suitable candidates will have a PhD backed by a well attested record of academic attainment in the application of isotope geochemistry to aspects of environmental research and/or Quaternary reconstruction. Experience and a proven success in laboratory and project management is equally important.

The combined academic and managerial responsibility will be recognised by an appointment at the Senior Lecturer level (in the salary range £29,968.00 to £33,868.00) and it shall be open to the Appointing Committee to recommend to the Principal that the successful candidate be considered for promotion to a Personal Professorship. This will be a fixed term appointment; the post has guaranteed funding for 5 years in the first instance and renewal thereafter will be subject to a peer assessment and the assignment of scientific priorities within NERC's overall funding regime.

Specific queries concerning perceived scientific priorities and/or available analytical facilities should be addressed to Dr D D Harkness; tel: +44 (0) 1355 260037; fax: +44 (0) 1335 229829; email: DDH@wpo.nerc.ac.uk; or Professor A E Fallick; tel: +44 (0) 1335 270139; fax: +44 (0) 1355 229898; email: T.Fallick@surre.gla.ac.uk.

Lectureship in Environmental Archaeology

This is an additional post to the one advertised earlier this year.

The Department of Archaeology, University of Wales, Lampeter is seeking to make an appointment in Environmental Archaeology for a fixed term of three years, in the first instance. Specialism is open, though preference will be given to those with proven laboratory experience and a broad view of science within an interdisciplinary archaeology. A strong research and publication programme is essential. It is hoped that the successful candidate will join the Department in October 1998 or January 1999.

Salary will be at the appropriate point on the Academic Lecturer A salary scale i.e. £16,655 -£21,815 p.a.

Further particulars are available from the Personnel Office, University of Wales, Lampeter, Ceredigion SA48 7ED. Your letter of application, with a full curriculum vitae and the names of three referees should be returned to the above address, no later than 4 September 1998. There are no application forms.

Further particulars: <http://www.lamp.ac.uk/vacancies/envarch.htm>

For information on the Department of Archaeology see: <http://archaeology.lamp.ac.uk>

Income and Expenditure Summary

January 1, 1997 to December 31, 1997

As of January 1, 1997:

Bank of America Checking balance	\$	15,706.85
UCR Campus Credit Union balance	\$	461.34
TOTAL ACCOUNT BALANCES	\$	16,168.19

INCOME

Membership Income	\$	25,042.45
Gifts (donation by Roy Shlemon).	\$	300.00
Royalty (publication sales)	\$	92.27
Other Income (State tax refund).	\$	10.34
Dividend/Interest	\$	10.82

TOTAL INCOME \$ 25,455.88

EXPENDITURES

Advertising	\$	0.00
Annual Meeting.	\$	0.00
Banking Costs	\$	482.71
Bulletin printing/postage	\$	2,197.24
Miscellaneous (BoA Merchant Adjustment; State non-profit corp. filing fee).	\$	250.75
Office expense - President	\$	100.00
Office expense - General Secretary	\$	192.40
Office expense - Other (renewal printing, postage, envelopes, fax).	\$	426.57
Other expense (book development, reimbursements).	\$	452.14
Payment to Academic Press for JAS subscriptions.	\$	18,360.00
Taxes:		
Federal	\$	0.00
State	\$	10.00

TOTAL EXPENSES \$ 22,471.81

As of December 31, 1997:

Bank of America Checking balance	\$	19,580.10
UCR Campus Credit Union balance.	\$	472.16

TOTAL ACCOUNT BALANCES \$ 20,052.26

Membership Report 1998

Arleyn W. Simon, VP for Membership

The good news for 1998 is that the tide has turned and SAS membership increased nearly 8% over the previous year! This change is due to:

1) SAS is back in circulation again with the *Bulletin* back on track, thanks to Rob Tykot's editorship;

2) We ran a "membership drive" article in one of first issues to be distributed directing members to contact Felicia Beardsley to renew and update address and email information. The latest issue has a full page membership form that can be copied and sent in;

3) We now have a printable membership application on the website, thanks to Jim Burton, which has increased visibility and accessibility, especially among students and internationally; and

4) Felicia Beardsley has done an outstanding job of corresponding with new and renewing members and tracking the membership.

At the 1997 annual meeting, we set several goals to boost membership in the coming year: first, we planned to use the SAS membership table-top exhibit at a variety of professional meetings throughout the year. The exhibit was displayed (at no charge) by Rob Tykot (Metals Conference at Harvard, September 10-13th, 1997). However, further attempts to use the display at the SAA and GSA were cut short by the prohibitive costs quoted for booth rentals (approximately \$600-800 each).

As alternatives for this strategy, we now plan to distribute the remaining SAS brochures, and then order new revised brochures for distribution. We discussed mailing the brochures to other society's rosters, such as that for the International Archaeometry Symposium which Felicia will undertake. A second alternative is the distribution of business-sized cards, which will have the SAS website address and a few key phrases of SAS membership benefits. Arleyn Simon will (has now) produced a master file for printing these cards in MS Excel. These can be copied inexpensively and widely distributed at meetings. Anyone wishing copies or an electronic copy of the form should contact Arleyn at ASU-ARI.

A second goal set at the 1997 meeting was to have a SAS sponsored symposium at each SAA annual meeting to raise visibility of the society and recruit potential members. The 1998 SAS sponsored symposium at the 1998 SAA in Seattle, entitled *From Glass to Ceramics: Archaeometry in Archaeological and Technological Studies*, was co-organized by Arleyn Simon and Nancy Olsen and was successfully presented with a wide range of participants from various disciplines and interests. The discussants were Robert Tykot and Jeffrey Dean. The symposium was well attended with an average of about 40 in the audience, a good number considering 30 concurrent sessions, several with overlapping topics (including the obsidian workshop in which Robert Tykot and Steven Shackley were participants).

Plans were made to have a SAS sponsored symposium or forum at the 1999 SAA annual meeting, organized and chaired



From left to right, Robert Tykot, Arleyn Simon, and Jeffrey Dean at the SAS sponsored symposium "From Glass to Ceramics: Archaeometry in Archaeological and Technological Studies."

by Jeffrey Dean which will address Archaeometry in Archaeology in the next century. This program will focus on means of improving communication between archaeometrists and archaeologists, including archaeometry courses and training in undergraduate and graduate curriculum, and expanding employment opportunities for archaeometrists/archaeologists in academia, museums, research institutions, and the archaeological private sector.

A student award including a two year membership in SAS and subscription to JAS will be awarded for outstanding poster presentation at the International Archaeometry Symposium. Steve Shackley and Jim Burton will be attending and will handle the award selection. The award is viewed as a way of acknowledging future archaeometrists and SAS members. Members of SAS are encouraged to give out the SAS website in classes and at meetings to encourage awareness of and participation in the society.

SAS Membership Roster	
543 Names (people and Institutions) (not all are current)	
148 Non-U.S. Members (30 different countries)	
68 Life-time members	

Membership	1996	1997	Increase	1998 to date	% to date:
Total Membership	354	381	27 7.6%	242	63.5
Regular		277		190	68.6
Student/Retired		32		18	56.3
Institutional		25		18	72.0
Associate		27		16	59.3
JAS Subscriptions		295		205	69.5

Projected and Actual Income and Expenditure Summary

January 1, 1997 to December 31, 1997

	1997 <u>Budget</u>	1997 <u>Actual</u>	<u>Difference</u>
INCOME			
Membership Income	6,300	6,682.45	382.45+
Other Income	0	402.61	402.61+
Interest Income	10	10.82	0.82+
<i>JAS</i> Subscriptions	18,000	18,360.00	360.00+
TOTAL INCOME	24,310	25,455.88	1,145.88+
OPERATING EXPENDITURES			
Advertising	0	0.00	0.00
Annual Meeting	250	0.00	250.00-
Banking Costs	500	482.71	17.29-
Bulletin printing/postage	3,500	2,197.24	1,302.76-
Miscellaneous	350	250.75	99.25-
Office expense - President	100	100.00	0.00
Office expense - General Sec.	500	192.40	307.60-
Office expense - Bulletin	200		
Postage - other	500	878.71	221.29-
Printing - other	400		
Payment to Academic Press	18,000	18,360.00	360.00+
Taxes	10	10.00	0.00
TOTAL OP. EXPEND.	24,310	22,471.81	1,838.19-

1998 Budget

January 1, 1998 to December 31, 1998

Projected Income

Membership	\$ 6,300.00
Interest Income	\$ 10.00
<i>J. Archaeological Science</i> Subscriptions	\$ 18,000.00
Projected Total Income	\$ 24,310.00

Projected Operating Expenditures

Annual Meeting	\$ 250.00
Banking Costs	\$ 500.00
Bulletin printing/postage	\$ 3,500.00
Miscellaneous	\$ 350.00
Office expense - President	\$ 100.00
Office expense - General Secretary	\$ 500.00
Office expense - Bulletin/Other	\$ 200.00
Postage - other	\$ 500.00
Printing - other	\$ 400.00
Payment to Academic Press for <i>JAS</i>	\$ 18,000.00
Taxes	\$ 10.00
Projected Total Expenditures	\$ 24,310.00

Report from the Webmanager/Chair for Electronic Communications

James Burton

SASweb

Web documents for the Society for Archaeological Sciences (SASweb) are now at a new address: <http://www.wisc.edu/larch/sas/sas.htm>. SASweb was previously using, gratis, server space of the University of Wisconsin's Department of Information Technology ("DoIT") allocated to the Department of Anthropology (<http://www.wisc.edu/anthropology/sas/sas.htm>). Tight disk-quota restrictions and rapidly increasing use by the Anthropology Department required that we move our web documents to another location. SASweb documents are now available through DoIT server-space allocated to the Laboratory for Archaeological Chemistry. The SAS will also pay \$20 monthly to cover costs for its use of the server facilities, including the disk quota and file maintenance by DoIT. Links to the old address will be rerouted to the new address, but everyone should change their 'bookmarks'. If you maintain links to SASweb through your own html documents, please make the appropriate address changes in your own documents.

Web documents include society information, *Bulletin* contents, email addresses of the SAS membership, and extensive links to archaeometric facilities, publications, meetings, and other resources. In 1997 the compilation of abstracts from the 1996 International Archaeometry Conference was the most popular document on SASweb. Currently most popular are the contents of the *SAS Bulletin*, followed by links to archaeometric facilities.

The number of SASweb visitors increased in 1997 to several hundred visits per month and has remained fairly constant at that level in early 1998, with the greatest increase coming from visitors located outside the U.S. At least one third of the visitors (to the extent domain names can be resolved) are now from outside the United States, led by the U.K., Canada, and Australia. Because locations of visitors accessing SASweb from networks such as Prodigy and AOL cannot be resolved, the percentage of non-U.S. visitors is probably close to parity with visitors from within the U.S.

SASnet

SASnet is now in its eighth year, quite a long history by internet mail group standards. The subscriber base has grown from 437 in June 1997 to 471 in March 1998. Like SASweb usage, a significant fraction of subscribers, and posts to SASnet, are now from outside the United States. Although SASnet was set up as a moderated list to avoid the 'flamewars' that frequently spring up on other mailing lists, such has not been a problem on SASnet. No messages have had to be returned or edited because they were deemed abusive. SASnet has also received remarkably few inappropriate advertisements and 'spams'. The major advantage to moderation has been the ability to filter messages accidentally posted to SASnet that were obviously

intended for just a single individual. Although some mailing lists, including the original SASnet, could be configured so that replies to a message go only to the sender of the original message, the current SASnet is set up so that replies go to everyone on the list. Please keep that in mind when you use a 'reply' command - good advice for responding to any message, not just those from SASnet!

To subscribe, send the following command: "subscribe SASnet <your name>" to the list server address: listserv@relay.doit.wisc.edu.

Inter-Society Relations Report

M. Steven Shackley, Vice President

The 1996/1997 year was an educational experience for the Inter-Society Relations committee of one. Continued association with the International Association for Obsidian Studies (IAOS) and attempts to continue contact with the Archaeometry Symposium Standing Committee met with varying success.

Probably most important was the proposal by my lab, the Phoebe Hearst Museum of Anthropology, in intellectual 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 also tenured proposals, and we were confident ours would be given serious consideration. The lab, the Archaeological Research Facility, and museum brought Mike Tite, the standing committee chair, to Berkeley to show off the facilities, and our capability to host such an event. In the end, Mexico City was chosen to host the symposium in 2000, and we were asked to consider resubmitting for 2004 when the symposium returns to North America. We intend to do so, emphasizing the commitment of support by the Society for Archaeological Sciences.

I have a copy of our proposal, which will be modified appropriately for the next submission.

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.

Timely decisions about the day for the SAS business meetings at the SAA would be helpful to insure that the various newsletters publish our meeting schedule.

Following on the above, the business meeting of the IAOS was held in Seattle at the same time as the SAS business meeting this year. Since most IAOS members, as well as some who *could be* SAS members, are also SAS members, it would behoove us to coordinate with IAOS in the future. I attempted to do so this year, but both organizations schedule the business meetings at the last minute.

As usual, any member that has inter-society type news, please forward it, and I'll act on it appropriately.

AWARDS

Archaeological Institute of America: 17th Annual Pomerance Award for Scientific Contributions to Archaeology

Martin J. Aitken, who retired in 1989 as Professor of Archaeometry and Deputy Director of the Research Laboratory for Archaeology and the History of Art, Oxford University, joined the Research Laboratory in 1957 and began to apply magnetic methods to both the dating and location of kilns and hearths. In 1958, he undertook the first archaeological proton magnetometer survey on the Roman city of Durobrivae, near Water Newton. Also in 1958, the Laboratory published the first volume of the journal *Archaeometry*, which has become one of the leading vehicles for the



Martin J. Aitken

publication of scientific research in archaeology. Aitken turned his attention to the application of the phenomenon of thermoluminescence to the dating of ceramics in 1960, and in 1990, he produced his most widely known volume, *Science-based Dating in Archaeology*, which has rapidly become the standard undergraduate text on the subject, both for archaeologists and the wider geological audience. In recognition of his scientific achievements he was elected a Fellow of the Royal Society in 1983 - a tribute not only to his outstanding ability as a scientist who chose to work in archaeology, but also a recognition of the fact that science in archaeology had come of age. (from the *AIA Newsletter* 13(2)1998:6)

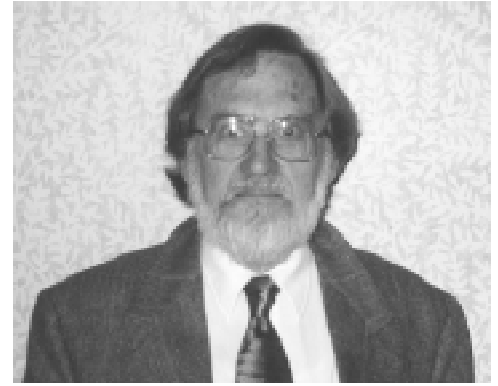
Archaeological Institute of America: Best Poster Award

The 1997 award went to Scott Pike, Wiener Laboratory, American School of Classical Studies at Athens, for his poster "A Petrographic Characterization Study of Bronze Age Sandstone Quarries in East Crete and its Application to Minoan Archaeology."

Society for American Archaeology: Fryxell Award

This year's winner of the Fryxell Award for Interdisciplinary Research in archaeology is John W. Weymouth, who earned his PhD in physics from the University of California-Berkeley in 1951. Throughout the 1950s and 1960s, he explored the application of a variety of physical and analytic techniques - among them x-ray diffraction of ceramics - to archaeology. Since the early 1970s, he has made physical sensing techniques his prime research focus. He initially experimented with proton magnetometer survey as a tool for locating buried features at archaeological sites. Since then, and even in retirement, he has expanded his purview, working with resistivity, ground penetrating radar, and chemical surveying. Weymouth has continually refined these techniques, pioneering their use in a

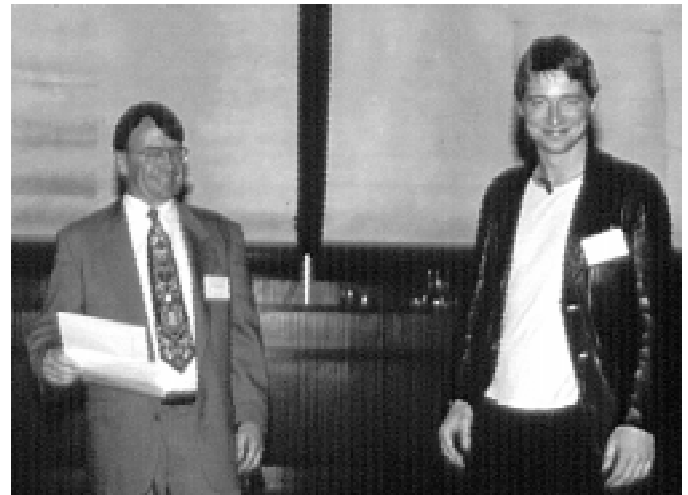
wide range of historic and prehistoric contexts in North America, Japan, and Europe. In addition, Weymouth is a generous scholar, eager to share his knowledge, expertise, maps, and data. He is a patient teacher, enthusiastically explaining the complexities of geophysics to archaeological and diverse popular audiences. He has consulted with countless archaeologists, pushign sensors or filters to perform at the highest possible level. For making geophysical techniques an indispensable part of the archaeological tool kit, SAA is honored to present this award to Weymouth. (from the *SAA Bulletin* 16(3)1998:18)



John W. Weymouth

31st International Symposium on Archaeometry

Several awards were given out at the International Symposium on Archaeometry, held in Budapest, Hungary, 27 April-1 May 1998. The winner of the Society for Archaeological Sciences Poster Award was Peter Tomkins (University of Sheffield), with coauthors Peter M. Day (Sheffield) and Vassilis Kilikoglou (NCSR Demokritos, Greece). Their poster was entitled "The First Pottery in Europe: Technology, Production and Consumption in Early Neolithic Knossos, Crete." Tomkins will receive two years' full membership in SAS, including a subscription to *JAS*.



Steve Shackley presenting the SAS Poster Award to Peter Tomkins at the 31st International Archaeometry Symposium on Archaeometry in Budapest, Hungary

The Martin J. Aitken Awards for Best Posters were won by Robert Linke, Manfred Schreiner (both Academy of Fine Arts, Vienna), H. Winter and M. Alram (both Kunst-historisches Museum, Vienna) for their poster "Friesacher Pfennig. Energy-Dispersive X-Ray Fluorescence Analysis of Medieval Silver Coins," and by Elizabeth Aveling and Carl Heron (both University of Bradford) for their poster "Characterisation of Mesolithic 'Chewing Gums'."



Robert Linke

poster "Finite Element Analysis for Failure Prediction of Archaeological Pottery"; E. Aveling and C. Heron (see above); B. Fabbri, S. Gualtieri (CNR, Faenza, Italy) and S. Santoro (University of Bologna, Italy) for their poster "The Importance of Firing Atmosphere in the Production of Coarse Ceramics with Calcite and Chamotte Inclusions"; and M. Cowell, S. La niece (both British Museum) and J. Rawson (Oxford University) for their poster "A Study of Later Chinese Metalwork."

Recipients of the Canadian Awards were V. Kilikoglou and G. Vekinis (NCSR Demokritos, Greece) for their



Vassilis Kilikoglou

Abstracts of these presentations are still available at the Symposium website: <http://gw.ace.hu/MNM/MN/ametry/index.html>

ARCHAEOLOGICAL CERAMICS

Charles C. Kolb, Associate Editor

The column in this issue covers three main topics: 1) summaries of more than a dozen recently published or forthcoming books; 2) notices of three forthcoming conferences; and 3) reports on six conferences that have been held recently. My next column will include a review of listserves with ceramic contents; summaries of World Wide Websites that will be of interest to those concerned with archaeological pottery; and a list of major websites that deal with petrography. Contributions and emendations from our readers are always welcome.

New Publications

Pottery Ethnoarchaeology in the Central Maya Highlands by Michael Deal is scheduled for publication in June 1998 (Salt Lake City: University of Utah Press, Foundations of Archaeological Inquiry, 208 pp., 137 illustrations, 2 appendices, ISBN 0-87480-561-9 \$25.00 paper, ISBN 0-87480-560-0 \$55.00 cloth). Deal, an Associate Professor in the Department of Anthropology, Memorial University of Newfoundland, is known for his ceramic studies in Eastern North America (Maritime Provinces and New England), Mesoamerica (Highland Maya), and more recently, the eastern Mediterranean. The information presented in seven chapters and two appendices was assembled by Deal under the auspices of the Coxoh Ethnoarchaeological Project in Chiapas, Mexico, which sought to establish material culture links between the now extinct Coxoh and modern Maya groups in the region. Data collected from each Maya household focused on family social structure, settlement characteristics, economic background, and variability



Ron Hancock presenting a Canadian Award to Elizabeth Aveling, who also received one of the Martin J. Aitken Awards.

in household material culture. The household is studied as a production, consumption, and depositional unit with a view toward determining household socioeconomic conditions as seen in the archaeological record. Two appendices, "Classification of Chanal and Aguacatenango Pottery" and "Glossary of Vessel and Nonvessel Forms," plus references and an index complete the volume. This study is significant not only for providing specific information about ancient Maya ceramic usage but also as a model which demonstrates the use of ceramic data to help interpret archaeological pottery assemblages in other cultures. Additional information may be obtained the University of Utah Press, 1795 E. South Campus Drive, Suite 101, Salt Lake City, UT 84112; toll free orders: 1-800/773-6672; e-mail: info@upress.utah.edu.

Pottery in Rajasthan: Ethnoarchaeology in Two Indian Cities by Carol Kramer (Washington and London: Smithsonian Institution Press, Smithsonian Series in Archaeological Inquiry, 1997, ISBN 1-56-98-740-5 \$49.95 cloth), which was cited in the previous issue of the *SAA Bulletin* 20(3-4):6 (1997), has been reviewed by Charles C. Kolb for the humanities listserves H-ASIA, H-REVIEWS, and H-URBAN and published on 26 March 1998. This eight-page review may be accessed at <http://www.h-net.msu.edu/reviews/showrev.cgi?path=19892891016105>.

Studies in the Iron Age Pottery of Israel: Typological, Archaeological, and Chronological Aspects by Orena Zimhoni (Tel Aviv, Israel: Sonia and Marco Nadler Institute of Archaeology of Tel Aviv University, Occasional Publications Series, No. 2, 263 pp., 137 figures and plates, 3 maps, 1997, ISBN 965-266-010-8, \$25.00 hardcover). The author, a leading expert on the Iron Age ceramics of Israel, has prepared a topical analysis of pivotal materials related to the debate about the "United Monarchy." Her analysis of early first millennium pottery from Tel 'Eton, Tel Jezreel (including the Pre-Omrude settlement), Lachish (Iron Age II Levels V-IV) and Lachish III and II, documents challenges to the accepted dating of key "chronological anchors" at these sites. The volume may be purchased directly from the Sonia and Marco Nadler Institute of Archaeology, Tel Aviv University, P.O. Box 39040, Tel Aviv 69978, Israel, or via e-mail: archpubs@ccsg.tau.ac.il. Summaries of this and other institute publications may be reviewed at website <http://www.tau.ac.il/~archpubs/pubs.html>.

Radiography of Cultural Material by Janet Lang and Andrew Middleton (Oxford: Butterworth-Heinemann, 192 pp., 24 color and 182 halftones, 31 line illustrations, 1997, ISBN 0-7706-2621-6, £45.00 hardback). Both authors are at the Department of Scientific Research at the British Museum, and have written about the theory and practice of radiography, and its use in material culture analyses, curation, conservation, and restoration. Separate chapters consider metals, ceramics, paper, paintings, and human remains. Lang and Middleton also provide an introduction to digital image processing. Middleton prepared the chapter on ceramics (pp. 60-81) and covers topics which include the characterization of clay fabric, imaging and identifying inclusions, analyzing forming and fabrication techniques (both primary techniques and modifications), hybrid vessels and composite objects, and future prospects. Examples are drawn from a variety of cultures: Greek, Islamic, Peruvian

(Chimu and Moche), European (British and German), and Bronze Age cultures (Jordanian, Israeli, and Rhodian). The volume may be ordered directly from the publisher, Butterworth-Heinemann, Linacre House, Jordan Hill, Oxford OX2 8DP, UK, or by e-mail: bhuk.orders@repp.co.uk.

Imported and Locally Produced Pottery: Methods of Identification and Analysis, edited by Andrzej Buko (Warsaw, Poland: SNAP/Scientific Society of Polish Archaeologists, 1998, \$7.00 U.S. currency). The 13 papers in this English-language volume, published in late February 1998, result from "I Conference of [the] Pottery Research Group of [the] Committee for Pre- and Protohistoric Sciences of [the] Polish Academy of Sciences." Buko's initial contribution, "Pottery Provenance and Ceramological Research," sets the stage for 12 essays on European ceramics: Central European imports and imitations, Roman imitations, Iberian amphorae, Polish early Medieval glazed wares, Pomeranian glazed ceramics, 17th century marbled pottery from Warsaw, and Silesian pottery of the Renaissance. To order the volume, write to: SNAP Oddzial w Warszawie, ul. Długa 52, 00-241, Warszawa, Poland.

Pottery and People: A Dynamic Interaction, edited by James M. Skibo and Gary M. Feinman is scheduled to be published in December 1998 (Salt Lake City: University of Utah Press, 1998, ISBN 0-87480-576-7, \$55.00 cloth; ISBN 0-87480-577-5. \$25.00 paper). This volume appears in the "Foundations of Archaeological Inquiry" series, edited by Skibo. Contributors to the volume include Dean E. Arnold, Philip J. Arnold III, Eric Blinman, Patricia L. Crown, Gary M. Feinman, William A. Longacre, Barbara J. Mills, Michael B. Schiffer, Carla M. Sinopoli, James M. Skibo, Barbara L. Stark, James B. Stoltman, and Karen D. Vitelli. Additional information may be obtained the University of Utah Press, 1795 E. South Campus Drive, Suite 101, Salt Lake City, UT 84112; toll free orders: 1-800/773-6672; e-mail: info@upress.utah.edu.

Ceramic Production in the Andes: Technology, Organization, and Approaches, edited by Izumi Shimada, has been announced as forthcoming by the Museum Applied Center for Archaeology at the University Museum of Pennsylvania Museum of Archaeology and Anthropology. This 15-chapter volume, published as *MASCA Research Papers in Science and Archaeology*, a supplement to *MASCA* Volume 15 (1998) is an English-language version of Shimada's Spanish-language edition of a similar volume published in Peru in 1994: *Technologia y organizacion de la produccion ceramica prehispanica en los Andes* (Lima: Fondo Cultural de la Pontificia Universidad Catolica del Peru, 1994, ISBN 94-89309-92-2). A majority of the 17 chapters from the 1994 edition appear in the re-edited English edition; in addition, three chapters are deleted from the original and one replacement contribution is inserted. The 15 chapters comprising the English version are authored by Shimada; Shimada, Elera A., Chang, Glascock, Neff, U. Wagner, and Gebhard; Russell, Leonard, and Briceño R.; Uceda and Armas; Cleland and Shimada; Raymond, Oyuela G., and Carmichael; U. Wagner, Gebhard, Morad, Riederer, Shimada, Ulbert, and F. E. Wagner; Cummins; Carmichael; Anders, Chang J., Shimada, Tokuda, and Quiroz; Pozzi-Escot B., Alarcón, and Vivanco; D'Altroy, Lorandi, and Williams; and Hayashida. Prudence M. Rice and Dean E.

Arnold provide separate commentaries on the papers. Further information about the date of publication and the cost of this volume may be obtained by contacting: University Museum Publications, 33rd and Spruce Streets, Philadelphia, PA 19104; Telephone 800/306-1941 or 215/898-4124, or by e-mail: publications@vax.museum.upenn.edu.

The Early Porcelain Kilns of Japan: Arita in the First Half of the Seventeenth Century, by Oliver Impey (Oxford: Clarendon Press, Oxford Oriental Monographs, New Series, 156 pp., 1996, ISBN 0-1982-6370-8, \$165.00 hardcover). This expensive but very important work contains 12 chapters, two appendices, three maps, a bibliography, and glossary. Impey's volume is the first book in an English language to document porcelain production in Japan during the first half of the seventeenth century, tracing the beginnings of the Japanese industry to the period when export trade to Europe and the Middle East developed. Arita porcelain was made for the Japanese domestic market and, therefore, is little known in the West. The author presents a comprehensive reconstruction of the production practices of Japanese potters during the seventeenth century, assesses the individual kilns of Arita, and examines modern workshop methods in order to evaluate manufacture during the seventeenth century. Impey's study also documents which of the kilns were working, when these were in production, and which types of porcelain were being produced. He also documents conclusively that the "problematic" porcelain of Old Kutani is nearly all of Arita manufacture. Further information may be obtained from the website: <http://www.oup-usa.usa.org/>.

Hispanic New Mexican Pottery: Evidence of Craft Specialization 1790-1890, written by Charles M. Carrillo, provides a needed synthesis of an important topic for a crucial timeframe. This unique, well-written book, a revision of the author's dissertation, is published by LPD Press [2400 Rio Grande Blvd. NW, #1213, Albuquerque, NM 87104-3222; Telephone 505/344-9382], (xvii +265 pp., 13 figures, 2 maps, 60 plates, 2 tables, ISBN 0-9641542-3-4, \$37.95 cloth). It is distributed by the University of New Mexico Press [1720 Lomas Blvd. NE, Albuquerque, NM 87131-1591; Telephone 505/277-3350 for customer service and 800/622-8667 for orders]. Charlie Carrillo, holds a Ph.D. in anthropological archaeology (1996) from the University of New Mexico and is recognized for his research on historic santos of northern New Mexico and the excavation of historic archaeological sites. In this volume Carrillo combines archaeological, ethnographic, documentary, and oral historical records in his consideration of Spanish Colonial New Mexico and the evidence from New Mexico, during the nineteenth century. He provides a useful historical overview and presents an archaeological case study of Abiquiu, a Hispanic village with a complicated history beginning in 1734. In Chapter 4, he examines and tests Dean Arnold's model (*Ceramic Theory and Cultural Process*, 1985), considers demographic pressures and other factors, and documents archaeological and craft specialization implications. Carrillo (1997:30) notes that "the application of Dean Arnold's 1985 model to the archaeology of Hispanic New Mexico has significant potential for archaeological studies in the Southwest and for ceramic studies in general."

The Kirkpatricks' Pottery in Illinois: A Family Tradition by Bonnie L. Gums, Eva Dodge Mounce, and Floyd Mansberger (Urbana: University of Illinois, Illinois Transportation Archaeological Research Program, TAAR 3, 96 pp., 1997, paperback) is distributed by CAA Press, P. O. Box 366, Kampsville, IL 62053 (\$8.00 + \$4.00 postage and handling). This volume is an historical and archaeological study of the Kirkpatricks' potteries which operated in Illinois from 1836 to 1906, but focuses upon excavated kilns and ceramics from the pottery works located in LaSalle County in northern Illinois which was in operation from 1836 through 1871.

Ceramics and Delaware Valley Prehistory: Insights from the Abbott Farm by R. Michael Stewart (edited and produced by Charles A. Bello, Archaeological Society of New Jersey; Trenton, Archaeological Society of New Jersey, *Trenton Complex Archaeology Report* 14, x + 309 pp., 119 figures, 3 tables, 1998, no ISBN, paperback, no price stated). The author is a faculty member in the Department of Anthropology, Temple University, Philadelphia, PA. Funding to publish this analysis came from the Federal Highway Administration and New Jersey Department of Transportation Bureau of Environmental Analysis; The Cultural Resource Group of Louis Berger & Associates, Inc.; and the Archaeological Society of New Jersey. The volume provides an up-to-date description of pottery recovered at the Abbott Farm National Landmark, and provides chronologies, and regional comparisons. This important work was recently distributed with the society's *Bulletin* 52 (for subscription year 1997). Information may be obtained from Charles A. Bello, *Bulletin* Editor, 19 Ledge Lane, Pipersville, PA 18947; e-mail: hob@epix.net.

The *Encyclopedia of Underwater and Maritime Archaeology* edited by James P. Delgado (New Haven and London: Yale University Press, 1998, ISBN 0-300-07427-1, \$55.00 cloth), published in association with the British Museum Press, was published initially in England as the *British Museum Encyclopaedia of Underwater and Maritime Archaeology* (London: British Museum Press, 1997, £29.95). Of particular interest is an entry entitled "Ceramic studies" (pp. 94-95) authored by Dr. Teresita Majewski (Statistical Research, Inc., Tucson, AZ). She considers the significance of ceramic analyses to the cultural interpretation of shipwrecks, submerged towns (such as Port Royal, Jamaica), and Mesoamerican cenotes and lakes. Majewski also reviews the concepts of provenance, qualitative observations (including decoration), chronometric techniques (thermoluminescence), the construction of typologies, the importance of comparative materials (such as Mediterranean amphoras), and the significance of artifact locations within shipwrecks. In addition she also provides a list of ten suggested readings, among them recent works by Bass, Deagan, and Marken, as well as Goggin's classic study of Spanish olive jars (1960), and Pearson's *Conservation of Marine Archaeological Objects* (1987). A review of this volume, prepared by Charles C. Kolb for the H-PCAACA (Popular Culture and American Culture Associations) listserve on H-NET, may be accessed directly at: <http://www.h-net.msu.edu/reviews/showrev.cgi?path=21917895003940>.

An excellent volume entitled *Traces of the Past: Unraveling the Secrets of Archaeology through Chemistry* by Joseph B.

Lambert has recently been published (Reading, MA: Helix Books, Addison-Wesley, 1997, viii + 319 pp., ISBN 0-201-40928-30, \$30.00 hardcover). "Chapter 3: Pottery" (pp. 48-70), "Chapter 4: Color" (pp. 71-103), and "Chapter 5: Glass" (pp. 104-128) are of particular interest. A review of this volume prepared by Charles C. Kolb appeared in *American Scientist* 86(3):290, 292 (May-June 1998), and a review by James Burton begins on page 12 of this issue. Additional information about the volume may be obtained from the publisher's website: <http://www.aw.com/gb/>.

Geoarchaeology: The Earth-Science Approach to Archaeological Interpretation is the title of a textbook written by George (Rip) Rapp, Jr., and Christopher L. Hill (New Haven and London: Yale University Press, 1998, xiii + 274 pp., 63 illustrations, ISBN 0-300-07075-6 cloth \$40.00, ISBN 0-300-07076-4 paper \$22.50). In this comprehensive textbook consisting of nine chapters, the authors present a theoretical and historical overview; consider sediments and soils; review the contexts of archaeological record formation; and summarize paleoenvironmental reconstructions. In addition, they; document raw materials and resources; consider provenance studies; explicate techniques for age estimation; present a summary on geological mapping, remote sensing, and survey; and conclude with an analysis of construction and destruction, site preservation, and materials conservation. Chapter 2, "Sediments and Soils and the Creation of the Archaeological Record" (pp. 18-49) is particularly useful to students interested in ceramics. Information about clays (pp.124-141), temper (pp. 141-142), and petrographic analysis and thin sectioning (pp. 149-151) are also included. Yale University Press (302 Temple Street, New Haven, CT 06520) may be contacted by telephone: 203/432-0960. The press has a website at: <http://www.yale.edu/yup/>. The volume is also a selection offered by the Natural Science Book Club.

Rediscovering Darwin: Evolutionary Theory and Archeological Explanation edited by C. Michael Barton and Geoffrey A. Clark (Arlington, VA: American Anthropological Association, Archeological Papers 7, 1997, ISBN 0-9131167-87-8 paperback, price not given), contains 17 chapters. Chapter 5, "Methodology of Comparison in Evolutionary Archaeology" (pp. 75-94), authored by Hector Neff (University of Missouri, Columbia) and Daniel O. Larson (California State University, Long Beach) considers that evolutionary archaeology needs methods for recognizing how the selective retention of cultural variation shaped the archaeological record. The authors derive adaptive hypotheses from evolutionary design arguments and test a hypothesis about the evolution of local productive specialization. They ask the question "how does selection shape the patterning of ceramic formal and compositional diversity in the archaeological record?" Examples of ceramic diversity drawn from Pacific Coastal Guatemala, The Southern Basin of Mexico, and the American Southwest are employed to test the model. Further information may be obtained from the AAA Publications Office, Suite 640, 4350 North Fairfax Drive, Arlington, VA 22203-1620; Telephone 703/528-1902, Extension 5; URL: <http://www.amanthassn.org>.

The seventh installment of "Ceramics: Recent Book Reviews," authored by Charles C. Kolb, will appear in the

September issue of *La Tinaja: A Newsletter of Archaeological Ceramics* 11(3), 1998. Kolb's previous annual tabulations of recent reviews of books and monographs concerning pottery and ceramic technology have appeared in *La Tinaja* 5(3):7-11 (September 1992), 6(2):5-8 June 1993), 8(1):5-8 (January 1995), 8(4.1):4-9 (September 1995), 9(3):6-10 (September 1996), and 10(3):11-15 (September 1997).

Forthcoming Conferences

Conference on 15th Century Asian Ceramics

From 23-25 October 1998, The Field Museum of Natural History and the Asian Ceramic Research Organization (ACRO) will host a conference entitled "Asian Ceramics: Resolving the Enigmas of the 15th Century." The symposium will explore three major themes: environment and ceramics, technology and production, and cross cultural influences of 15th century ceramics in Asia. This will be the third in an ongoing series of international conferences on Asian pottery. The program for the conference has recently been announced. The "Preliminary Speaker Roster" includes: Chuimei Ho and Malcolm N. Smith (Field Museum/ACRO), "Fifteenth Century Asia and Ceramics;" Hiram W. Woodward, Jr. (Walters Art Gallery, Baltimore, MD), "Southeast Asian Design Motifs and Their Historical Context;" Kim Young-Won (Kongju National Museum, Korea), "The 15th Century Korean Ceramics – Unique Style and Foreign Influences;" Trinh Cao Tuong (Vietnam Archaeological Institute, Hanoi), "Vietnam and Vietnamese Ceramics in the 15th Century;" Ouyang Shibin (Jingdezhen Ceramic Institute, China), "15th Century Chinese Ceramics Made at Private Kilns;" Echo D. Evetts (American Ceramic Circle, Washington, DC), "A Conservator's View;" Sayan Prishanchit (The 2nd Office of Archaeology and National Museums, Thailand), "Ceramic Production in 15th Century Thailand;" Peter D. Holmes (University of New Zealand, Auckland), "The Thousand Dragons: Ceramic Production in Southeastern Asia;" Pierre-Yves Manguin (Ecole Francaise D'Extreme Orient, Paris), "Transportation and Communications;" Pamela Vandiver (Smithsonian Institution, Center for Materials Research and Education), "Green Glaze Technology;" Miyata Etsuko (Hagi Urugami Museum, Hagi, Japan), "15th Century Southeast Asian Ceramics;" Allison I. Diem (Independent Scholar, Manila), "Influences of North Vietnamese Kilns on Ceramic Production in the Central Region of Vietnam;" Hsieh Ming-leung (National Taiwan University, Taipei), "Japanese Collectors Attitude on Chinese Ceramics in the 15th/16th Century;" Arakawa Masaaki (Idemitsu Museum of Arts, Tokyo), "The Tea Ceremony and Ceramic Utensils of 15th Century Japan;" Richard Wilson (International Christian University, Tokyo), "Fifteenth Century Ceramic Assemblages in Okinawan Castles;" Sumitr Pithiphat (Thammasat University, Bangkok), "Thailand Review;" Morimoto Asaka (Independent Scholar, Japan), "An Approach to the Enigmas: Observations from Hakata's Archaeological Data;" Roxanna Brown (Independent Scholar, Los Angeles), "Evidence in Southeast Asia for a Ming Gap Involving Chinese Blue-and-White Ceramics."

Session chairpersons include: Donald F. Lach and Katherine Tsiang Mino (University of Chicago), Chapurukha M. Kusimba

(Field Museum), Ross Edman (University of Illinois at Chicago), Mary Lawton, Loyola University, Chicago), and Elinor Pearlstein (The Art Institute, Chicago). In addition, Roxanna Brown, Bennet Bronson (Field Museum), Charles C. Kolb (National Endowment for the Humanities), Bernd Jesse (The Art Institute, Chicago), and James C. Y. Watt (Metropolitan Museum of Art, New York) will serve as discussants for the sessions. The commentator for the entire conference will be Dean E. Arnold (Wheaton College, IL) who was also the "wrap up" speaker for ACRO's second international conference in 1996.

Approximately two hundred scholars, academics, museum professionals, collectors, students, and interested members of the public are expected to attend. For further information, please contact Malcolm Smith, Anthropology, The Field Museum of Natural History, Anthropology Department, Roosevelt Road at Lake Shore Drive, Chicago, IL 60605; Telephone: 312/922-9410, Ext. 832; FAX 312/427-7269; e-mail: bronson@fmppr.fmnh.org.

Conferences Planned

Ceramic Ecology '98

"Ceramic Ecology '98," an international and interdisciplinary symposium which honors the contributions to ceramic studies made by Frederick R. Matson — ceramic engineer, archaeometrician, ceramic ethnoarchaeologist, and ethnographer — emphasizes the technological and socioeconomic aspects of ceramic materials regardless of chronology or geography. Symposiasts represent a variety of disciplines ranging from art historians and professional potters to ethnoarchaeologists, archaeometricians, and physicochemical and materials scientists. The twelfth annual Ceramic Ecology Symposium will be held at the 1998 annual meeting of the American Anthropological Association, Wednesday, December 2, 1998, 6:00 pm, in Philadelphia. As in the past, the conference co-organizers are Louana M. Lackey (Maryland Institute, College of Arts) and Charles C. Kolb (National Endowment for the Humanities). This year, Barbara L. Stark (Chair and Professor of Anthropology, Arizona State University) will be the symposium discussant. This year a majority of the papers concern ceramic materials from the Andes or South and East Asia. The scheduled presentations include: Louise Cort (Freer and Sackler Gallery, Smithsonian Institution) and Leedom Lefferts (Department of Anthropology, Drew University), "A Preliminary Cultural Geography of Contemporary Village-based Earthenware Production in Mainland Southeast Asia;" Frances Hayashida (Physik Dept., Technische Universität München, München, Germany), Michael Glascock (Missouri University Research Reactor), Werner Husler (Technische Universität München, München), Hector Neff (Missouri University Research Reactor), Joseph Riederer (Rathgen Research Laboratory, Berlin), and Ursel Wagner (Technische Universität München, München, Germany) "State Pottery Production in the Inka Provinces: Archaeometric Perspectives" [Note: Frances will join the faculty of the Department of Anthropology at The Pennsylvania State University in the Fall of 1998]; Chuimei Ho (Department of Anthropology, Field Museum of Natural History; and Asian Ceramic Research Organization [ACRO]),

"Sino-Indonesian/Malaysian Ceramic Making in Borneo;" Charles C. Kolb (National Endowment for the Humanities), "One If by Land, Two If by Sea: The State, Ceramic Production and Distribution — Imperial Entanglements in Rome, India, and China;" Louana M. Lackey (Maryland Institute, College of Art), "Who, What, When, Where: Recent Research on Ceramics;" Maria A. Masucci (Department of Anthropology, Drew University) "Imported Vessels, Population Movement, or Technological Change? Tracing the Expansion of the Prehistoric Manteño, Coastal Ecuador;" Ken Sasaki (International Research Center for Japanese Studies, Osaka, Japan) "Ceramics Approach to Redistribution in [Japanese] Prehistory;" Ilse Schütz (Museo de Alfareria, Agost [Alicante], Spain), "Women's Participation in Traditional Spanish Pottery Production;" Arleyn W. Simon (Arizona State University), "Ceramics and Settlement: Salado Social Dynamics in Central Arizona;" Michael S. Tite (Research Laboratory for Archaeology and the History of Art, University of Oxford, UK), "Cooking Pots and Their Thermal Shock Resistance."

Reservations for paper presentations at Ceramic Ecology symposia scheduled for the years 1999 and 2000 are currently being received. Please e-mail Charlie Kolb for further information: ckolb@neh.gov.

Mesoamerican Ceramic Figurines

"Mesoamerican Ceramic Figurines II," a follow-up symposium to the very successful conference held at the annual meeting of the Society for American Archaeology in 1996 in Nashville, is being planned for the SAA's 64th annual meeting to be held in Chicago, 24-28 March 1999. Like the 1996 meeting, this symposium is being co-organized and co-chaired by Charles C. Kolb and Cynthia Otis Charlton. For further information, please contact Charlie Kolb by e-mail: ckolb@neh.gov.

Recent Conferences

SPMA-SHA/London

The Joint Meeting of the Society for Post-Medieval Archaeology and Society for Historical Archaeology (SPMA-SHA) was held from 3-7 November 1997 in London at the Museum of London and the British Museum. Among the 29 papers presented, two that were given at the British Museum on 4 November, concerned ceramic materials: "Redwares, Borderwares & Tinglazed Wares" by Beverly Nenck (British Museum), Jacqui Pearce and Roy Stephenson (Museum of London Archaeological Service); and "Excavations at the Donyatt Potteries, Somerset" by Richard Coleman Smith (Director, Donyatt Research Group).

Smithsonian Research in Mexico

The Department of Anthropology at the Smithsonian Institution sponsored a program entitled "Smithsonian Research in Mexico" which was held in Washington, DC on 27 February 1998. This was the first annual forum on current and future anthropological research in Mexico and featured nine presentations by Smithsonian staff, fellows, and associates. One paper focussed on ceramic materials. Maria Sprehn, a pre-doctoral Smithsonian Research Fellow for 1997-1998, gave a

paper, "Pottery Production in Prehistoric Northern Mexico," in which she presented a research design to study systematically 400 polychrome pottery vessels from 14th century Casas Grandes by employing an elaborated paradigm based on Costin's specialization model (context, scale, concentration, and intensity) with particular emphasis on labor investment, efficiency, standardization, and skill.

Society for American Archaeology

The 63rd Annual Meeting of the Society for American Archaeology was held in Seattle, WA from 25-29 March 1998. At least 125 papers devoted to ceramics were presented in various symposia, and in three important symposia. An SAA symposium, "Glass to Ceramics: Archaeometry: in Archaeological Provenance and Technological Studies," (Sponsored by the Society for Archaeological Sciences) with 12 papers (seven of which considered ceramics), was organized by Arleyn W. Simon and Nancy H. Olsen, with Robert H. Tykot and Jeffrey S. Dean serving as discussants. "Ceramic Ethnoarchaeology", a symposium organized by Brenda Bowser, with Michelle Hegmon and Cathy L. Costin as discussants, had nine presentations. There was also a general session concerned with plain or undecorated ceramics, "Can't We Just Throw It Away? New Approaches to Plain Pottery," which had 12 papers. This session was organized by Susan A. Dublin and David Yoon; Warren R. DeBoer served as the discussant. A ten-page report on this meeting including a list of the 125 presentations, their authors and affiliations, and paper titles (with additional information appended as necessary about content and culture area or region) has been prepared by Charles C. Kolb. It is being published in *La Tinaja: A Newsletter of Archaeological Ceramics* 11(2), 1998.

Society for Post-Medieval Archaeology and Northern Ceramic Society

An exhibition, "Digging for Early Porcelain: The Archaeology of 18th-century British Porcelain Factories," continues from 4 April through 21 June 1998 at the City Museum & Art Gallery, Stoke-on-Trent, U.K. The exhibition highlights the role of archaeology in the study of early porcelain manufacture in Great Britain, particularly England and Scotland. Major factories located at Limehouse, Pomona, Worcester, Longton Hall, West Pans, and Gilbody are represented. Technical complexity and information provided from wasters are documented. On 25 April 1998, a special open house was held and attended by members of the Society for Post-Medieval Archaeology and the Northern Ceramic Society.

Pots, People and Processes

The joint conference for the Society Post-Medieval Archaeology and the Northern Ceramic Society entitled "Pots, People and Processes" was held from 24-26 April 1998 in Stoke-on-Trent, U.K. The theme of the conference was recent work on British ceramics from historical and archaeological perspectives. Over thirty speakers considered ceramic manufacture, firing technology, pottery types, factory excavations and waste assemblages, and distribution and consumption during the past four centuries of British ceramic

developments. Speakers included Paul Courtney, Robin Emmerson, Christine Longworth, Noel Boothroyd, David Barker, Ken Murphy, David Higgins, Janet Spavold, John Allen, Katey Banks, Julie Edwards, and Keith Matthews. For additional information about the exhibition and the conference, please contact the conference coordinator, David Barker, Keeper of Archaeology, City Museum & Art Gallery, Hanley, Stoke-on-Trent, ST1 3DE, U.K.; Telephone +44 (0)1782 232323, FAX +44 (0)1782 121200; e-mail: david.barker@stoke01.stoke-cc.gov.uk.

International Symposium on Archaeometry

The 31st International Symposium on Archaeometry was held from 26 April through 2 May, at the Hungarian National Museum in Budapest. The conference chairman was Michael S. Tite, University of Oxford, who is the editor of the acclaimed journal, *Archaeometry*. Approximately 270 papers were presented in poster and oral sessions. The topical foci included biomaterials, provenance and technology (metals, stone, and pottery), and round table meetings. Papers on pottery were presented all day on 30 April and on the morning of 1 May. It is anticipated that the scientific papers from the conference will be published as a number in *British Archaeological Reports*, Oxford. Each written presentation was not to exceed ten pages (6,000 words) together with illustrations. The conveners of the symposium will review all manuscripts prior to publication. Additional information may be obtained from the conference website <http://origo.hnm.hu/ameury98/>. The program and abstracts were made available on a website during the conference so that speakers could entertain questions from cyberspace as well as in person at the symposium: <http://www.ace.hu/MNM/AMETRY/index.html>.

Two papers presented in the session on Biomaterials on 27 April, were of particular interest to ceramic archaeologists: "The Use of Stable Carbon Isotopes in the Identification of Dairy Products in Archaeological Ceramics" (S. N. Dudd and R. P. Evershed) and "Lipids in Ancient Ceramics" Patterns and Processes" (R. J. Stacey, C. P. Heron, O. E. Craig, et al). Twelve presentations in the sessions on Provenance focussed on ceramic materials: "Instrumental Neutron Activation Analysis and Eastern Terra Sigillata II Pottery Revisited" (J. Gunneweg and M. Balla), "Technology and Organization of Inka Pottery Production: Neutron Activation Analysis and Mossbauer Spectroscopy Studies" (F. Hayashida, M. Glascock, H. Neff, et al.), "Pottery Production and Exchange in Eleusis Greece, during the Middle Helladic Period" (E. W. Faber, V. Kilikoglou, E. Kiriati, et al.), "Ceramic Micropaleontology: Potentials and Limitations of Micro- and Nanno-foil Analysis in Archaeological Ceramics" (P. S. Quinn, P. M. Day, and N. M. Hine), "Identification and Characterisation of Local Pottery Production Sites in Southern Italy by a Combination of Thin-Section and Heavy Mineral Analysis" (R. Sauer, V. Gassner, and H. Haiden), "A Multidisciplinary Study on Ancient Iznik Ceramics" (E. Uzgil, G. Saglamer, A. Tekin, et al.), "The Earliest Carbon Fibre Was Discovered in Chinese Black Pottery" (Ch. Wang, X. Chen, and Zh. Liang), "Some Results of [a] Study of Cucuteni-Tripolye Decoration Technic [sic.]" (I. Palagutta), "Technical Investigation of Ptolemaic Period

Faience in the Walters Art Gallery” (Y. Mao), “The Technology and Development of 12th Century AD Islamic Polychrome Ceramics” (M. S. Tite and R. B. Mason), “EDXRF Study of Tupiguarani Archaeological Ceramics from the North of Parana State in Brasil” (C. R. Appoloni, F. R. Espinosa-Quinones, P. H. Aragao et al.), and “New Developments in the Analysis of Archaeological Ceramics by Total Reflection X-ray Fluorescence /TXRF” (M. Garcia-Heras and R. Fernandez-Ruiz).

For additional information about the symposium, contact Katalin T. Biro, Hungarian National Museum, Department of Information, H-1450 Budapest Pf. 114. Hungary; Telephone/FAX: (36)-1-2101-338; e-mail: h5852tbi@ella.hu.

Central and Inner Asian Seminar

The University of Toronto was the location of a conference, “Central and Inner Asian Seminar,” held 1-2 May 1998, which featured 14 papers. Among the presentations was “The Material Culture of the Nomadic Uighurs of Central Asia in the 8th and 9th Centuries” by Dr. Ablet Kaayumovich Kamalov (Chairman, Department of Uighir History, Almaty, Kazakhstan). His paper concerned Uighur and Kyrgyz ceramics.

Material Thought and Action

A conference entitled “Material Thought and Action: Technological Perspectives on Prehistory,” held in honor of Maxine Kleindienst and H. Bruce Schroeder, took place at University College, University of Toronto, 16-17 May 1998. Twenty-four papers were presented at this meeting which was sponsored by the Department of Anthropology and supported by a grant from the Social Science and Humanities Research Council. A majority of the presentations involved lithic technologies, Levantine prehistory, and the Dakhleh Oasis Project. On Sunday afternoon, 17 May, a session entitled “The Origins of Agriculture in Southwest Asia” included two presentations with ceramic orientations: “Container Technology in the Near Eastern Neolithic: A Design Approach to the Origins of Pottery” (E. B. Banning) and “Clay, Grain, and Rats: Motivation for the Specialization of Chalcolithic Potters” (Mark Blackham). Additional information about the conference may be obtained from Michael Chazan, Department of Anthropology, University of Toronto, by telephone 416/978-2199 or e-mail: mchazan@chass.utoronto.ca.

Archaeometallurgy

Martha Goodway, Associate Editor

The Titanic seems to dominate the news in many categories, including ours. Plates and rivets recovered from the wreck of the Titanic as well as pictures of parts still underwater are being closely examined to determine the quality of the materials used in construction of the hull. This is being done with several questions in mind, among them whether these materials contributed to the sinking of the Titanic after its collision with an iceberg on the night of April 14, 1912.

The wreckage was located on the sea floor in 1986. A study of several hull plates retrieved at that time was done at the University of Missouri-Rolla and is reported by Katherine Felkins, H. P. Leighly and A. Jankovic in the January 1998 issue of *JOM, the Journal of the Mining, Metals, and Materials Society*, pages 12-18. “The Royal Mail Ship Titanic: did a metallurgical failure cause A Night to Remember?” can also be found in a hypertext-enhanced version at <http://www.tms.org/pubs/journals/JOM/9801/Felkins-9801.html>.

Felkins et al. concluded from the very low nitrogen content (0.0035%) that the plates were open hearth steel, and from the high sulphur (0.069%) and phosphorus (0.045%) contents that an acid-lined hearth had been used. The microstructure indicated no heat treatment subsequent to air cooling after rolling. MnS inclusions were aligned with residual banding from rolling but averaged only 40x60µm rather than being strung out as would happen at higher rolling temperatures. The manganese level (0.47%) was low for so high a sulphur content, resulting in poor impact strength properties. For an impact energy of 20 Joules, ductile-brittle transition temperatures as high as 56 C were measured transverse to the rolling direction, well above the seawater temperature at the time of the collision, which was -2 C.

Another report, “Metallurgy of the RMS Titanic,” by Tim Foecke of the National Institute of Standards and Technology (NIST-IR 6118, dated February 4, 1998) includes information on two rivets. *The New York Times* feature story by William J. Broad in the January 27, 1998 issue (pages C1, C3), “Faulty rivets emerge as clues to Titanic disaster,” comes to a conclusion that Foecke in his report is not prepared to make until more rivets can be examined. Underwater photographs do suggest, however, that instead of rupturing the hull plates, the iceberg had caused the heads of the rivets to be sheared off. At least 37 empty rivet holes can be seen in these photographs, and bent but not fractured hull plates. Foecke estimated from cross sections of the rivets that the slag content by volume was about 9%, rather than the expected 2 or 3%. They were preformed from wrought iron, the slag lines showing an even spread of the metal in the preformed head but at the other end where the rivet had been set the metal was so sharply bent that it was folded back into an angle somewhat greater than 90 degrees. Because of the highly directional nature of tensile strength in wrought iron, it is thought that the initial failure occurred at this point in the rivet, allowing the hull plates to separate. It is planned to salvage more rivets (there were more than three million in the ship) in August 1998.

Jérôme Bonhôte has written a book, *Forges et Forêts dans les Pyrénées Ariégeoises*, with a preface by Georges Bertrand, that addresses the historical impact of metallurgy on the forests of the Pyrenees. It has 320 pages and is available for 248 francs plus 30 francs for shipping from Pyrégraph éditions, Rue Gambetta, F-31160 Aspet, France; telephone 33-5 61 88 41 75, fax 33-5 61 8841 77.

Donald B. Wagner’s book mentioned in an earlier column, *The Traditional Chinese Iron Industry and its Modern Fate* [ISBN 0-7007-0951-7], is now being distributed in the US by the University of Hawaii Press, 2840 Kolowalu Street, Honolulu HI 96822; telephone 808-956-8255, fax 1-800-650-7811. The

price is \$29.00 plus \$3.50 shipping, and they take both Mastercard and Visa.

Come September 1999 we will have what is becoming the traditional September scheduling conflict. Peter Northover is organising a conference on "Founders, Smiths and Platers: Metal Forming and Finishing from the Earliest Times" to celebrate the 20th anniversary of the Materials-Based Archaeology Group of the Department of Materials at Oxford. It will be held at St. Catherine's College, September 20-24, dates which will conflict with the 14th International Bronze Congress in Cologne. For more information on the Oxford meeting contact Peter Northover, Department of Materials, Oxford University, Parks Road, Oxford OX1 3PH, UK; peter.northover@materials.ox.ac.uk.

The next World Archaeological Congress, WAC4, is to be held January 10-14 in Cape Town, during the southern hemisphere's summer. Has anyone planned a symposium or a workshop on an archaeometallurgical topic for this Congress? Let us know. The website for the Congress is <http://www.uct.ac.za/depts/age/wac>.

James Thorburn has a tour of ancient mining areas in Northern Spain and Portugal planned for June, to the mines of Devon, Cornwall and Wales for August 14-24 with a possible extension to southern Eire, and to Mexico for September 22 to October 6. For further information write Atalaya Tours Ltd., Deinionfa, Capel Dewi, Aberystwyth, SY23 3HR, UK; telephone and fax 44-1970-828989.

Professor Ernst Pernicka has moved from Heidelberg to Freiberg, where he has established a new institute, the Lehrstuhl für Archäometallurgie, in the Fakultät für Werkstoffwissenschaften und Werkstofftechnologie of the Technische Universität Bergakademie Freiberg. His address is Gustav-Zeuner-Strasse 5, 09599 Freiberg (Sachs.), Germany; telephone 37-31-39-3353, fax 37-31-39-3657.

Amongst more weighty decisions, the Chief Justice of the United States Supreme Court, the Vice President of the United States and the other members of the Smithsonian Institution's Board of Regents recently approved changing the name of the Conservation Analytical Laboratory to the Smithsonian Center for Materials Research and Education (SCMRE). The Center's postal address has been changed to its street address, in the hope of speeding deliveries. Help us test delivery time by sending your archaeometallurgical news or comments to:

Martha Goodway, Smithsonian Center for Materials Research and Education, 4210 Silver Hill Road, Suitland MD 20746, USA; tel. 301-238-3700 x164; fax 301-238-3709; e-mail cal.meg@cal.si.edu.

Geoarchaeology

Michael R. Waters, Associate Editor

In this column I will (1) explore educational programs in geoarchaeology and where to find information about these programs and (2) discuss organizations dedicated to geoarchaeology.

Educational Programs

For students interested in studying geoarchaeology there are a number of excellent graduate programs available across the United States and Canada. These programs are listed in the *Directory of Graduate Programs in Archaeological Geology and Geoarchaeology*. This guide is now in its tenth edition and was recently updated in October 1997. This directory was first started by George (Rip) Rapp. For years, George Rapp updated this guide annually. In 1996, responsibility for updating and publishing this directory was passed to the Education Committee of the Geological Society of America's Archaeological Geology Division.

The directory contains information on twenty-seven geoarchaeology programs. Some programs are narrowly focused while others are much broader in scope. Entries are provided by each university that offers a specialization in geoarchaeology or archaeological geology with information about the program including facilities, areas of interest, courses, supporting faculty and contact people. This guide is intended to help prospective graduate students find an appropriate geoarchaeology program. This directory is available free to any student or person requesting a copy. Send requests to: Rolfe Mandel, Dept. of Geography, University of Kansas, Lawrence, KS 66045-2121 or contact Rolfe Mandel via email at mandel@falcon.cc.ukans.edu

Organizations

Students and professionals should also be aware that there are two organizations with a special interest in geoarchaeology or archaeological geology. The first and oldest organization is The Archaeological Geology Division of the Geological Society of America. This Division of the GSA was established by George Rapp in 1977 and has flourished ever since. The Division is the only organized group of geoarchaeologists. The membership has a wide range of specialities covering all fields within the earth sciences. The Division holds a special symposium at the annual GSA meeting, an annual field trip, publishes a newsletter twice a year, and provides scholarships for student travel and research. In addition, the division awards the "Rip Rapp Archaeological Geology Award" annually for outstanding contributions to the interdisciplinary field of archaeological geology. To join the Archaeological Geology Division you must first join the Geological Society of America and then the Division. Membership information can be obtained from the GSA, P.O. Box 9140, Boulder, CO 80301 or 1-800-472-1988.

Within the last year, a "Geoarchaeology Interest Group" was organized at the annual meeting of the Society for American Archaeology. This group plans to meet annually at the SAA meeting. The purpose of this group is to increase interaction and enhance cooperation between geoscientists and archaeologists. The Group plans to hold organized symposium at the SAA meeting and publish a newsletter. Any interested person may join the Geoarchaeology Interest Group by contacting the Society for American Archaeology (900 Second Street NE #12, Washington, DC 20002-3557; 202-789-8200).

Finally, anyone having news or information that they would like to have shared with the readers of the *SAS Bulletin* are encouraged to contact me (address on back cover).

CONFERENCE REVIEWS

Early Materials Forum

Paula Mills, Victoria and Albert Museum, London, UK

In the UK, and perhaps elsewhere, there is very little impetus to hold cross-disciplinary meetings. Instead every effort is made to break fields down into smaller and smaller specialisms and thus the wider context gets forgotten. The Early Materials Forum (EMF) has resulted from a perceived need to encourage cross-fertilization in the particular area of artefacts.

The idea to form the group came out of discussions at the Archaeological Sciences meeting in Durham 1997 (reviewed in the last issue of the *SAS Bulletin*) and subsequently more informal chats. Colleen Stapleton (formerly of the British Museum, Department of Scientific Research) and myself decided to take the risk of establishing the group now known as the EMF. We were very keen from the outset to ensure the meetings were an informal way of encouraging people to report their current work at negligible cost and without the emphasis on publication. In essence it would allow researchers to get together and talk about what they are currently doing.

The first problem encountered was what name to choose and it is worth a few lines to explain the scope of the group. Materials was easy - we are primarily interested in artefacts i.e. not human remains, the word 'early' was chosen to reflect the fact we include both historical and archaeological media, i.e. we exclude the modern plastics, and finally forum had a nice ring to it. Since its inception but before the first meeting, Colleen returned to her native Florida, although she thoughtfully found a replacement for her role as co-organiser - Katherine Eremin (National Museums of Scotland).

The first meeting was held at the end of January 1998 at the British Museum. Speakers from a range of backgrounds and studying a variety of media were invited to highlight the following aspects - museum based science, conservation science, provenancing and technological change. I didn't take much persuading to open the meeting by discussing a study of eighteenth century Chinese ceramics. David Thickett (British Museum, Department of Conservation Research) then took us to ancient Egypt and the problem of salt seepage from cuneiform tablets. Louise Joyner (University of Sheffield) talked about neolithic mortars and Ruth Saunders (University of Reading) followed this with a petrographic study of Roman quern stones. Paul Maclean (University of Bradford) rounded the session off with the results of his work on high antimony bronzes.

The first meeting was a pilot - which I can say was warmly welcomed. The decision was that the cross-discipline approach was refreshing and that perhaps two such afternoons should be planned a year. The debate as to location was resolved with the compromise of one in London and the other elsewhere in the UK. Fortunately, a representative from Oxford offered Christ Church college as a location for the next meeting. Equally a

website was volunteered - <http://www.emf.tc> - which Kathy and myself will attempt to keep as up to date as possible.

The second meeting, 12 May 1998, started out with an all encompassing list of presentations - metals, ceramics, glass, wallpaintings and gemstones - but due to a number of factors the final 'delegate list' comprised of three metals papers and one on gemstones. What the new list lacked in variety of media it more than made up for in style. The session began with a conservator talking about reconstructing a tenth century blade which was followed by a fascinating presentation on ancient Chinese bronzes. The talk on emerald mining in Roman Egypt generated lots of discussion with the session being brought to a close with analyses of Norse grave goods. The enthusiasm for the group was such, that a third meeting is planned for later this year which will be hosted by Cambridge University.

It is hoped that the EMF will continue to flourish with a further broadening of the audience with time and improved advertising. There are currently more than sixty people on the mailing list (electronic by necessity) and the opportunity to publish on the web is now available to those that wish to increase their 'audience'. My vision for the future if I can be so bold would be to continue to have more talks volunteered than there is time to present and to see the group develop into an established self-help group that truly crosses the disciplines of archaeology, science, conservation and art history.

Metals in Antiquity

Martha Goodway, Smithsonian Center for Materials Research and Education

This international symposium was held at Harvard University in Cambridge, Massachusetts, 10-13 September 1997. It was also sponsored by the University of Bradford and drew more foreign participants than Americans. I wish I could say this was entirely due to the quality of the symposium, but I am afraid it had more to do with the relatively small numbers working in this field in the United States compared with other parts of the world, especially in Europe. So many participated that speaking time was completely filled and there were too many papers to mention all of them; many had to be given as posters. The symposium opened with reports of current research, followed by a day devoted to ore deposits and extractive metallurgy, and another given over to the social context of metal production and use, both theoretical and ethnographic. The symposium closed with a workshop on metals analysis.

Concerning current research, Chase et al. mentioned analyses done at MIT of a single galena crystal that had a linear distribution of lead isotope ratios rather than a single point, the galena having been deposited over a period of time, and concluded that at least some isotope data will have to be looked at linearly. Knapp reported on the Sydney Cyprus Survey Project (SCSP), which is mapping human modification of the landscape, relating industrial sites to agricultural villages and urban centers.

He said that though the heaps of ancient slag, which amounts to more than four million tonnes, are protected in Cyprus, spoil heaps are not. A copper smelting workshop has been located by this survey at Politico Phorades and according to Kassianidou plano-convex slags are present with ceramics giving a 16th century BC date that is awaiting confirmation by AMS. Nikolaas van der Merwe observed iron smelting in Malawi, where natural draft furnaces a meter and a half high produced high carbon steel. Baboula and Northover tackled the distribution of metal grave goods in Late Minoan Crete and concluded that the Late Minoan metal shortage occurred earlier in the period than had been thought. They had done this by comparing richer assemblages with poorer ones rather than simply examining elite materials alone. Seventeenth century brass from villages in Canada analysed by Hancock showed a pattern of higher tin in red brass than in yellow brass, and rivets whose compositions were not always the same as the sheet they fastened.

In a discussion of ore geology and provenance Ixer mentioned the usefulness of poorly processed metal slag in determining which ore was chosen for smelting, since most deposits are the result of more than one geological process, hence offer a choice of ores. He warned against the 'magpie principle of sampling,' collecting just the pretty bits. I have seen this happen, brightly colored ore minerals collected (as if they could have been overlooked!) from an area that was, as it turned out later, inaccessible in ancient times. Regarding provenance, Thomas asserted that compositional matches don't matter; that because of overlaps only negative evidence can be used in sourcing. That led me to wonder about all the materials we have not yet characterized, and provoked much discussion in the midst of which someone, I don't recall whom, remarked that 'to hoard is human.' Luckily for us.

The Bochum group presented some early results from their project identifying the sources of third millennium copper in Mesopotamia as Bahrain (the ancient Dilmun) and Oman (part of Magan.) These coppers contain nickel and arsenic, in Omani copper about a percent of each. The Gales presented more lead isotope data bearing on recent discussions of Cyprus and Sardinian ore sources, which they find are more complex than was shown in their earlier work. There is more than one field in Cyprus, but these still can be discriminated from Laurion ores. The use of ellipses to indicate error limits, rather than the usual error bars, was recommended. Ingot forms were also discussed; Gale claimed that oxhide ingots were from Cyprus even when found on Sardinia, later discussed in the paper by Tykot, and there was an interesting speculation that LBA bun ingots were metal that was remelted.

Macfarlane related Mexican and Andean lead isotope ratios to subduction along the Middle American trench and the Peru-Chile trench, in both cases lead ore becoming more radiogenic ($^{206}\text{Pb}/^{204}\text{Pb}$ ratio increasing) with distance from the trench, though there are a few deposits that do not fit the pattern. Isotopic fractionation of lead during processing was dismissed since there is no effect unless more than 40-70% of the lead evaporates. In a discussion of South Indian copper alloys Srinivasan reported a 4th century ingot of zinc, dated from an inscription on the ingot. Her analyses suggest local sources for the alloys of South Indian images. The Prehistoric Gold

Research Group (PGRG) of the British Isles gave a kind of tag-team paper in which they identified the manufacture of new objects from the scrap gold of a specific source, the two hoards from Downpatrick in County Down, Ireland. They feel they can link local gold to its hard rock source, and that the earliest Irish gold comes from the north, not from Wicklow.

Shimada et al. reported on the extensive work done at Batan Grande on the north coast of Peru. They have located what may be a workshop for precious metals. Some alloys in the objects from the elite tombs dating to ca. 1000AD contain amounts of copper and arsenic that together are roughly equivalent to the silver content. They have found prills with arsenic contents as high as 28-32% but most objects contain only 1-2% arsenic. It is not known what properties arsenic confers on precious metals. They have observed that cleaning these metals, even the mildest sort of cleaning, affects their color. O'Brien, the excavator of the EBA (2500-1900BC) mining site at Ross Island, County Kerry, presented the evidence for smelting at this site. He takes the absence of slags as pointing to the use of sulphur containing ore (fahlerz) rather than secondary deposits. A droplet of metal was analysed and contained about 7% arsenic. "Sheet" seems to be formed of several of these droplets hammered together. Arsenic was only gradually displaced by tin. Northover commented that older analyses of bronzes, due to the methods used, usually do not include sulphur but that sulphur should be evident metallographically.

Pigott reported on the Thailand Archaeometallurgy Project (TAP), specifically the site of Non Pa Wai in central Thailand, dated to the early second millennium BC. This village had a burial that contained pieces of a broken mold. Crucibles about six inches in diameter have been found but no tuyeres. Perhaps the furnaces, which were movable smelting chimneys, were wind blown. Rostocker has shown that mixed oxide-sulphide smelting was exothermic and produced copper in a matte envelope. This low-tech approach would need no charcoal, only dry wood fuel. The ingot molds have unique shapes; slag has turned up that fits them but no metal. But small metal ingots of a size suitable for remelting have been found, and in special shapes that are thought to be coded for use in trade. The picture here is of part-time, dry season local production active in exchange. Joosten et al. estimated iron bloomery furnace output in the Netherlands between the 4th and 11th centuries AD from slag remains, based on a model confirmed by experimental reconstructions that for a 1:1 fuel:ore ratio gave a ore:slag:iron ratio of 1.8:1:0.4 for slagpit furnaces and 1.4:1:0.2 for slag-tapping furnaces. They also added 'irattlestones' to our vocabulary. These are a kind of bog ore in which goethite has formed an envelope around pebbles that rattle inside.

Several promising examples of the application of highly sensitive analysis were presented. Ferrari et al. showed the data from Greenland ice cores that has received so much recent attention. Ice there is laid down at a rate of about 40cm per year. They took cores weighing about 250kg, which they analyzed down to picogram per gram levels. They detected increased signals of copper and lead during Classical Antiquity that correlate well with the production figures published by the late Clair Patterson. They hope eventually to be able to do

quantitative studies of metal production. Shotyk et al. measured lead deposition in a Swiss bog as far back as 12370 years. By indexing against scandium, the beginnings of smelting in the Mediterranean could be detected at 3000BP in the peat record, as could the Roman empire and its decline. Killick suggested that lower lead values after the peak around 1300AD might have been an effect of silver imported from the New World.

The social context of early metal production was discussed by Shennan, who reviewed recent hypotheses that have replaced the application of what were essentially modern economic principles, as in the cementing of relations by gifts replacing profits from trade. He referred to some of this scholarly activity as 'ethnographic parallel-picking,' but remarked that you do have to make assumptions and some assumptions are more fruitful than others. Gillis discussed tin foil covered ceramics found as grave goods in the Aegean LBA. Replication experiments have shown that heated tin foil can oxidize to a golden color. She suggested the burials may have been of smiths, asserting that they held a high position amongst craftsmen. Both she and Olmsted identified tin as a status metal. Olmsted presented Gaulish smiths of the LIA also as having status; they are known by name, were not slaves, and their work was not specialized. Westover is studying the relationship of metallurgical sites and sacred sites in the Aegean and the Near East, for which she detects different purposes. Perea's paper on the study of technological change using gold in Spain as the paradigm sparked much discussion; data without theory was declared meaningless. But it was asked, where in this construct are the 'getting acquainted' studies?

The session on the ethnography of metallurgy opened with Killick's review of the many forms that iron bloomery technology takes as it still exists in Cameroon and Nigeria. It was evident from the variety of details that it is not easy to know what needs to be recorded. He warned that because iron making skills need constant practice they are very soon lost. This was also emphasized in Blair's report of replication experiments relating to iron making in the Alps. These lead him to believe that there was a whole array of specialist workers. Baldia related the trade in copper in early northern Europe to the rise of megalithic tombs, relating their location to causeways and their intersections, river crossings and harbors. In North America the recycling of metal from copper kettles manufactured in Europe was reported by Moreau. Fragments of kettles were cut and shaped by the Amerindians, one form being little cones that were sewn to clothes or other objects to make a tinkling sound.

Much of what was useful in this symposium were reminders of what is not so, or may not be, supplying a necessary balance against the natural urge to drive interpretation of results just as far as they can be made to go. Gale reminded us that slag is not always the product of local ore. The finding by Skinner et al. that debasement of tin in English tokens was far too late to be ascribed to the collapse of the tin industry upon the Black Death was presented as an warning against simplistic economic conclusions from technological factors. And so on. Suzanne Young and Paul Budd, the organizers of this symposium, are to be congratulated for a highly stimulating meeting. We look forward to the volume of proceedings now in preparation.

International Work Group for Palaeoethnobotany

*Delwen Samuel, Institute of Archaeology,
University College London*

The apocryphal story about the first meeting of the International Work Group for Palaeoethnobotany (IWGP), held 30 years ago, is that the gathering was small enough that every one attending could fit into a single taxi - an alternative version says it was a telephone booth. The eleventh meeting was held in Toulouse, France, May 18-23 1998, at the Université Paul Sabatier, and was organised by Philippe Marival (Université Paul Sabatier) and George Willcox (Institut de Préhistoire, Jalès-Berrias). This was the largest IWGP meeting yet, with 150 people listed as participants. The steady rise in numbers over 30 years is a healthy development for archaeobotany, but it also means a turning point may have arrived for the structure and format of the IWGP.

The six-day programme was very full and it appeared that most of the participants gave a paper or presented a poster. Five whole days were taken up with lectures, with some time - not enough - at the end of each day for poster-viewing, as well as small-group practical discussions of the archaeobotanical material which various participants had brought. Because there was so little time scheduled for these latter activities, the organisers encouraged those who so wished to come and go from the lectures. The lunch break each day gave some time for local exploration, and many took advantage both of the fine weather and the botanical gardens next to the University to enjoy picnics, and coffee at the pleasant park cafe. The sixth day was devoted to an excursion to the Montpellier area, a region with typical western Mediterranean vegetation.

The IWGP is certainly international, with participants coming from 25 different countries, although only five of these are non-European. Its scope focuses solely on the Old World but has begun to range more broadly than ever before. This is in part due to the greater number of participants, but also no doubt because archaeobotany is becoming much more widely accepted as an integral part of archaeological investigation. It is also an indication of recent political changes and attendant new possibilities for archaeological activity.

An archaeobotanical "first" must be plant remains from Albania. Julie Hansen (Boston University) presented a waterlogged and charred assemblage from late Bronze Age/Iron Age Sovjan in the east central part of the country.

There were no less than three papers on the archaeobotany of Turkmenistan, a country whose archaeological record is just beginning to become known outside the former Soviet Union. Mike Charles (University of Sheffield) discussed the central role of einkorn, a low-risk, low-input crop of Neolithic farmers living in the harsh conditions of southern Turkmenistan. The basis of agriculture in Chalcolithic and early Bronze Age Turkmenistan was described by Naomi Miller (University of Pennsylvania), at which time einkorn seems to have been abandoned in favour of six row barley and bread wheat. The

historical period at the Silk Road oasis of Merv completed the sequence, where Sheila Boardman (University of Sheffield) and Mark Nesbitt (University College London) found evidence for flourishing summer cultivation of cotton in Sasanian times, well before the Islamic “agricultural revolution” postulated by Watson (1983).

There were nearly a dozen further talks on regions far-flung from the IWGP’s traditional core European zone. They included ethnobotanical and archaeobotanical investigations in Nepal (Karl-Heinz Knörzer, Neuss, Germany) and the origins and development of agriculture, especially of pulses, in southern India (Dorian Fuller, University of Cambridge). Caroline Vermeeren (BIAX Consult Amsterdam) spoke on the wood resources of the Roman port of Berenike on the Egyptian Red Sea coast, including the use of teak from dismantled boats originating in the Indian Ocean region. The ethnography of finger millet processing in Uganda was presented by Ruth Young (University of Bradford), as a case study for the explanation of the scarcity of ancient charred plant remains in eastern Africa.

The conference opened, not by considering any particular region, but with a session on methodology. This fell into two parts: first, a discussion on molecular methods, dominated by DNA analysis, and second, statistical methods for the analysis of ancient assemblages and modern ecological data. Two DNA papers were presented by a team from the Botanisches Institut, Basle (Robert Blatter, Stefanie Jacomet, Angela Schlumbaum). Their careful work has had a very low recovery rate, making the faith in DNA analysis to answer a range of archaeobotanical questions - a prospect raised by several speakers throughout the meeting - seem misplaced.

For the first time at the IWGP, participants were invited to provide papers on a general theme proposed by the organisers. The topic was the origins and diffusion of crop plants, an important archaeobotanical question, and one that has potential links with wider questions of economic, social and cultural change. Daniel Zohary (The Hebrew University, Jerusalem) focused on modern data, explaining the use of living plants to investigate whether crops were domesticated once or several times. Most talks in this session were archaeobotanical case studies investigating the arrival of crops in a particular region, such as Aoi Hosoya’s (University of Cambridge) presentation on the introduction of rice in Japan and accompanying social changes. It was less obvious how some other papers related to the theme.

The other general theme of the conference was ethnobotany. Some papers in this session were interesting descriptive accounts of traditional plant use. Two examples were the Iberian cultivation of hulled wheats and legumes described by Leonor Peña-Chocarro (Universidad Autonoma de Madrid) and Lydia Zapata-Peña (Universidad del País Vasco, Bilbao), and Füsün Ertuğ’s (Istanbul) paper on gathering and consumption of wild bulbs and roots by Turkish villagers. Other papers started from an archaeobotanical assemblage and investigated modern knowledge to explore how different species might have been used in ancient times. One such presentation was given by Rene Cappers (Groningen Instituut voor Archeologie) on the food supply to Roman Berenike, which considered, amongst other topics, the pickling of peaches. Like the session on origins and

diffusion, however, it was difficult to see why certain papers had been included with this theme.

The remaining four conference sessions grouped papers according to geographical location. Of these, three covered different regions of Europe, and the European sessions took two and a half days - almost half the time allotted to all lectures.

Organisation by geographical grouping was unfortunate because it discouraged people from attending a wide range of papers. Participants tended to listen to the papers from “their” region, and to do other things when another area was being discussed. A few hardy souls sat through the entire five days solid (sitting on incredibly uncomfortable lecture hall benches), but they were definitely in the minority. This reviewer admits to missing a substantial number of European reports. In turn, I noticed a large proportion of the European contingent were absent from sessions covering non-European topics.

Perhaps strangely for a major conference on archaeobotany, there were no papers on identification presented in the methodology theme. Identification is of course of fundamental importance and agreement on criteria is vital. Many identification problems, such as the separation of wheat grain and chaff, are now yielding to detailed analysis (e.g. Hillman et al. 1996 [for 1995]), or at least archaeobotanists are making efforts to reach a consensus about identification criteria. Indeed, one of the most important functions of the IWGP is to bring archaeobotanists together to observe and discuss material in order to reach such agreement.

Speakers chose not to present identification-based papers as methodology, because they aimed to use identification decisions to address other questions. The taxon of the meeting was grape. At least two papers attempted to separate wild and cultivated grapes or different varieties of grape, based on grape pip morphology: Ruth Pelling (University of Oxford) and Marijke van der Veen (University of Leicester) on the origin and spread of viticulture in North Africa, and Danièle Martolini (Ecole Polytechnique Fédérale de Zurich) and Christiane Jacquat (Geobotanisches Institut ETH, Zurich) on grape pips from Nabatean and Roman Petra. Stummer’s index (Stummer 1911), the earliest measure attempting to separate wild and cultivated grapes, was frequently referred to. After one of the “grape” papers, Mordechai Kislev (Bar-Ilan University, Israel), chair of the session, vigorously questioned the use of Stummer’s index, not only in these papers, but in many other archaeobotanical reports. He pointed out that it is already well known to be unreliable yet it is constantly used, while other detailed studies, such as those by Facsar (1970; 1973) and Terpó (1976; 1977) have been largely ignored.

The way forward, it seems to me, is a major wide-ranging study of modern and ancient grape pip morphology, including taphonomic issues such as charring distortion (a study begun by Smith and Jones (1990)). Image analysis may be one way to tackle the problem, along the lines of the important work presented by Jean-Frédéric Terral (Université de Montpellier II) on distinguishing wild and cultivated olives. Clearly, such novel approaches are required to move forward and may well be applicable to other difficult taxa.

Although there were many excellent exceptions, there were still too many papers in this meeting which followed the same

uninspiring formula: description of the site followed by presentation of the archaeobotanical assemblage, perhaps completed by brief site-specific interpretation. Often, nothing was explored beyond presence of plants and basic local farming practices. With so much emphasis on regions and catalogues of archaeobotanical data from them, there is at present not enough of interest for all participants.

What works for smaller groups of people is not necessarily suitable for larger numbers, and the strengths of the original intimate gatherings are perhaps in danger of being lost in the current format. There are a variety of ways in which information exchange, wider relevancy and close personal interaction can be fostered within a larger group. The sessions could in future concentrate on general archaeobotanical themes, not on regional divisions. Speakers should be encouraged to address wider issues raised by site assemblages. In general, archaeobotanists working in different regions will not find colleagues' reports truly of interest unless they demonstrate how the results are relevant to broad economic, social and cultural questions, or they present stimulating methodological and theoretical approaches.

Two very different papers given at Toulouse provide examples. Klaus Oeggl (Leopold-Franzens-Universität, Innsbruck) spoke on that perennially interesting topic, the Iceman. What made the lecture fascinating was the integration of a range of different environmental data. These confirmed an origin of the Iceman to the south of the Alps, and provided new evidence for the season in which he died - in spring or at latest early summer, not in autumn as had previously been assumed. Anne de Hingh (Rijksuniversiteit, Leiden) reviewed theoretical models for agricultural intensification to reassess how Bronze Age and early Iron Age farmers of north west Europe intensified production. She rejected Boserup's (1965) oft-quoted but inappropriate model of increased frequency of cropping and technological evolution, in favour of Morrison's (1994) emphasis on diversification. The theoretical input means that this paper should be of relevance and interest to all archaeobotanists working on agricultural systems, not only those working in north west Europe.

As Glynis Jones (University of Sheffield) warned when announcing the next IWGP to be held in England in 2001, if large numbers of papers continued to be offered, many would have to be converted into posters instead. This may be an opportunity, not a demotion. Given a dedicated session with authors available for discussion, posters can be more memorable, and are unquestionably more interactive than papers. The one-to-one or small group exchanges centred on posters are beneficial both to the presenter and the audience. The format allows the participants to choose the level of involvement: a quick glance to see what subjects are covered, detailed reading, brief chats or intense discussions. Three years on, I remember far more of many posters presented at Innsbruck, where dedicated time was provided, than of most lectures, precisely because of the interactive nature of the session.

With dedicated poster sessions, more time is available for lectures, which can then become truly broad-based thematic sessions with adequate time for discussion rather than brief question and answer periods. One of the major problems with talks at Toulouse could be avoided, namely that the 15 minutes

allotted for each lecture was, in most cases, simply not enough to develop a well-argued theme from complex data.

One of the great strengths of the IWGP has always been the opportunity to examine archaeobotanical material from many periods and places. The "work group" aspect needs to regain its dominance. With less emphasis placed on lectures, this would be possible. Now that the IWGP covers such a wide geographical region and the full range of the Holocene, there is a good case to be made for practical sessions in which people can demonstrate not only their mystery specimens, but also known material which may be highly unusual imports elsewhere, and therefore difficult to identify, or which is generally rare or problematic.

At Toulouse, the size of the conference, the diversity of participants and the broad geographical and chronological topics which were covered is a clear and heartening indication that archaeobotany in the Old World is a vigorous and expanding subject. The IWGP faces a challenge to maintain its historical strengths in the face of its growing membership. There are, however, ample opportunities to build on developments in methodology and increasing knowledge about ancient human interactions with plants, to allow the IWGP to flourish for the next 30 years.

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3rd International Symposium ¹⁴C and Archaeology

*A.J. Timothy Jull, Arizona AMS Facility,
University of Arizona*

After a break of some 11 years from the second symposium, the 3rd International Symposium on ¹⁴C and Archaeology took place in Lyon, France, 6-10 April, 1998. The meeting's focus was to discuss problems of radiocarbon chronologies and applications and consequences for archaeology. The conference was ably organized by Dr. Jacques Evin and Christine Oberlin of the Centre de Datation par le Radiocarbone (CDRC) of the Université Claude Bernard - Lyon and other organizations. The previous two meetings of this conference had occurred in Groningen, the last in 1987. The meeting had a heavy European emphasis, probably due to the fact that over 85% of the around 200 participants were from European countries (including the European part of Russia). Less than a dozen North American and Australasian scholars were present. The meeting was a welcome opportunity to try and discuss archaeological and dating problems (and successes) amongst two groups who often interact less than one might expect.

Several presenters discussed new possibilities for calibration schemes for radiocarbon based on varve chronologies (Van der Plicht) and maybe even oceanic cores (Grootes et al.). However, the tree ring calibration was extensively summarized by Bernd Kromer and Edouard Bard gave an impressive summary of the situation with the coral ¹⁴C vs. U-Th chronology, en français of course. The appearance of a new *Radiocarbon* volume devoted to calibration is expected within the year, which will provide the current "best calibration" based on tree rings and corals.

Subsequent sessions dealt with a myriad of topics, in some cases preceded by a "working group report" which in many cases was presented in a rather dry fashion, with insufficient visual aids. There were a large number of posters. The technical papers themselves were generally of good quality. I learned much about archaeological problems, which I as a radiocarbon specialist might otherwise dismiss as "poor sampling". I hope my archaeological counterparts also learned a little about dating and that "bad dates" can sometimes tell you something important. Sessions focused on the Paleolithic, Neolithic, Peopling of the British Isles, historical periods, as well as different geographic areas. "Grandes séries de datations" occupied more speakers' time than was perhaps needed. In these talks, often a wide range of dates in huge collections of all dates on some specific area were presented. Perhaps after this conference, the use of such databases without some reference to the quality of the measurement (the dater's problem) or the sample (the archaeologist's problem) will become less common. These types of presentations would be best done as posters. For myself, some of the best talks focused on specific dating problems, such as "AMS dating of charred food remains" by Rupert Housley (Glasgow).

At this point, it is perhaps important to note that the conference was conducted in 2 languages, English and French, with simultaneous translation facilities. This resulted in some dichotomy between the presentations in different languages, especially during the question periods, when the language situation could become a little confused. However, in general, thanks to the excellent translators, the proceedings went smoothly. Certainly, this procedure allowed more discussion than might have otherwise occurred. As one who listened to both languages with equal interest without the translator's version, I realized that the language discord could be a wonderful analogue for the problems confronting archaeologists and radiocarbon specialists. Sometimes, it would appear that these two groups are talking different languages. Perhaps this is the reason for this conference. I believe that better communication between these two groups, the "daters" and the "archaeologists" is critical.

As might be expected, the social events for the conference were exquisite. Lunches were provided for all. A welcoming reception was held at the historic "Hotel de Ville" of Lyon. Indeed, we learned at this reception that the city representative of Lyon was well aware of radiocarbon dating, due to an archaeological excavation for the town hall parking lot! An excellent banquet took place on a river boat, the "Hermes", which cruised the Rhône and Saône for several hours with magnificent views of old Lyon.

In my opinion, we need more such conferences to discuss the deeply intertwined, but sometimes apparently separate, topics of archaeology and radiocarbon dating. The next conference is expected to be held in Oxford early in the next millenium, in 2001. It is to be hoped that the next meeting will bring the diverse viewpoints of these two scientific communities closer together. More participation from the Americas and Australasia would also help broaden the Eurocentrism apparent in several of the presentations.



**Christine Oberlin and Jacques Evin at the
Centre de Datation par le Radiocarbone (CDRC)
of the Université Claude Bernard - Lyon**

Book Reviews

Moundbuilders of the Amazon: Geophysical Archaeology on Marajo Island, Brazil. Anna Curtenius Roosevelt. Academic Press, San Diego, 1991. xxvii + 495 pp. \$89.95 (cloth). ISBN 0-12-595348-8.

Archaeological Prospecting and Remote Sensing. Irwin Scollar, Allain Tabbagh, Albert Hesse, and Irmela Herzog. Topics in Remote Sensing No. 2, Cambridge University Press, Cambridge, 1990. xv + 674 pp., figures, tables, notes, index. \$135.00 (cloth). ISBN 052132050X.

Reviewed by James I. Ebert, Ebert & Associates, Albuquerque, NM 87107 USA

Although “archaeological prospection” has long had a respectable following – probably the majority of those who have constituted it are members of this society – a number of recent signs point to a resurgence in interest in applying remote sensing, particularly geophysical methods such as magnetometry, ground penetrating radar and soil resistivity surveying, to the search for and non-destructive characterization of archaeological remains. The 1st and 2nd International Conferences on Archaeological Prospection were well attended in 1995 and 1997, and another is planned for this year. Extensive Web sites dealing with the subject have appeared, and several institutions offer graduate degrees in archaeological prospection and related areas. John Wiley recently announced the publication of a journal, *Archaeological Prospection*, to cover all manner of archaeological discovery methods including geology, remote sensing, and geophysical and geochemical methods in “urban, rural, and marine environments.”

The major incentives for this expansion in interest in non-contact detection of subtle surface or subsurface archaeological remains are probably the same as those for much of what else is happening in archaeology today: The phenomenal increase in the availability of digital methods, and the ever-increasing necessity for increasing the cost-effectiveness of conservation and research in the field. Nonetheless, it is interesting that what are arguably two of the most useful and comprehensive contributions to the literature of archaeological prospection, which are the subjects of this review, were published in 1990. Anna Roosevelt’s *Moundbuilders of the Amazon* is a conscientiously detailed account of a pioneering and exhaustive program of using geophysical methods to complement survey and excavation; its primary lessons are that such a program (then or now) must be meticulously planned and does not, by any means, produce “data for free.” Irwin Scollar and his colleagues’ *Archaeological Prospecting and Remote Sensing* is a work of such staggering comprehensiveness in its subjects that it will probably serve the profession as our basic manual in these areas for decades to come.

Moundbuilders of the Amazon presents a meticulous, step-by-step description of research integrating geophysical remote sensing with intensive surface survey and excavation at Teso dos Bichos, a large population center of the Marajoara

Chiefdom, which from A.D. 400-1300 occupied alluvial floodplains of the Lower Amazon noted for its monumental earthen mounds and elaborate ceramics, particularly funerary urns. It could today, as easily as when it was written, be used almost as a set of “how-to” instructions by archaeologists working virtually anywhere who would like to experiment with such methods in the context of their own site-based or regional fieldwork.

In fact, Brazilian archaeologists were among some of the first to experiment with geophysical survey methods because of their availability: geological exploration in Brazil made heavy use of them. Some early archaeological applications there were encouraging, and beginning in 1983 Roosevelt began a collaborative project with Brazilian archaeologists, under both NSF and Brazilian support, directed toward comparing various geophysical survey methods. These included total station topographic mapping, magnetic survey, conductivity survey, resistivity survey, and ground penetrating radar.

The overall impression gained by any reader, especially one interested in applying practical lessons about geophysical prospecting in their own work, is that using these techniques is not to be lightly undertaken. Geophysical surveying is not something done as a “shortcut,” nor does it in any way obviate systematic excavation. Geophysical data serve, rather, to bolster and amplify what one learns from later, hands-on digging. One must from the beginning be overwhelmingly systematic and meticulous, particularly in recording the spatial locations of data collection. That Roosevelt and her collaborators did their geophysical surveying just before computer data recording and data analysis became automatic procedures emphasizes these facts, but they are no less true today.

A base map with resolution congruent with that of the geophysical data to be collected is a fundamental prerequisite. The area of Teso dos Bichos Roosevelt and her colleagues studied measures on the order of 140m x 160m, and geophysical measurements were taken at resolutions as high as 1m x 1m, so a high-precision topographic base map had to be compiled first. This was done with EDM (electronic distance measurement) technology, familiar to many archaeologists today but something quite new in the early 1980’s. An EDM theodolite was used to map the site, with its x-y-z readings being manually entered in real time into a laptop computer (a Herculean effort, as I can attest, having done much the same thing over large areas at about this same time). The researchers also set out stakes at 5m x 5m intervals to serve as datums for the geophysical surveys. This was much more difficult than they had anticipated, as setting out always is, for one must use the survey instrument as feedback for plus or minus movement readings. This is still a problem today, and it would behoove us to find ways to automatically track survey instruments such as magnetometers using radio direction finding or some similar technology.

The natural soils of the site are highly conductive because of alkalinity and active-exchange clays, but when sherds, ash and bone are added become less so. When heated, as around hearths, they become highly magnetic. Clay sediments from nearby stream courses were used by the inhabitants of the site to construct their mounds, and ceramic clays were used to construct stoves. These practices created pockets of highly

differentiated sediments in the site which were easily detected geophysically.

Magnetic survey was the most valuable technique in discriminating the size, number and composition of households in the site. Readings were taken at 1m x 5m and 2m x 2m intervals with proton precession magnetometers; to control for diurnal changes in the earth's total magnetic field measurements were also taken from a permanent datum station every 15 minutes. Some higher resolution surveys were also done. Burned clay stoves and hearths were pinpointed, as was a burned house. Expectably, anomalies were more easily discriminated in the higher resolution surveys. A manually calculated and drafted map of magnetometer reading locations and magnetic contours on page 206 of this book stands as testimony to the tremendous field and laboratory effort expended in this process, and under magnification appears as meticulous and precise as anything we can make with a computer today.

Conductivity survey was used to derive more general maps of the major stratigraphic units in the site, and to confirm specific features, sensing soil texture, moisture retention, chemistry, and compaction. Native soils are more conductive while cultural inclusions reduce conductivity; an electronic induction meter was used to measure conductivity differences at 1m intervals along transects, and suggested earth constructions in some places, reinforcing the magnetometer surveys.

Electrical resistivity survey was additionally employed along seven sections of the site and resulted in bounding the total disturbed area of the site, as well as confirming large earth constructions in several parts of Teso dos Bichos and some areas outside the site.

Ground penetrating radar survey also was conducted over most of the site, in continuous transects 2m apart to make profile maps of the site's stratigraphy, and to locate large subsurface anomalies or objects. Radar anomalies occurred only in small patches within the site, probably because of soil moisture and the high conductivity of the clay alluvium. The radar did, however, detect intrusions into the uppermost meter-plus of the soils.

Testing by excavation of the results of the various geophysical surveys is detailed in Chapter 5 of the volume. While excavation is to be regarded as the essence of archaeology, of course, this is perhaps the least interesting part of *Moundbuilders of the Amazon*. As any archaeologist who has tried to compare such disparate sorts of data as (for instance) those derived from aerial photointerpretation and ground survey of the same site knows, there is often very little comparability, and very little that one can say about such a comparison. The data are different, and they are complementary, but one is not in any sense a "reflection" of the other. It seemed to me, in fact, that Roosevelt may have only been reaching this conclusion, the most important lesson it has to teach the aspiring archaeological "prospector," as she finished her volume.

Archaeological Prospecting and Remote Sensing is written by an archaeologist, two geophysicists, and a mathematician, the authors point out in their preface. Although the archaeologist, Irwin Scollar, clearly provides the organization of this volume, no reader will be able to ignore the influence of the other "hard"-er scientists, and in fact some may be able to wade through

parts of this volume only with difficulty. This is not to say that pages of equations weren't necessary to reach the authors' goals of presenting a systematic outline of the principles of geophysical methods employed in archaeological prospection, which they have without a doubt fulfilled.

Irwin Scollar has been and continues to be a trailblazer in "high-tech" applications in archaeology beginning some 40 years ago when he studied with the father of British aerial archaeology, O. G. S. Crawford. Scollar later took a research position at the Rheinisches Landesmuseum in Bonn, where, funded by a number of German agencies and foundations, he began using techniques then available only to a very few – including digital scanners, image processing, computer photogrammetry, and geophysical prospecting. He currently continues to occupy the cutting edge of digital archaeology as developer of the Bonn Archaeological Software Package (WinBASP), which incorporates many of the statistical and photogrammetric methods he began working on in Bonn.

Chapter 1 defines archaeological prospecting as using a wide range of passive (aerial and other photography, magnetic, thermal, and gravity prospecting) and active (electrical, electromagnetic, radar, seismic, and induced polarization) methods to detect and map sites and features. Such methods are necessary because excavation is destructive, expensive, and increasingly a "tool of last resort." The data they produce lends itself to visualization once it is transformed and displayed using computer methods, through which it can be organized spatially and temporally, and analyzed statistically to understand associations among types, periods, time, and space.

The archaeological phenomena actually discovered and measured by such techniques are structures, which are created either by bringing in non-native materials, or disturbing native materials (soils and sediments); other aspects of settlements such as fires, animals, agriculture and waste disposal also alter sediments in detectable ways. Properties of soils and sediments and additions, subtraction and alterations to them which produce measurable anomalies are explored in depth in Chapter 2.

The next section of *Archaeological Prospecting and Remote Sensing*, Chapters 3-5, constitute one of the most exhaustive discussions of aerial photography, image enhancement, and photogrammetry available to archaeologists today. The use of aerial photography for archaeological purposes has been pursued systematically in England and Europe since the 1920's. The basic method of such "aerial archaeology," as its English-speaking practitioners call it, is to fly around visual indications of archaeological sites and structures until one gets an aerial photo that makes those indications "obvious" to the archaeologist – large and contrasty. Almost all such aerial archaeological air photos are oblique, taking advantage of subtle variations in sun angle, vegetative patterning, moisture markings, and frost and snow marks as viewed from different perspectives. This is in striking contrast to archaeological remote sensing in the United States, where aerial photographs have also been used by archaeologists since the 1920's, but *not* very systematically, where archaeologists tend to use vertical axis photographs which are not taken for optimum clarity but rather for engineering mapping purposes. Cameras, films, lenses, filters, exposures, and other factors in taking the clearest possible

aerial photos for archaeological purposes are discussed at very useful length.

Archaeological image processing, the subject of Chapter 4, is the quantitative use of imaged data, although it is emphasized that digital methods can never replace the judgement of the archaeological mind – it is the archaeologist's knowledge and judgement that are all important, regardless of new technical methods. How many times has any reader encountered such an argument in any more recent, “upbeat” discussion of promising new methods? Not often enough. This explicit statement goes a long way toward the amelioration of the reader's potential annoyance at some of the pages on image processing which follow, with perhaps somewhat overly-technical discussions of point spread functions, filtering, histogram modification, correction of motion blur, noise reduction, and edge extraction.

A photograph is the accommodation of a scene in the 3-dimensional world to a 2-dimensional image, and correcting for or perhaps more realistically using some of the resultant geometric distortions through rotation, scaling, projective transforms, and rubber sheeting are found in Chapter 5 where, finally, a number of real archaeological examples are employed to demonstrate how oblique aerial photos of crop marks and other patterning can be made into maps. More equations are also included, which no contemporary archaeologist will ever use in doing photogrammetry because software does it all for us today – in fact, Scollar's WinBASP software does. Most of the examples are even more dated, however, involving aerial photos and photogrammetry done as long ago as the 1970's – but the principles are still the same, and the discussions of photogrammetric computation of digital terrain models, contouring, digital photomosaics, scanning and film writing are as valid today as they ever were.

The second half of the volume is directed toward all of those other archaeological prospecting methods: resistivity prospecting (Chapter 6), magnetic prospecting and its scientific basis in soil properties (Chapters 7 and 8), electromagnetic prospecting (including ground penetrating radar)(Chapter 9), and thermal prospecting (Chapter 10). Although like most somewhat technically-oriented archaeologists, I like to feel that I understand such methods intuitively, I quickly began skipping more and more pages of differential equations in these sections, which are clearly the work of the two geophysicists and the mathematician. There is probably much more than you will ever need, or ever wanted, to know in these chapters, although there is also much practical detail here which would benefit anyone actually doing, say, resistivity prospecting – how to orient quadripoles to reduce the effects of apparent anisotropy in a resistivity map, equations to calculate the actual speed of making resistivity measurements, illustrations of various types of resistivity electrodes (including a tractor-towable disc electrode array), and a discussion of parasitic electrical phenomena.

In Chapters 7 and 8, building upon the baseline measurement of the magnetic properties of soils ameliorates the difficulty of determining the shape and nature of buried objects through magnetic survey, which can also be aided by the theoretical calculation of expected anomalies. Such calculations are complex, requiring more double and triple

integration. A somewhat less mathematical discussion of the principles of the operation of different sorts of magnetometers and the data products produced by each should, however, be of wider interest, as will sections on practical considerations of magnetometry such as differential magnetometry, avoidance of magnetic contamination, position control of measurements, radio positioning, and data reduction and display. A section on the treatment of data as images in grayscale or color, aided by image processing, allowing the “photointerpretation” of magnetometer data is worthy of close reading. Possibly the most interesting section of Chapter 8, however, is a concluding historical note on the development of magnetic prospecting in archaeology, some of which was laid as early as 1896, culminating in the first archaeological magnetometry experiments in Cambridge University in the mid 1950's, which involved some of the very first archaeological use of computers.

The last two Chapters of *Archaeological Prospecting and Remote Sensing* cover electromagnetic remote sensing and “thermal prospecting,” and serve to reinforce, as does the conclusion of Roosevelt's *Moundbuilders of the Amazon*, the fact that geophysical prospecting does not produce the same sort of data as does archaeological surface survey or excavation. Electromagnetic prospecting, in contrast to electrical and magnetic prospecting, measures man-made electromagnetic fields at low frequencies (metal detectors) or high frequencies (ground penetrating radar). To me, the output from ground penetrating radar has always looked almost exactly like what one gets from a Bass Lo-k-tor, which in fact is what it almost exactly is, and anyone who has used such an aid in fishing knows that a Bass Lo-k-tor doesn't tell you what you are looking at, or even just where it is. A great deal of expertise and judgement (to echo Scollar's previous point) is needed on the part of the fisherperson or archaeologist to translate between geophysical data, or in fact that derived from aerial photographs, and what one sees or expects to see on or in the ground. This is also true for data derived through thermal imaging, covered in the volume's last chapter.

Quite surprisingly, there is no concluding chapter or statement in this otherwise seemingly exhaustive volume. This may be because, after examining the complexities of the techniques of archaeological prospecting and the interpretation of the data they produce, the authors might be forced to conclude something slightly different than they optimistically set forth in the book's introduction: that rather than an alternative to destructive and expensive excavation, the use of geophysical methods in archaeology results in unique, while complementary, information on what is contained on and in the ground.

Ground Penetrating Radar: An Introduction for Archaeologists. Lawrence B. Conyers and Dean Goodman. AltaMira Press, Walnut Creek, London and New Delhi, 1997. 232 pp., 58 figures, 8 color plates, 6 tables. Price: \$54.00 (cloth), \$26.95 (paper). ISBN 0-7619-8927-7.

Reviewed by Stephen Ball, Glenn A. Black Laboratory of Archaeology, Indiana University, Bloomington, IN 47405 USA

Geophysical remote sensing techniques are experiencing a pronounced revival among archaeologists. Although part of the overall archaeological tool kit since the late 1960s, they have sometimes been viewed as suspect and not a viable alternative to excavated or surface collected data. Recently, the increasing costs of archaeological excavation, curation, and a greater emphasis on preservation have added to the appeal of remotely sensed data. Furthermore, the development of GIS has familiarized archaeologists with the manipulation of digital data, and landscape archaeology has provided new conceptual frameworks for the integration of geophysical techniques. The easy availability of fast, powerful computers and software for the filtering, analysis and display of digital data has created a situation wherein the average archaeologist, with some study, can legitimately derive useful archaeological information from geophysical data.

Ground Penetrating Radar: An Introduction for Archaeologists by Conyers and Goodman represents a serious effort by the authors to communicate both the capabilities and promise of a remote sensing technology to archaeologists with little background in geophysics. For this effort, I believe they should be congratulated. Good introductory handbooks for archaeologists interested in geophysical remote sensing are rare, and this book constitutes an earnest effort to secure a wider acceptance of these techniques.

The book is organized into nine chapters. Chapter 1 introduces ground penetrating radar (GPR) methods and their history in archaeology. Chapters 2, 3 & 4 cover technical considerations of GPR surveys, equipment, and post-acquisition data processing. Chapter 5 briefly illustrates synthetic GPR modeling of archaeological features and chapter 6 describes the use of velocity analyses in GPR. Chapters 7 & 8 present the results of various GPR surveys from around the world emphasizing the use of amplitude time slices to present 3-dimensional data in a 2-dimensional format. Chapter 9 concludes with the authors stressing the integration of GPR into archaeological research, not simply as an anomaly finder, but as part of the overall interpretive framework for sites. Chapter 9 also provides a feasibility table assessing the appropriateness of a GPR survey for a variety of archaeological targets.

In chapter 1 the authors clearly identify the intended audience of the book, stating that most archaeologists trained today have more than enough scientific background to allow them to understand and use this exciting and promising method of archaeological mapping (Conyers & Goodman 1997:17). The use of the term archaeological mapping versus archaeological prospecting is deliberate. The use of GPR as a means to more thoroughly investigate a site, rather than a simple prelude to excavation, is thus emphasized.

The specifics of the GPR method are presented in the next chapter (2) in a clear non-technical manner. The authors introduce many terms and concepts related to GPR survey yet they do not overwhelm the reader with excessive details. The physical specifications of various GPR receivers, general survey logistics and radar signal properties are addressed through the judicious use of illustrations. The use of simple equations aids in the understanding of the material.

The great advantage of GPR over other geophysical methods is its ability to determine the actual depth of archaeological features and model them in three dimensions. The key principle of relative dielectric permittivity (RDP), the property which determines the velocity at which radar waves travel through a substance, is introduced. A series of clear, well-executed illustrations does much to simplify some technical aspects of GPR. Variables critical to the design of a successful GPR survey such as the relationship of the receiver wavelength to the depth and dimensions of features sought are discussed in detail. The chapter gives the novice a good overview of GPR survey logistics, as well as the factors that will eventually determine the success of a GPR survey.

Chapter 3 focuses on GPR data gathering. Basic procedures are discussed, including surveying in grids, correcting for topography and the mapping of natural features. Specialized GPR survey parameters are also presented and explained. The time window (amount of time the receiving antenna will listen for the returning signal), samples per scan (especially the relationship between sample interval and possible feature resolution) and other pre-survey adjustments are described.

Post-acquisition data processing is described in the next chapter (4). A brief discussion of signal filtering techniques (which curiously includes filters which are not presently applicable to GPR) unfortunately does not address computer programs for the application of these filters. This problem recurs in the ensuing chapter on synthetic radargrams and continues throughout the book. Despite the fact that most GPR filtering software is custom-written by geophysicists, some suggestions as to where one could acquire signal processing software that could be adapted to the analysis of GPR would be quite helpful, especially considering the introductory nature of the book.

Chapter 6 presents a thorough discussion of the various velocity tests which can be employed at a site. These tests determine the radar wave velocity by measuring the amount of time it takes for a radar wave to travel a known distance. Once this velocity is known, time-depth conversions allow the display of GPR data as a series of time slices which represent real horizontal slices of the subsurface. The authors emphasize the fundamental role of the velocity test, through which one determines the RDP of the various soil strata, and the need to redetermine wave velocity with each new survey due to the effect of soil moisture content on RDP. Overall, Conyers and Goodman do an excellent job explaining time slices and the methods through which digital imaging algorithms can be applied to GPR data.

The authors complement their theoretical discussion with some very impressive examples of GPR surveys, mostly from Japan and El Salvador, that effectively illustrate radar's great promise. Most of the surveys are presented as a series of time slices (well illustrated in a series of color plates), which allows the remote construction of horizontal sub surfaces. The arrangement of these amplitude slices in horizontal layers, representing real depths, is in a visual format familiar to archaeologists, analogous to that of excavation levels. By presenting GPR results in this manner they are made much more accessible to archaeologists.

A series of surveys in chapter 8 demonstrates the use and importance of GPR surveys in real archaeological situations. The surveys also provide excellent examples of the application of filters to correct for surface topography, uneven subsurface topography and the filtering of the near field zone to disclose shallow features. The use of GPR for feature interpretation is illustrated in the radar survey of the Nyutabaru burial mound group, which provides data that allow the formulation of probable scenarios of construction and abandonment. Moreover, successful surveys from North America, including Spiro and Shawnee Creek, acquaint the reader with the ability of GPR to work well on non-volcanic landscapes.

Despite the fact that the examples presented in chapter 8 show the exceptional promise of GPR, two critiques arise, one general and the other of a specific nature. At least five of the GPR surveys presented leave out the method by which the soil RDP was established. Having absorbed the directive of chapter 6, I was quite interested in the type of velocity test used. The bar method is the preferred velocity test but it requires an open excavation, a condition not always present on prospective survey sites. Since there are alternative velocity tests which do not require open excavations, I was interested to see if theoretically less effective ways of establishing soil velocity would still produce useful results.

My specific critique focuses on the comparison of geophysical techniques at the Matsuzaki site in chapter 8. The comparison of magnetic, resistivity and GPR surveys focused exclusively on the superiority of GPR over the other two techniques. Most of us who have incorporated geophysical techniques into our research are aware that cross-referencing geophysical surveys dramatically increases the ability to identify features. Rather than simply extolling the virtues of GPR, the integration of the different information sets would have set a better precedent. As in most archaeological endeavors, a single technique is unlikely to answer all our questions. The use of multiple geophysical survey methods is crucial to the success of such techniques in archaeology.

This book is a valuable guide to any archaeologist interested in the application of GPR surveys. The authors should be complimented on their efforts to write at a level approachable by the general archaeological public while at the same time providing sufficient information to get one started in GPR surveying.

Geological Methods for Archaeology. Norman Herz & Ervan G. Garrison, Oxford U Press, 1998. 352 pp., 79 linecuts and 31 b/w photos, ISBN: 0-19-509024-1 (cloth \$75.00)

Reviewed by Professor Brooks Ellwood and students from his Geoarchaeology course at the University of Texas-Arlington.

Introduction

I decided to use this textbook during the Spring semester, 1998, in teaching a course titled Geoarchaeology. The course is taught to a difficult mixture of students; junior and senior undergraduates, freshman graduate students, students in geology

and students in archaeology and anthropology. Early in the semester I asked the students in the class to evaluate the textbook from their perspective and provide me with a written review; two of their reviews are included at the end of this review, one from a graduate student and the other from an undergraduate student.

In teaching the course I cover first how archaeological sites are impacted by and controlled by the geological setting. I then go on to look at how archaeometric methods are useful in solving archaeological problems. This approach requires that the text I use for the course have strong sedimentological, pedological and geomorphological chapters, with good introductory level but general and easily understood chapters on geophysical, geochemical and isotopic methods.

Text Overview

There are three main topics covered in this textbook. These are geology (including soils and geomorphology), geophysical and geochemical methods, and included are a number of archaeological examples where these topics are applied. In the text, 48 pages are devoted to geology, 31 pages are devoted to geophysics and 184 pages are devoted to geochemical and dating methods. The rest of the book is devoted to introduction and notes. Given the title and length of the book, there is a very disproportionate weight given to the topics covered in the book. There should have been more weight given to geological discussion and contexts, more weight given to main-stream geophysics applied to archaeology, and much less emphasis placed on sourcing and geochemical methods.

The quality of the diagrams in the book is very poor (not the authors fault) and in many cases better examples (diagrams) should have been used to illustrate methods. The discussions of methods is often too detailed or complex for most students in archaeology or anthropology to grasp, and thus these students are forced to go to other sources to understand critical concepts.

The book is broken into four major parts as follows:

Part I of the book (48 pages; 2 chapters) gives a brief and general overview of sediments, soils and geomorphology. For my purposes this is too brief and I was forced to supplement this material with quite a number of additional readings. Chapter 2: This provides a good introductory discussion of geomorphology. Chapter 3: This gives a very brief discussion of sediments and soils, again, necessitating additional material. A good, long discussion of paleoclimates based on plants and pollen was also included in this chapter but did not include other paleoclimatic estimators.

Part II of the book (74 pages) was dedicated to dating, and this was useful and gave good examples. Chapter 4: This chapter covered relative dating primarily using chemical methods, and provided a good overview. Chapter 5: Absolute dating methods were covered in this chapter with some chemical and radioactivity introductory comments. The chapter discussed many of the methods used in the field and a number not used at all. Chapter 6: This provides a discussion of radiation damage methods, Carbon-14 dating and gives some interesting examples. Chapter 7: Other non-radioactivity based dating methods were discussed including archaeomagnetic dating, dendrochronology and tephrochronology.

Part III of the book (Site exploration, 43 pages) included geophysics plus phosphate analysis. Of these few pages, 9 were dedicated to phosphate analysis, 9 pages were dedicated to seismic exploration, and all the rest of geophysics was covered in 22 pages. This created a serious problem for me because I had to require a good amount of external reading to cover the most important areas (in my view) in archaeological geophysics. Seismic exploration is little used in main-stream archaeological site exploration, but it received 9 pages of coverage, while electrical, ground penetrating radar and magnetic exploration methods, those methods used most commonly today, together only received 12 pages of text. This section should have been significantly expanded. Chapter 8: This chapter included all of geophysics and should have been expanded. Some of the material is out of place, for example ground penetrating radar and microgravity are sandwiched between magnetic discussions to which they are unrelated. Chapter 9: A stand alone phosphate chapter in the scheme of main-stream archaeological exploration techniques and in an introductory text was unwarranted.

Part IV of the book (Artifact analysis, 101 pages) involved mainly geochemical methods and sourcing. A significant area in archaeology, oxygen and carbon isotopic analyses, important in terms of relative dating, climate, and other areas, was covered extremely briefly and then these were only covered as sourcing methods. However, this portion of the book does provide an excellent resource for those methods used in artifact analyses including sourcing. Chapter 10: This covers basic rocks and minerals and should have been included early in the book in Part I. The Sphinx, Stonehenge and Roman were good examples. Chapter 11: Covering instrumental analytical techniques, this chapter is a good resource. Chapter 12: Economic geology applied to archaeology is an interesting chapter but might better be placed in a textbook titled archaeometry. Chapter 13: Ceramics is another area that is more specific and less general and introductory, although again, the chapter does provide an interesting resource. Chapter 14: This chapter deals with sourcing using stable isotopes and again is less introductory although is a useful resource.

Graduate Student Review

The required text for the Geoarchaeology course, *Geological Methods for Archaeology* by Herz and Garrison, was not a sufficient reference manual. The text barely seemed to scratch the surface of topics that required greater explanation. If the target audience for the book was college level geology, archaeology, and anthropology majors, I feel the book did not do its job.

Overall, the text assumed a greater knowledge of the subject material than most of the students taking the course had. From what I know of most universities, students in anthropology and archaeology are not required to have a technical physics course. Without a detailed explanation of the basic terms, most of the material within the Geophysical Methods section would be lost to these students. The text assumes, at minimum, a college level physics course in the students background.

My biggest complaint of the book is the way the authors presented the material. First there would be a brief, inadequate introduction followed by a case study. There was no section on

how to interpret data from the field. This feeling is directed towards the geophysical methods and the soil and sediments chapters.

The text was also a poor quality product. The figures and graphs were very fuzzy and difficult to read. Often the figures had been sized down to a point where the words were not legible. There were technical photographs in the text that lacked a scale for size. For some students, these photographs would be meaningless.

It seemed like the authors wanted to cover too much material in one book and in order to do that, a significant amount of information was left out. This book did not serve as an educational tool as well as did the class notes, extra readings, Internet searching, and my individual research. The book may introduce new concepts to a student, but after that, it is up to the student to find other sources that can actually educate them about the material.

Undergraduate Student Review

In looking back at *Geological Methods for Archaeology* by Herz and Garrison, I focused on how useful it was in helping me to succeed in this class. I found that the book was not reader friendly and at times intimidating for a beginning class in geoarchaeology. The text is short on plain explanations and long on equations and examples, which seem to require a more detailed background for accurate understanding. The text is by the nature of its subject, meant for a narrow audience but it makes little attempt to reach out for a larger audience. The text is difficult to follow at times and the obviously Xeroxed photos and diagrams do little to illustrate points brought up in the text. This is not a total condemnation of the book, as there appears to be quite a bit of information in its chapters that perhaps with further education in the field will become more useful. I am curious to see if my impression of this text changes in a few years with more study. I do not think that this book serves its purpose if it was intended for an introductory course in geoarchaeology - I do not feel that this book encouraged me to dive into its pages and extract the information inside. There are obviously informative parts contained inside but it was hard to persevere through its often over technical pages to get to it. I think that the authors have tried to put too much into too short of a text to succeed, the lengthening of the book with the inclusion of better introductory sections would make it a more useful text.

Ancient Mining. Robert Shepherd. Chapman & Hall, London and New York, 1993. xv + 494 pp., 69 figures, 9 tables, 5 appendices, references, name-, site-, and subject indices. \$128.95 (cloth). ISBN 1-85861-011-7.

Reviewed by F.R. Beardsley, Department of Anthropology, University of California-Riverside, Riverside, CA 92521 USA

Ancient Mining begins with an ambitious premise, to survey the history of the extractive industries from the dawn of history to the final years of the Roman Empire (p. v). It was intended to be a sequel to Shepherd's *Prehistoric Mining and Allied*

Industries (1980), but with a difference. By concentrating on a period in which written documents are available for scrutiny, Shepherd seized the opportunity to incorporate the commentaries of both classical Greek and Roman authors to establish the context for his ensuing discussions. He originally planned on treating both mining and metallurgy in this work, but as Shepherd himself notes (p. v), the work was becoming unduly long; so he decided to confine his topic to mining with references made to metallurgical industries, smelting, ingots, and so on.

Unfortunately, this rather laborious work did not seem to achieve all it promised. *Ancient Mining* was supposed to present a comprehensive account of mining in the classical era of the western world; yet, I suspect, its failure to do just this had much to do with the structure of the book as a whole and its treatment of the area eventually dominated by the Roman Empire. The decisions that go into designing a book and its format involve many choices. For a topic as large as ancient mining, the drawbacks are equally fierce no matter which arrangement might be selected—treatment by region, by stone type, or perhaps an approach through the history of technology. In either case, there is bound to be repetition, a tendency toward disorientation especially on matters of chronology—what came first? when? where? in the meantime, what was going on over there?—and the occasional irrelevant detail tossed into the maelstrom of historical events, e.g., the start of oil prospecting in 1933 in Saudi Arabia (p. 244).

The story of *Ancient Mining* is recounted in eleven chapters, along with five appendices which provide lists of the Greek and Roman authors consulted throughout the main body of the book, a chronology of Roman emperors, units of money, and so on. The main text begins with an introduction to mining. The first two chapters, Mining Practice in Ancient Times (Ch. 1) and Administration and Labour in Ancient Mines (Ch. 2), provide a useful prologue to mining practice, terminology, and the legal- and labor issues that were an inextricable part of mining in the ancient world of the Greeks and Romans. The latter chapter is illustrated with specific examples from the silver mines of Attica and textual sources from the Roman Empire. The former goes through the basic mechanics of both surface and subsurface mining, the various approaches toward excavating mining shafts, galleries, and the necessities of ventilation, drainage, and lighting.

Chapters 3 through 10 cover the geographic regions that were eventually absorbed into the Roman Empire: Greece (Ch. 3), Roman Italy and the Danubian Provinces (Ch. 4), Gaul and the Rhine Provinces (Ch. 5), Iberia (Ch. 6), the Middle East (predominately Anatolia; Ch. 7), Southwest Asia (Ch. 8), Egypt and North Africa (Ch. 9), and Britain (Ch. 10). Each chapter begins with a very, all-to-brief introduction to the geology and general overview of the political and social climate of the specific region; this is intended to set the stage for the pursuant discussions on mining. Shepherd relies heavily on classical period observers in his descriptions, as well as many sources that are historical in their own right, but otherwise seemingly out-of-date. One is left with the impression of a nineteenth century gazetteer, with snippets of information on various sites presented. This is, perhaps, not unexpected as Shepherd has gained his appreciation, interest, and understanding of ancient

mining through a unique avenue. Shepherd is a mining engineer who encountered the evidence of many ancient workings during his own explorations.

Regional coverage throughout these eight chapters (Chs. 3 through 10) is uneven. The chapter on Britain, for example, occupies nearly one-quarter of the total number of pages in the book, whereas the other regions have been allotted anywhere from 12 to 67 pages. Such an extended and lengthy treatment of Britain is probably best attributed to a couple of reasons, such as Shepherd's own familiarity with the region, as well as the differential amount of research on mining and metallurgy that has been undertaken in Britain as opposed to the other regions. A casual glance through the literature will certainly demonstrate that British researchers are at the helm of research into early metallurgy, while references to personal insights and observations by Shepherd on ancient mining (particularly coal mining; pp. 389-390) will attest to his own acquaintance with the topic.

The final chapter, Ancient Quarrying and Sources of Building Materials in Ancient Times, extends the topic of mining to that of quarrying building stone. Like mining, this is a subject to which whole volumes can be dedicated, from the search for ancient quarries to the mechanics of quarrying and production. This single chapter is in essence a spectre of this larger topic. Shepherd presents a summary of the quarrying, transport and fitting of building stone, and then proceeds to take the reader on a whirlwind tour of each region (sort of a condensed version of the preceding chapter by chapter discussion of regions), identifying quarry sites and recording specific observations made by classical authors on the materials quarried (e.g., Pliny's innumerable references to marble usage in the Greek Islands or Strabo's mention of several quarry sites in Asia Minor).

Altogether, *Ancient Mining* was not wholly satisfying, although I must confess I approached this work with rather selfish motives. I wanted, or rather expected to gain some insights into historical mining (evidence, techniques, solutions) in other regions of the world beyond the one with which I am most familiar. I was surprised, to say the least, when I opened to the table of contents and discovered that my initial impression of the book and its coverage was considerably different than what was actually presented. Shepherd's conception of ancient mining, indeed even his definition of ancient, differed from my own. I expected a book that would cover the globe; yet, here was a book confined to an area half a world away from my own. I realized I had to redirect my own expectations. Fortunately, we share some common ground. With the exception of metallurgy (an industry that is absent from the Pacific, a geologically young region with a dearth of ore bearing mineral deposits), methods and techniques of mining mechanics and building stone quarries pose similar problems and solutions in both our worlds.

There remain large gaps in the literature on ancient mining and quarrying, and I suspect that the hope and expectation was that Shepherd's *Ancient Mining* might fill part of that gap. Shepherd, however, seems to have taken on a task that appears to have been much more formidable than he had anticipated. Yet, the book is not a complete disappointment. It contains many useful and interesting details that can surely be pursued with a

cautious, thoughtful and thoroughly disinterested nature. Some of these bits and pieces of information include commentaries on local labor markets (e.g., p. 60, a discussion of renting slaves to concessionaires as part of the cadre of miners), the residual marks of mining and historical observations of the methods which produced those marks (p. 104, a description of possible rope marks left on a mine shaft wall during the removal of ore from a mine in Italy), or even the observation that 60 million tons of charcoal were needed to produce 200,000 tons of copper on Cyprus (pp. 114-115).

In the end, one is left with the impression that the book ends where it begins, that more work still remains to be done on mining and quarrying sites in western Europe (p. vii). I would suggest that this statement be extended to the other regions of the world as well. Shepherd's efforts should be viewed as a first step in constructing a comprehensive exposition of mining in the ancient world, broadly defined. He would likely agree that his is not the final or definitive tome on a subject that is only just receiving the attention it deserves through the increased interest in provenance research, metallurgical studies, and inquiries into ancient technological industries.

The Origins of Native Americans: Evidence from Anthropological Genetics. Michael H. Crawford. Cambridge University Press, 1998. xv + 308 pp., includes author and subject indices. \$64.95 (cloth). ISBN 0-521-59280-1.

Reviewed by David L. Browman, Department of Anthropology, Washington University, St. Louis, MO 63130-4899.

This book is a revised English translation of Crawford's 1992 Spanish language volume published for the 500th anniversary of Columbus' journeys. The revised edition is still subsidized by the MAPFRE American Foundation of Madrid, Spain, but has some significant differences from the Spanish version. In this volume, Crawford eschews much of the osteological work, feeling that most publications are "strongly slanted towards osteology" (p. xiv) and instead elects to focus primarily upon the evidence from genetics. In addition, he has "personalized" (p. xiii) this new volume by emphasizing much of his own work. Thus much of the discussion focuses upon the Black Caribs and Tlaxcaltecs of Mesoamerica, and a selected group of Eskimo and Siberian groups in the Arctic. In spite of its more encompassing title, then, the book centers primarily on North America; Crawford recognizes this and frequently refers his readers to the volume by Francisco Salzano and Sidia M. Callegari-Jacques (1988) for coverage of South America.

In Chapter 1, Crawford reviews ideas from linguistics, archaeology, and biological anthropology for the origin and antiquity of humans in the New World. This chapter is basically unchanged from the earlier version, and thus somewhat out-of-date. In linguistics, for example, none of the new work of Johanna Nichols is mentioned. The archaeology relies on materials of 15 years ago, and does not include corrections and changes made in Siberian dating. Because osteology is downplayed, there is no discussion of the implications of recent

finds such as Hourglass Cave, Buhl, Kennewick, Windover, etc. The antiquity of the first migration is placed at 35-40,000 years ago, based on mutation rate estimates for mtDNA haplotypes. This age estimate assumes no heteroplasmy, although some recent studies hypothesize rates might be as high as 10-20%; and also assumes that all differentiation represents genetic mutations which occurred only subsequent to the crossing of the Bering land bridge into the Americas.

Chapter 2 focuses on population size estimates of the New World in A.D. 1500. Crawford places the number at 44 million, proposing that 3/4 of the entire population was clustered in Mesoamerica and the Caribbean. He presents a surprisingly high estimate of 7 million for the Caribbean Islands, and a rather low estimate of only 3.5 million for the entire Inca empire (which was six times larger than the Aztec empire in spatial area in A.D. 1500). In the later part of the chapter, the evidence for New World infectious diseases is summarized. The third chapter continues the demography theme, discussing parameters of fertility, mortality, immigration, and emigration.

The subsequent trilogy of Chapters 4-6 is the real essence of the volume. It is here, in quasi "Annual Review" style, that Crawford lays out the information from human genetics that he wants to highlight in this volume. He recognizes genetic variations as the result of three factors: (a) the number and sizes of the first migratory populations; (b) the influence of various mechanisms of gene flow; and (c) the more recent impacts upon the Amerindians through epidemics, warfare and slavery. He examines the implications of (a) in Chapter 4, of (b) in Chapters 5 and 6, and of (c) in Chapter 7.

In Chapter 4 Crawford deals with blood group, serum-protein, red cell protein, histocompatibility and DNA polymorphisms, and discusses their implications with respect to the possible founding populations. Many researchers have attempted to employ genetic markers to identify the number and size of early migratory groups, essentially by assuming one can ignore or eliminate the contributions of (b) and (c) above. Crawford believes this may be possible because it appears that systems which display variable numbers of tandem repeats reveal more current or recent evolutionary history, whereas the variation in gene products are more conservative evolutionarily, and thus display the results of natural selection in more ancient time. On this basis, he argues that evidence from the suite of genetic markers he reviews indicate that the "founding populations must have been small, probably made up of extended lineages, and were not randomly constituted subsets of the ancestral groups", that is, the genetic patterning follows the fusion-fission model, although he does caution that "in these groups gene pools were highly subject to stochastic processes and past effects of selection might not be discernible to us." (p. 147)

Chapter 5 is devoted to the evaluation of population structure, admixture and gene flow over time. Employing particularly his data from the Black Caribs of Honduras, the Tlaxcaltecs of Mexico, the St. Lawrence Island Eskimos, and selected Siberian groups, he argues for significant correlations between genetics and geography, genetics and latitude, and genetics and language.

Chapter 6 reviews what he considers the significant components of morphological variation. He maintains that genetic studies are superior to morphological studies because: (i) there are major inter-observer variation errors in measurement in morphology, and (ii) ontogenetic changes have significant impacts on specific measurements. While Crawford does note that the “comparison of two independent research groups’ genetic characterizations of the same population one year apart reveals that even under optimal conditions some differences in gene frequencies and detection of a few specific alleles will be seen” (p. 92), he argues that in contrast to the morphological inter-observer errors, these inter-observer differences in genetic variations have little impact upon measurement of population parameters. This chapter gives a summary of anthropometric, dermatoglyphic, dentition, and skin color studies. Here he also concludes that the traits are ecosensitive; that is, he sees significant correlation between anthropometrics and geography, and dermatoglyphics and geography, which he finds not surprising, as much of the variation in polygenetic traits expressed in morphological measures is believed to be a consequence of gene-environment interaction.

In Chapter 7 he turns to assessing the impact of isolation (reservations), hybridization and disease on the surviving First Nations populations. Discussion of implication of issues such as the thrifty gene hypothesis and its relationship to late-onset non-insulin-dependent diabetes mellitus, the effect of conquest and epidemics, the impact of socioeconomic factors, and other medical and evolutionary costs of survivorship are reviewed. The resulting evidence clearly shows that the Amerindian population has passed through a tight selective “bottleneck”; this coupled with the massive gene flow and hybridization resulting from European conquest “has forever altered the genetics of the surviving groups, thus complicating any attempts at reconstructing the pre-Columbian genetic structure” (p.261); any genetic reconstruction of the earliest migrants will necessarily be susceptible to challenge because of these two issues.

As the subtitle suggests, this is a solid review of the evidence from anthropological genetics, especially for the First Nations populations of North America. Morphological studies are explicitly less considered. Despite the main title, Crawford is less concerned with the current debates on origins, but more interested in providing us with a comprehensive synopsis of the advances made in studying variations of human genetics of First Nations, and in this he has succeeded admirably.

References

- Crawford, Michael F. 1992 *Antropologia Biologica de los Indios Americanos*. Madrid: Editorial MAPFRE.
- Salzano, Francisco, and Sidia M. Callegari-Jacques. 1988. *South American Indians: A Case Study in Evolution*. Oxford: Clarendon Press.

Radiocarbon Dating News

The Contents and Abstracts of the Proceedings of the 16th International Radiocarbon Conference (Groningen, June 1997) are available online at <http://www.radiocarbon.org/>. The recently printed volumes were issued as *Radiocarbon* volume 40, numbers 1 and 2. The forthcoming volume 40, number 3, will be INTCAL98 (the ‘New Calibration Issue’) edited by Minze Stuiver. Individual subscriptions for all three issues of *Radiocarbon* volume 40 are a modest \$55.00 (institutions \$115).

The Radiocarbon Laboratory of the University of Texas, Austin will close as of August 31, 1998. For further information, you may contact the director, Ernest Lundelius, Jr. by email: erniel@mail.utexas.edu.

Meetings Calendar

Susan Mulholland, Associate Editor

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

1998

- Aug. 27-28. Second International Meeting on Phytolith Research. Aix en Provence, France. 2nd IMPR, J.D. Meunier, CEREGE, Europole Mediterranee 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>.
- Sept. 5-7. 15th Biennial Meeting of the American Quaternary Association. Puerto Vallarta, Mexico. Socorro Lozano Garcia, Instituto de Geologia, Universidad Nacional Autonoma de Mexico, Ciudad Universitaria, Apartado Postal 70-296, 04510, Mexico City, Mexico; fax: 52-5- 550-6644.
- Oct. 4-10. V Congreso de la Asociacion Latino-americana de Antropologia Biologica y VI Simposio de Antropologia Fisica “Luis Montane.” Universidad de La Habana, Cuba. Antonio J. Martinez Fuentes, Secretario Asociacion Latino-americana de Antropologia Biologica, Museo Antropologico Montane, Facultad de Biologia, Universidad de La Habana Calle 25 #455, entre J e I, Vedado Ciudad Habana 10400, Cuba; tel: 53-7-32-9000/79-3488; fax: 53-7-32-1321/33- 5774; email: montane@comuh.uh.cu.
- * Oct. 9-10. 5th Gender and Archaeology Conference: From the Ground Up-Beyond Gender Theory in Archaeology. Milwaukee, Wisconsin, USA. Bettina Arnold, Dept. of Anthropology, Univ. of Wisconsin-Milwaukee, PO Box 413 Bolton Hall, Milwaukee, WI 53201, USA; email: barnold@csd.uwm.edu; web: <http://www.uwm.edu/~barnold/>
- * Oct. 11-13. Dust Aerosols, Loess and Global Change. Seattle, Washington, USA. Alan Busacca, Crop and Soil Sciences, Washington State University, Pullman, WA 99164-6420, USA; tel: 509-335-1589; fax: 509-335-8674; email: busacca@wau.edu; web: <http://www.eus.wsu.edu/c&i/programs/dust.htm>

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- Oct. 14-17. 56th Annual Meeting of the Plains Anthropological Conference. Radisson Inn, Bismarck, North Dakota, USA. Fern Swenson, State Historical Society of North Dakota, 612 E. Blvd. Ave., Bismarck, ND 58505, USA; tel: 701-328-3675; email: ccmil.fswenson@ranch.state.nd.us.
- 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>
- Oct. 31. 4th Annual Conference, Graduate Students Association, Archaeology Dept., Boston University. Boston University, Boston, Massachusetts, USA. Topic: Animal, Vegetable, Mineral: Using Specialist Studies in Archaeology. GSA Conference 1998, Dept. of Archaeology, Boston University, 675 Commonwealth Ave., Boston, MA 02215, USA; tel: 617-353-3415; fax: 617-353-6800; email: dunwoody@bu.edu.
- Nov. Inter-Congress Meeting of Commission 4, Union Internationale des Sciences Prehistoriques et Protohistoriques. Arizona, USA. Keith Kintigh, Dept. Anthropology, Arizona State University, Tempe, AZ 85287-2402, USA; tel: 602-965-6900; fax: 602-965-7671.
- Nov. 2-8. IV Jornadas de Arqueologia de la Patagonia. Rio Gallegos, Argentina. IV Jornadas de Arqueologia de la Patagonia, INALP, 3 de Febrero 1370 (1426), Buenos Aires, Argentina; tel: 54-1-783-6554; fax: 54-2-783-3371; email: rafa@bibapl.edu.ar.
- 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.
- * Nov. 12-15. 31st Annual Chacmool Conference: On Being First-Cultural Innovation and Environmental Consequences of First Peoplings. Calgary, Alberta, Canada. 1998 Conference Committee, Dept. of Archaeology, University of Calgary, Calgary Alberta, T1N 2N4, Canada; fax: 2820-9567; email: nichols@acs.ucalgary.ca
- * Nov. 14-16. Biennial Festival International du Film Archeologique. Brussels, Belgium. Dider Dehon, President, Brussels Asbl Kineon, Chaussee de la Hulpe 579, B-1170 Brussels, Belgium; tel/fax: 322-675-9029; email: frederic.andre@skynet.be; web: <http://www.arkham.be/pragma/kineon/index.htm>.
- * Nov. 19-22. Inter-Congress Meeting of UISPP Commission for Data Management and Mathematical Methods in Archaeology. Scottsdale, Arizona, USA. George Cowgill; email: cowgill@asu.edu; web: <http://archaeology.la.asu.edu/usipp>
- * Jan. 5-10. 1999 Society for Historical Archaeology conference on Historical and Underwater Archaeology. Salt Lake City, Utah, USA. Theme: Crossroads of the West-19th Century Transportation, Mining, and Commercial Development in the Intermountain West. Don Southworth, Program Coordinator, Sagebrush Consultants, L.L.C., 3670 Quincy Ave., Suite 203, Ogden, UT 84403, USA; tel: 801-394-0013; fax: 801-394-0032; email: sageb@aol.com
- Jan. 10-14. World Archaeology Congress 4. Cape Town, South Africa. Theme: Global Archaeology at the Turn of the Millennium. Carolyn Ackermann, WAC4, Congress Secretariat, PO Box 44503, Claremont 7735, South Africa; tel: 27-21-762-8600; fax: 27-21-762-8606; email: was4@globalconf.co.za; web: <http://www.uct.ac.za/depts/age/wac> + Symposium on Genetics in Archaeology.
- + Symposium: Origins, Spread and Significance of Maize Agriculture in the New World
- * Mar. 12-13. National Council for Preservation Education 2nd National Forum. Towson, Maryland, USA. Theme: Multiple Views, Multiple Meanings. Michael Tomlan, Project Director, National Council for Preservation Education, 210 W.Sibley Hall, Cornell University, Ithaca, NY 14853, USA; tel: 607-255-7261; fax: 607-255-1971; email: mat4@cornell.edu.
- May. 1999 International Rock Art Conference. Ripon College, Ripon, Wisconsin, USA. Deborah Morse-Kahn, Regional Research Consortium, Minneapolis MN, USA; tel: 612-925-0749; email: deborah@pclink.com; web: <http://www.pclink.com/cbailey>
- Aug. 3-11. XV INQUA Congress 1999. Durban, South Africa. Theme: Environmental Background to Hominid Evolution in Africa. Mrs. E. Aucamp, PO Box 798, Silverton, Pretoria 0001, South Africa; fax: 27-12-8411221; email: eaucamp@geoscience.org.za; web: inqua.geoscience.org.za
- Aug. 23-29. 8th International Congress of the International Council for Archaeozoology. University of Victoria, Victoria, British Columbia, Canada. ICAZ '98, Conference Management, Division of Continuing Studies, University of Victoria, PO Box 3030, Victoria, BC V8W 3N6, Canada; email: ICAZ@uvcs.uvic.ca; web: <http://www.uvcs.uvic.ca/conference/archzool/>.
- * Sept. 6-10. 9th International Conference on Luminescence and Electron Spin Resonance. Rome, Italy. PR & Co., V. le Manlio Gelsomini, 26, 00153 Roma, Italy; tel: 39-6-574260; fax: 39-6-5748203; email: b.fersini@flashnet.it
- * Sept. 6-10. 8th International Conference on Accelerator Mass Spectrometry. Vienna, Austria. Institut für Radiumforschung und Kernphysik der Universität Wien, VERA-Laboratorium, Wahringer Str. 17, A-1090 Wien, Austria. Walter Kutshcera (chairperson); email: walterku@pap.univie.ac.at; tel: 43-1-40480-700; fax: 43-1-4076-200.
- * Nov. 18-20. 5th European Meeting on Ancient Ceramics. Athens, Greece. Laboratory of Archaeometry, NCSR "Demokritos", Aghia Paraskevi, 15310 Attiki (Greece). tel: 30-1-6503392; fax: 30-1-6519430. email: emac99@ims.ariadne-t.gr. web: <http://161.116.85.31/emac/athens.htm>
- * Jan. 5-6. Recent Advances in Quaternary Biostratigraphy. Cambridge, UK. Danielle Schreve, c/o Dept. of Palaeontology, Natural History Museum, London SW7 5BD, UK; tel: 0044-0171-938-9258; fax: 0044-0171-938-9277; email: D.Schreve@nhm.ac.uk.

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Department of Anthropology
University of South Florida
4202 E Fowler Ave SOC 107
Tampa FL 33620-8100

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