

# SAS Bulletin

## Society for Archaeological Sciences

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### SAS News

#### New Bulletin Associate Editors

We would like to welcome three new members to our staff of associate editors. Julie Stein has finished her tenure as associate editor for ge archaeology. Our thanks to Julie for her service and contributions for the past few years. She will be replaced by Robin Burgess. We have also added a new slot in the field of bioarchaeology. This position will be shared by Delwen Samuel and Mark Nesbitt of Cambridge University.

#### Robin L. Burgess, Associate Editor for Ge archaeology

Robin received her Ph.D. from the University of Chicago two years ago under Karl Butzer. Her dissertation research was a comparison of site formation processes and evidence for past environments between "dry" southern African and "wet" Tennessee caves and rock shelters. Part of the dissertation findings were presented with Walter Klippel at the New Orleans SAA meeting in May, and are being revised for submission to *Quaternary Research*. Robin was a Lecturer at Southern Illinois University at Edwardsville for four quarters after receiving her degree. She worked with the Goltepe project, directed by Aslihan Vener of the Smithsonian, in the Taurus mountains, Turkey, on Early Bronze Age tin mining and processing sites, interpreting the mine stratigraphy, and collecting paleobotanical and ge archaeological evidence for possible environmental impacts of smelting, for instance on deforestation. She is beginning a new position as senior research assistant with the Military Airlift Command, dealing with cultural resource and environmental monitoring of MAC's 15 bases.

#### Mark Nesbitt, Associate Editor for Bioarchaeology

Mark was born in 1961. He has a B.Sc. degree in Agricultural Botany from the University of Reading (1983), and an M.Sc. in Bioarchaeology from the Institute of Archaeology, London University (1984). He has been a Research Fellow with the British Institute of Archaeology at Ankara since 1985. His research interests focus on the archaeobotany of Near Eastern excavations, with fieldwork in Turkey, Iraq and Bahrain on sites ranging from the Epipalaeolithic to late Medieval. Other projects include ethnoarchaeological studies of wild plant use and archaic cultivation practices in Turkey.

#### Delwen Samuel, Assoc. Editor for Bioarchaeology

Delwen was born in 1962. She has a B.Sc. in General Biology and Classics from Bishop's University, Quebec (1984), and an M.Sc. in Bioarchaeology from the Institute of Archaeology, London University (1986). She has been a project archaeobotanist since 1985 at: Amarna, Egypt; the Khabur village project, Syria; and the IFEAD Medieval excavations, Syria. Delwen is currently a Ph.D. student in the Department of Archaeology, University of Cambridge. Her thesis topic is ancient Egyptian bread baking and beer brewing. This work emphasizes a multi-disciplinary approach, including archaeobotany, scanning electron microscopy, chemical analyses of residues and experimental archaeology.

In addition to scholarly publications, both Mark and Delwen have contributed book reviews to *Economic Botany*, *Journal of Ethnobiology*, and *Circaea*, and conference reviews and other short notes to the *Association for Environmental Archaeology* newsletter and the *SAS Bulletin*.

#### SAS Annual Business Meeting

The annual business meeting of the Society for Archaeological Sciences will be held this year at the *Archaeometry 92 Symposium* in Los Angeles. An announcement for this symposium is contained herein.

#### SAS "Bulletin Board"

The exact nature of the SAS Bulletin Board, which I started last year with more fanfare than planning, is now being reconsidered with the thoughtful and knowledgeable advice of Dr. Foss Leach (New Zealand), chairperson of the SAS Standing Committee on International Computer Networks and Information Sharing, and with the support of our president, Jim Burton. Foss and I have been discussing whether this service should be along the lines of a re-distribution mailbox, as I first suggested, or should instead/also include list server and true bulletin board (post, store and retrieve) capabilities, and where and who could best manage this service. We hope to have a progress report for the next issue.

## Conference Report Society for American Archaeology

The 56th Annual Meeting of the Society for American Archaeology was held in New Orleans from April 24-28, 1991. There were a number of organized symposia with archaeometric themes. We include summaries from the organizers (author underlined for symposia with two organizers) of most of these symposia.

### **Nutritional Modeling in Archaeological Context**

*Organizer: Joe Ezzo, University of Wisconsin*

The major objective of this symposium was to bring together scholars interested in the issues of diet and nutrition through a variety of analytical approaches. The five papers presented in the symposium dealt with faunal, botanical, isotopic, elemental, and coprolite analysis. The paper by David Rapson and Lawrence C. Todd, *Body Parts, Processing Options, and Energy Sources: Contextual Interpretations of Archaeological Faunal Assemblages*, emphasized the importance of parts frequencies, species composition, and butchery patterns to address the nutritional implications of prehistoric hunting on the Plains. Kristin Sobolik's paper, *Paleonutrition of the Lower Pecos Region of the Chihuahuan Desert*, considered diet and nutrition of Archaic population through faunal, botanical, patho-logical, and coprolite evidence. My own paper, *The Dietary and Nutritional Dimension of Stress at Grasshopper Pueblo, Arizona*, dealt with dietary changes through time which resulted in increased emphasis of cultigens (particularly maize) and a concomitant deterioration of health; I drew on elemental, isotopic, faunal, and pathological data. Dale Hutchinson and Lynette Norr, in *Corn and Dietary Importance: A View from Gulf Coast Florida*, discussed the importance of marine resources of coastal native populations in Contact-period Florida which contrasted with the maize-based diets of inland groups. Dawn Harn and Clark Spencer Larsen, in their paper entitled *Implications of Infectious Diseases in Precontact and Contact-Era Populations from Northern Spanish Florida*, employed paleopathological evidence to discuss the rapid increase in the spread of infectious disease and its relationship to dietary changes among native Americans after Spanish contact.

It was clear from the papers that paleonutrition is an exciting and growing field in archaeology, and that analysis along multiple lines of evidence is essential to addressing the issues of health, diet and nutritional status in archaeological studies. All but one of the papers dealt with human skeletal remains, and it would appear that detailed pathological studies are a critical aspect of research in paleonutrition.

### **Analysis of Large Archaeomagnetic Data Sets**

*Organizers: Rob Sternberg, Franklin and Marshall College, and William L. Deaver, University of Arizona*

*Sponsored by the Society for Archaeological Sciences*

Four of the six papers presented dealt with southwestern U.S. archaeomagnetic data sets. In the nearly three decades since Robert S. DuBois introduced archaeomagnetism as a dating method to Southwestern archaeologists, the Southwest has become a "hot bed" of archaeomagnetic research. In the past ten years literally thousands of samples have been collected and measured. Much of the earlier work in archaeomagnetic dating involved the reporting of dates for individual archaeological contexts, but now with access to larger archaeomagnetic data sets the character of archaeomagnetic research is changing, as the papers in this symposium show. Two papers discuss analyses of archaeomagnetic data sets in England and Mesoamerica; the analysis and problems of archaeomagnetic data in these regions are much the same manner as in the Southwest. The discussants, M.E. Evans and R.E. Taylor, raised several interesting points concerning the paleomagnetic and chronometric aspects of the data.

Four major themes emerged during the symposium. The first theme is a traditional mainstay of archaeomagnetic analysis: reconstructing the patterns of change in the Earth's geomagnetic field in the past. The archaeomagnetic data gathered from measuring the remanent magnetization acquired by some archaeological materials sometime in the past provide not only a means for determining when in the past these materials were magnetized, but also provide evidence of the behavior of the Earth's geomagnetic field. The archaeological application of the technique as a dating method and the geophysical analysis of the Earth's geomagnetic field are inseparable. Archaeomagnetic dating is predicated on first establishing the pattern of ancient secular variation of the geomagnetic field. Archaeomagnetic studies continually focus on extending secular variation reconstructions farther into the past and improving the resolution of the reconstructions that already exist. This theme is inherent in all papers, but the papers by Daniael Wolfman, Kenneth Hirth and George Hasemann (*Archaeomagnetic Dating in the Cajon Dam Project Area, Central Honduras*), and by William Deaver (*A Chronology of the Hohokam Pioneer Period and a Model of Archaeomagnetic Secular Variation During the First Millennium A.D. for the US Southwest*) focus specifically on this aspect of archaeomagnetic research.

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The second theme that emerged in the symposium is the trend in the profession to analyze the factors that affect and influence the precision and accuracy of archaeomagnetic dates. This is especially apparent in the papers by Jeffrey Eighmy, Donald Blakeslee, and Douglas Mitchell (Chronometry of Archaeomagnetic and Radiocarbon Dates from Pueblo Grande) and Rob Sternberg, Richard Lange, and Barbara Murphy (A Large Archaeomagnetic Data Set from Las Colinas: Factors Affecting Precision and Accuracy). In the not-so-distant past archaeomagnetic dating was sort of a "black box" where samples were taken from a site into the lab and sometime later a date emerged. Archaeomagnetic research in the U.S. Southwest has become more self-critical in the past decade, largely because we now have very large data sets with which to work. While the papers in this symposium focused on the factors that affected archaeomagnetic dating, researchers are also investigating other aspects of the technique such as the factors that affect the accuracy and precision of an archaeomagnetic direction and whether or not we are using the best methods of reducing the raw data to create master records of ancient secular variation and deriving archaeomagnetic dates.

The third theme is a spin-off of the second theme. As researchers evaluate the technique, new methods emerge to apply archaeomagnetic data in archaeological research. Most of these applications involve dating and the papers presented by Wolfman and Deaver provide some non-traditional twists toward archaeomagnetic dating. The paper presented by Donald Tarling (The British Directional Archaeomagnetic Data Base) went further and discussed some applications of archaeomagnetism to answer questions about ancient archaeological technologies.

The final theme is in fact the main theme of the symposium: the importance of having access to a large amount of archaeomagnetic data. There are three aspects to this theme. First, the papers presented by Eighmy, Sternberg, and Wolfman are good examples of the detail that can be obtained from large amounts of archaeomagnetic data from excavations at individual sites or from several sites within the context of a single archaeological expedition. These details concern the technique itself as well as the chronological history of the archaeological sites.

The second aspect of this theme, evident in the papers by Tarling and Deaver, is the accumulation of a large archaeomagnetic data set over an extended period of time. The British archaeomagnetic data base accumulated over 30 years and the archaeomagnetic data used to reconstruct

the pattern of secular variation during the Hohokam Pioneer period accumulated over the past 10 years. In the case of the Hohokam Pioneer data, many of the samples were taken from contexts that were known to be older than the beginning of the then extant master dating records and, quite simply, these samples could not be used to archaeomagnetically date these contexts. Yet the fact that the archaeologists had the foresight to collect these samples anyway provided a data set that can now be used to extend the Southwestern master dating record back to A.D. 1.

The third aspect of this theme is exemplified by the paper by David Doyel and Eighmy (Refining the Archaeomagnetic Chronology for the Bonito Phase in the Chaco Canyon Region, New Mexico), and is possibly the most critical aspect of this final theme. All of the papers presented show how the archaeomagnetic technique has changed, is changing, and will change. These changes lead to the unavoidable result that some of the interpretations of archaeomagnetic data made several years ago are now obsolete and these data need to be reevaluated and reinterpreted in light of the newer methods. This is precisely the point of Doyel and Eighmy's paper. Unfortunately the archaeomagnetic data which they need to reevaluate the chronology of the Bonito phase in the Chaco Canyon region are not available and they must reconstruct these basic data as best as possible. Probably one of the biggest differences between archaeomagnetism in the U.S. Southwest today and 20 years ago is the emphasis on publishing not just the archaeomagnetic dates, but also the archaeomagnetic data from which archaeomagnetic dates are derived, so that in the future the data can be reevaluated in light of even newer information.

### **An Archaeological Perspective on Geophysical Prospection, Or When Not to Dig**

*Organizers: John Weymouth, University of Nebraska, and Rinita Dalan, University of Minnesota*

This symposium had the express aim of having all the papers presented by archaeologists who had used or had benefited from the use of geophysical methods on archaeological sites, rather than the presenters being archaeometrists. The hope was that rather than having physical scientists talking to each other, archaeologists would come to hear archaeologists. It would seem that this hope was fulfilled - there was standing room only after the first two or three papers, and that on a Saturday morning.

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The first paper, by Berle Clay, (*Earth Conductivity in Remote Sensing: Technology and Results*), concentrated on the theory and use of EM conductivity meters on prehistoric and historic sites in Kentucky with examples which included an earthwork enclosure, a battlefield, an historic house foundation and an historic sheet midden. He was able to show, for instance, that in the study of the earthwork, dirt from the construction of the ditch had been thrown to the interior of the enclosure, which suggested the presence of a stockade.

Next Rinita Dalan (*Expanding the Use of Geophysics in Archaeology: Macro and Micro Approaches*) stressed both a macro and a micro approach to using geophysics in analyzing an archaeological problem in her discussion of a study of the so-called Grand Plaza at Cahokia Mounds. She used a conductivity meter to map out the soil differences. She then analyzed the soils with both low-field magnetic susceptibility and anhysteretic remanent magnetization to distinguish between in situ soil development profiles and cultural fill in order to throw light on the evolution and construction of the Plaza.

In the third paper by David Orr (*The Discovery of the Widow Tapp's House: Geophysical Survey of Ephemeral Historic Sites*), read by Brook Blades, the problem was described of locating an ephemeral site, Widow Tapp's cabin at the site of the Battle of the Wilderness, in the Fredericksburg and Spotsylvania National Military Park. After careful examination of conductivity, magnetic and radar data obtained by Bruce Bevan, the area was extended and new data were obtained. This new area proved to be the only place where appropriate 19th century material was found.

Clark Dobbs (*The Application of Remote Sensing Techniques for Settlement Pattern Analysis at the Red Wing Locality*) described a combination of soil resistivity measurements, photogrammetric mapping and controlled surface collecting to study the settlement pattern of two prehistoric mound and village sites in Minnesota. One of the interesting problems they solved was to relate an 1885 map of a group of mounds and some 1967 aerial photos to the present, partially destroyed, site. By careful examination of all the data they were able to determine a consistent error in the 1885 map and thus recreate the position of all the mounds of that early map.

Anna Roosevelt (*Investigation of Community Organization by Geophysical Survey*) described the use of several tools including soil resistivity, EM conductivity,

magnetics and radar, all conducted by Bruce Bevan, to map out, excavate and study a large prehistoric site at the mouth of the Amazon. Her work in establishing the existence of a well advanced society in Amazonia has been ground breaking (pun unintended). She, as had the other speakers, strongly endorsed and urged the use of geophysical methods on archaeological site assessment problems.

In a joint paper entitled *Geophysical Survey Methods Employed at the Shawnee Creek Site, Shannon County, Missouri*, Mark Lynott and James Price detailed the results of the excavation of several locations at an emergent Mississippian site in the Ozarks that had been identified by magnetic anomalies. The magnetic data had been previously obtained by the Midwest Archeological Center and analyzed by John Weymouth. All but one of the features was either a sizeable pit or a fire hearth. The exception was close to the edge of the site and the source of the anomaly had not been determined.

A very interesting symposium was topped off with a lively presentation by David Thomas who promoted his belief that we should take a cubist view of archaeology rather than a Renaissance view, that is that there is more than one way of viewing the truth of a site. This discussion was complete with slides of Rembrandts and Picassos. He urged on the audience his view that geophysical data can provide an information bank or a geophysical conservancy, leaving parts of sites or whole sites unexcavated for the future.

The formal presentations, interspersed with some floor discussion, was followed by discussants remarks by Chris Peebles, John Weymouth and Robert Dunnell. There then followed much more lively floor discussion. Many of the remarks were directed toward the value of applying geophysics, which has now become subsumed under the term remote sensing, to archaeological problems before excavation and the reluctance of most archaeologists to appreciate this. I agree with Chris Peebles, who said we must include geophysical methods as a routine part of archaeological research. I do not know if this makes me a Cubist; I do know that these intangible signals are as important as tangible artifacts. In our profession, we devalue these signals for the same reasons we devalue databases constructed for archaeological collections: they do not fit on museum shelves; they seem less enduring than artifacts; they seem less real than sherds and flints. Consequently fewer professional rewards and fewer funds flow to those who create them.

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### Site Formation Processes — New Techniques and Cultural Implications

*Organizers: Ofer Bar-Yosef, Harvard University, and Paul Goldberg, Hebrew University*

The increased realization that a thorough understanding of site formation processes constitutes an integral part of archaeological research was reflected in the recent Society for American Archaeology meeting. There, two related half-day symposia were arranged: one was devoted to site formation processes in caves and rockshelters (organized by David T. Nash and Michael D. Petraglia), whereas the second reviewed herein focussed on new techniques and their cultural implications. Eleven papers were contributed that included a variety of techniques, with applications mostly to Old World sites and contexts. A particular emphasis (three papers) was given to the technique of micromorphology, the study of archaeological sediments and soils using petrographic thin sections. Other methodologies included archaeo-zoology, regional and individual geomorphological study of site contexts, the study of artifact movement, and macro and microdebitage. These are briefly outlined below.

Three papers demonstrated the application of micromorphology to archaeological problems. The first, by M.-A. Courty (*The Concept of Cultural Layers and Living Floors Through the Microscope*) documented the micromorphological character of living floors from a number of tell, cave and open-air sites in Europe and the Near East. The implications for reconstructing variability in past use of a site were clearly demonstrated. J. Factor (*Cayönü Tepesi, Turkey: Micromorphology at a Neolithic Tell*) illustrated the micromorphological variety of deposits and post-depositional processes operating at the Neolithic tell site of Cayönü Tepesi, Turkey, and showed how results obtained from micromorphological observation of the deposits differed from those acquired in the field. I. Whitbread and P. Goldberg (*Micromorphological Aspects of Bedouin Tent Deposits and Their Implications in Archaeology*) used quantitative results obtained from computer enhanced microscopic images obtained from thin sections of samples from the substrate of a recently abandoned Bedouin tent in the Negev Desert, Israel. They were able to show lateral differences in void characteristics of the deposits that were linked to known activity within the tent area.

In the area of archaeo-zoology, J. Speth and E. Tchernov (*Taphonomic and Behavioral Implications of the Kebara Cave Fauna: A Preliminary Investigation*) presented

preliminary findings related to the taphonomic and behavioral significance of bone accumulations at Kebara Cave, Israel. Their results support those of S. Weiner (*Bone Preservation in Kebara Cave, Israel: An Onsite Fourier Transform Infrared Study*; submitted but not presented), who used on-site Fourier transform infrared spectroscopy to evaluate the distribution of bone in the cave. Both studies show that for much of the cave area that has been recently excavated, bone distribution is a function of human activity and not diagenesis.

The study of distributions of material artifacts was the subject of two papers. J. Phillips and B. C. Gladfelter (*The Role of Refitting in Understanding Site Formation Processes at Three Upper Paleolithic Sites in Southern Sinai*) demonstrated the use for refitting of flints from Upper Palaeolithic sites in south-central Sinai. The recovery and refitting of over 1300 artifacts is in large part due to the low energy fluvial deposition of silts which covered the lithic material. A similar theme was presented by M. Petraglia and R. Potts (*Water Flow and the Formation of Early Paleolithic Sites in Olduvai Gorge Tanzania*). By examining several attributes of artifacts (e.g., artifact abrasion, artifact damage, site context) from five sites in Olduvai Gorge, they were able to illustrate that water movement was an important factor in site formation. A. Rosen (*Microartifacts as a Reflection of Cultural Factors in Site Formation*) showed how the vertical and lateral distribution of microartifacts (flint, bone) could be employed to illustrate differences in activity areas from Tels Halif and Mique in Israel.

In a paper that represented the only New World setting, J. Stein (*The Formation and Deformation of Shell Middens: Effects on Interpretations of Coastal Adaptation*) provided enlightening insights into the formation processes associated with shell middens from the Pacific Northwest. The occurrence of shell, bone and organic matter often bestow chemical characteristics to the deposits (e.g., bedding) which are in fact secondary features. Her caveat - understand the origin of the bedding before undertaking artifact analysis - is well taken. F. Audouze (*Site Formation Processes in Verberie, a Magdalenian Site in the Paris Basin*) portrayed some of the types of processes operating at the Magdalenian site of Verberie in the Paris Basin. Field observations of carefully excavated living floors provided some constraints to the micromorphological results of M.-A. Courty cited above.

Geomorphic and stratigraphic aspects of site formation were described by J. Zilhão, R. Ferring and A. Marks

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(Geology and Site Formation Processes of Upper Paleolithic Sites in the Portuguese Estremadura) from several Upper Palaeolithic sites in Portugal. Although their results were only preliminary in nature, it was clear that an appreciation of geomorphic and depositional environments is needed if we are to fully understand human behavior and its interaction with local environments.

Remarks from the discussants were particularly instructive. The acerbic comments of M.B. Schiffer emphasized that the two symposia on site-formation processes at this year's SAA demonstrated that this research strategy had finally begun to catch on. In a more constructive vein, C. Perlès stressed that whereas micromorphology can provide invaluable insights into depositional, post-depositional and anthropogenic processes acting at most sites, more work is needed to integrate morphological results with field-based observations and interpretations. Such future efforts should entail experimental and ethno-archaeological approaches, as well as development of a greater dialogue between archaeologists, micromorphologists and other researchers studying microstratigraphy.

### **Ceramic Paste Characterization: Techniques, Methodology, and Recent Applications**

*Organizer: Hector Neff, University of Missouri*

The use of paste analysis in the study of archaeological pottery is currently advancing on several fronts: more labs with necessary analytical equipment and personnel with an interest in archaeology are opening up; archaeologists are beginning to grapple with the special problems arising from the nature of ceramic raw materials and the ceramic production process; and archaeologists are applying the available techniques and methods to ceramic collections from many world areas and time periods. This symposium provided a sampling of recent paste characterization studies.

The symposium began with five applications papers, all dealing with parts of the New World and all employing neutron activation analysis. Juan Vicente Guerrero Miranda, Frederick W. Lange, and Veletta Canouts presented a paper entitled *The Greater Nicoya Ceramic Sample*, which described the accumulation over the past 20 years of neutron activation analyses of pottery from Nicaragua and Costa Rica, with an emphasis on the identification of types pertaining to northern and southern ceramic traditions. Mary Hodge and Hector Neff co-

authored *Neutron Activation in Stylistic and Spatial Analyses of Aztec Ceramics*, which identified three production zones of Late Aztec Black-on-Orange pottery in the eastern Valley of Mexico. The *Characterization of Mesoamerican 'Thin Orange' by Neutron Activation Analysis*, by Garman Harbottle and Evelyn C. Rattray, documented a likely workshop source for Teotihuacan-related Thin Orange pottery. Stephanie Whittlesey, Paul Fish, and Suzanne Fish sketched a research design for a compositional investigation of Hohokam ceramics in Hohokam Classic Period Ceramic Production and Exchange in the Northern Tucson Basin, Southern Arizona. Finally, Caven Clark presented *Neutron Activation Analysis of Late Woodland Ceramics from the Lake Superior Basin*, a pioneering compositional investigation of pottery made and used in a context of seasonal mobility.

Emlen Myers paper, *Compositional Investigations of Elite Glaze-Painted Ceramics of Sixteenth Century Italy*, provided a bridge between applications-oriented papers and methodology-oriented papers. The paper documents a curious case of "resource specialization," in which majolica pottery specimens known to have been made in different Italian towns form a single, homogeneous chemical group. The methodological papers began with *A Comparison of Pattern Recognition Techniques Using Philippines Ceramics*, by Ezra Zubrow, Jay Leavitt, and Shannon Fie. James Stoltman and James Burton presented *Chemical and Petrographic Characterization of Ceramic Pastes: Two Perspectives on a Single Data Set*, which showed that chemical (ICP spectrometric) and petrographic approaches yield different but complementary inferences regarding ceramic production in the Kayenta region. Robert Rands' paper, *Integrative Approaches in the Compositional Characterization of Ceramic Pastes*, also concerned the use of complementary analytical approaches, including formal/decorative, low-power microscopic, petrographic, and chemical. Texture-related *Variation in the Chemical Composition of Pottery: Ultrasonic Disaggregation and INAA of Tucson Basin and Ohio Valley Ceramics*, by J. Michael Elam, Michael D. Glascock, and Christopher Carr, sought to determine whether analysis of clay separates rather than bulk samples might yield clearer subgroup patterning in studies using neutron activation analysis. In a closely related paper, *The Effect of Natural and Human Size Sorting on the Mineralogy and Chemistry of Ceramic Clays*, M. James Blackman showed that clay, silt, and sand fractions are enriched in different elements, so a bulk ceramic composition thus varies not only with overall

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"texture" but with the relative proportions of several particle size ranges.

One unstated but underlying theme in Ronald L. Bishop's commentary was that certain topics relevant to pottery paste analysis were not covered in the symposium papers. An absence of papers describing analytical techniques may reflect the fact that paste characterization techniques such as optical petrography and neutron activation analysis are well-established in archaeological research. Raw material sampling and assessment of regional-scale raw material variability, though crucial in paste characterization research, are other topics not addressed in this set of papers. Finally, only passing mention was made of quantitative methods for summarizing and recognizing patterning in the extremely complex databases resulting from paste characterization studies. Additional papers have been solicited on these topics in order to round out an edited volume of papers on recent paste characterization research.

#### **Metals In Society: Theory Beyond Analysis**

*Organizer: Robert M. Ehrenreich, National Academy of Sciences*

The objectives of this symposium were to demonstrate both the manner in which metallurgical analyses could be used to address important archaeological problems, and the relevance of archaeometallurgy to the non-scientifically oriented archaeologist. Archaeometallurgy has the reputation of being preoccupied with the reconstruction of early smelting techniques and the formulation of complex technological histories. As a result, most archaeologists tend to consider the results of the scientific analysis of archaeological metalwork as superfluous to the development of mainstream archaeological models. The aims of archaeometallurgy must be shown to reflect the goals of the study of archaeological materials in general, however. The true objectives of archaeometallurgy should be to augment our understanding of the reasons for the rise of craft specialization, the organization and importance of prehistoric industries, the effects of new technologies on societies, the extent and limits of cultural contacts, and the impetus and alterations required to change rudiments of societal infrastructure.

The six papers that were presented in this symposium explored the importance of the examination of metal artifacts in the formulation of archaeological theories. The topics included the prehistoric and historic use of iron and

copper in North America, Africa, and Europe. The papers comprised: *The Form of Cross-Cultural Contact in 16th Century Iroquoia*, by James W. Bradley (Robert S. Peabody Museum of Archaeology, Phillips Academy) and S. Terry Childs (University of Florida, Gainesville); *Iron as Utility or Expression: Reforging Function in Africa*, by S. Terry Childs; *For Want of a Nail: Archaeometallurgy and Dating in Historical Archaeology*, by Michael N. Geselowitz (MIT), Thomas R. Westcott (MIT), and Dana Wang (Boston Museum of Fine Arts); *Technology and Style: The Hiberno-Norse Case*, by Mark E. Hall (University of California, Berkeley); *The South Florida Metal Complex: A Preliminary Discussion of the Effects of the Introduction of an Elite Material on a Contact Period Native American Society*, by Jonathan Leader (South Carolina Institute of Archaeology and Anthropology); and *Canadian Arctic Trade Metal: Reflections of Prehistoric to Historic Social Networks*, by Allen McCartney (University of Arkansas, Fayetteville).

The discussants for the session were Peter Wells (University of Minnesota), Vince Pigott (MASCA, University of Pennsylvania), and Tamara Stech (Bryn Mawr College). Rather than adopting the standard Society for American Archaeology format of each discussant giving a set, 20-minute presentation, the discussants in this session first briefly summarized their views and then proceeded with a panel discussion. The topics that were discussed included the relevance of the study of metalwork to mainstream archaeology, the need for more studies that enhance our understanding of prehistoric and historic societies, and the necessity of standards among metalworking studies to permit better comparative analyses. It was also stressed that archaeometallurgists must realize that the onus of proving the importance of their field is theirs alone, and that this field will not be accepted by mainstream archaeologists until more highly visible, archaeologically relevant work is published in a manner palatable to the field of archaeology as a whole.

Proceedings of the symposium will be published by the University Museum, the University of Pennsylvania as Volume 8, Part 2, of their MASCA Research Papers in Science and Archaeology Series, and will be edited by Ehrenreich. In addition to contributions by the presenters and discussants listed above, the volume will also contain a paper by Ehrenreich (*Metalworking in Iron Age Britain: Hierarchy or Anarchy*) presented at this year's SAA symposium on the Context of Craft Specialization in Prehistory. A follow-up symposium on metals in society is being considered for next year's meeting.

## News of Archaeometallurgy

### Meetings

An International Conference on Archaeometry was held 7-11 October 1991 in Veszprem, Hungary. It was organized by the Archaeological Institute of the Hungarian Academy of Sciences. For information write Laszlo Bartosiewicz, Archaeological Institute of the Hungarian Academy of Sciences, 1250 Budapest, Uriutca 49, Hungary.

A Symposium on Ancient and Historic Metals will be held 21-23 November 1991 in Santa Monica, California. For information write Brian Considine, Conservator, Getty Museum, P.O. Box 2112, Santa Monica CA 90496, telephone 213-459-7611.

One of the many events marking the Columbian Quincentenary will be an international conference on Trade and Discovery: The Scientific Study of Artefacts from Post-Medieval Europe and Beyond, to be held 12-14 November 1992 at the British Museum. It is being organized by the Departments of Scientific Research and of Medieval and Later Antiquities and will concentrate on the period c. 1450-1800, covering the trade in ceramics, metals and other materials within Europe and between Europe and the Orient and the Americas. The resulting technological changes will be considered. For information write Duncan Hook, Department of Scientific Research, British Museum, London WC1B 3DG England.

### Publications

The retiring Conservation Officer of the Historical Metallurgy Society, C.R. Blick, has edited **Early Metallurgical Sites in Great Britain BC 2000 to AD 1500**, a guide to fifteen archaeometallurgical sites that range from the bronze age copper ore-working site of Great Orme Head to the 15th c. tin-blowing mill at Taw River, Devon. It includes maps and site plans as well as information on accessibility and nearby areas of interest. It is published by The Institute of Metals as their Book Number 494 (London 1991, ISBN 0 901462 84 5, softbound.) It is available from the Sales and Marketing Department of The Institute, 1 Carleton House Terrace, London SW1Y 5DB, UK (direct telephone 071-976-1338, fax 071-839-2078) for £9.00 plus £2.50 per order for carriage within the UK, or US\$21.00 plus US\$6.00 postage per order overseas. They accept Visa, Mastercard and American Express.

The final volume in the trilogy on the history of steelmaking by the late Kenneth C. Barraclough, whose obituary appears elsewhere in this issue, was published at

the end of 1990, shortly after his death. The title is **Steelmaking 1850-1900** and it deals with the developments in bulk steel production which characterized this period and gives details of the processes which reduced the cost of steel to less than a quarter of what it had been. It also is available from The Institute of Metals (order code 458, ISBN 0 901462 71 3, hardbound for £32.00 in the UK or US\$64.00 overseas.

The Institute has reprinted Ronald F. Tylecote's **The Prehistory of Metallurgy in the British Isles** (1990, ISBN 0 901462 96 9, softbound order code 506) at £25.00, US\$50.00, and has announced that the 2nd edition of his **A History of Metallurgy** will be published in 1991 (ISBN 0 901462 88 8, 224 pp., softbound) at £35.00, US\$73.50. History of Metallurgy Society members get 20% off. Membership is £15 to the membership secretary, Diana Court, Rock House, Bowen's Hill, Coleford, Gloucestershire GL15 8RD, UK.

The volume on the **Industrial Revolution in Metals** edited by Joan Day and Ronald F. Tylecote is also scheduled for publication by The Institute in 1991 (ISBN 0 901462 82 9, 256 pp., softbound) for £37.50, or US\$78.75. It will cover developments in lead, tin, copper and copper alloys and iron and steel from the early 17th century through to the mid 19th century.

Volume 2 of **Researches in the Arabah 1959-1984, The Ancient Metallurgy of Copper: Archaeology, Experiment, Theory**, edited by Beno Rothenberg has been published by the Institute for Archaeometallurgical Studies, London (1990, ISBN 0 906183 03 0) and is available in the UK from Thames and Hudson (Distributors) Ltd., 44 Clockhouse Road, Farnborough, Hants GU14 7QZ, UK for £42.00; in the US from International Specialized Book Services, Inc., 5602 N.E. Hassalo Street, Portland OR 97213-3640. It is available to members of IAMS for £36 including postage and packing from the Executive Secretary, The Institute of Archaeo-Metallurgical Studies, Institute of Archaeology, 31-34 Gordon Square, London WC1H 0P, UK. Membership is £5. Payment in order than sterling should include £5 for bank charges. In addition to the archaeological data presented by Rothenberg, the volume contains sections on experimental reconstructions of the smelting method by John Merkel and by Menahem Bamberger and the late Peter Wincierz, characterizations of the copper ingots by Itzhak Roman and of the refractories by Michael Tite, Michael Hughes, Ian Freestone, Nigel Meeks and Mavis Bimson, and a



## News of Archaeometallurgy

discussion of the adventitious production of iron during copper smelting by Noel Gale, Hans Bachmann, Rothenberg, Zofia Stos-Gale and Ronald Tylecote.

The Dumbarton Oaks Research Library and Collection has published *Axe-Monies and Their Relatives* by Dorothy Hosler, Heather Lechtman and Olaf Holm as Number 30 in their series, *Studies in Pre-Columbian Art* (Washington DC, 1990, ISBN 0-88402-185-8, 103 pp., softbound.) Copies can be ordered from Dumbarton Oaks Publishing, P.O. Box 4866 Hampden Station, Baltimore MD 21211, telephone 301-338-6954, for \$28. Postage is included on prepaid orders. They accept Visa and Mastercard.

Two volumes on *Techniques des ors antiques: La bijouterie iberique du VIIe au IVe siecle* by Gerard Nicolini have been published by Picard, Librairie Internationale, 82, rue Bonaparte, 75006 Paris, France for 680FF including post. They accept C.B., Visa, Eurocard and Mastercard.

The proceedings of a second symposium on issues posed by ancient materials, *Materials Issues in Art and Archaeology II*, edited by Pamela B. Vandiver, James Druzik and George Segan Wheeler, has been published as Volume 185 of the Materials Research Society Symposium Proceedings Series (Pittsburgh 1991, ISBN 1-55899-074-7, 845 pp., hardcover or microfiche.) It contains 71 papers covering materials from adobe to glass and the methods used to study them. It is available from the MRS Publications Department, 9800 McKnight Road, Pittsburgh PA 15237, telephone 412-367-3012, fax 412-367-4373, or from Clarke Associates-Europe Limited, 13a Small Street, Bristol BS1 1DE, UK, telephone 0272 268864, fax 0272 226437, for \$47.00 to members of MRS, \$52.00 list, \$58.00 foreign. For books the order code is 185J, for microfiche 185F.

The proceedings of *The Statue of Liberty—Today for Tomorrow* Conference held in New York City in October of 1986 has been published as *The Statue of Liberty Restoration*, edited by Robert Baboian, E. Blaine Cliver, and E. Lawrence Bellante (Houston, Texas, 1990, ISBN 1-877914-12-6, 149 pp., hardbound.) It records the history of the Statue as well as the engineering steps taken for its preservation. It is available from the National Association of Corrosion Engineers, Consumer Service Department, P.O. Box 218340, Houston TX 77084-4906 USA for \$39.95. There is no charge for shipping on prepaid orders. They accept American Express, Mastercard, Visa, Carte Blanche, Diners Card and Discover.

The papers presented at the March 1990 conference of the Historical Metallurgy Society held at the National Maritime Museum in Greenwich, London, have been published as *Metals and the Sea*, edited by Janet Lang (London 1990, ISBN 0 9506254 3 4, 56 pp., A4 softcover.) They cover such diverse subjects as propellers, sheathing, iron nails from India thought to date to 1500-1200 BC, and the failure of Bessemer steel. Copies are available from HMS Sales, Peak district Mining Museum, Matlock Bath, Derbyshire DE4 3PS, UK for L6.50 including post and packing, L8.00 overseas.

The proceedings of the 1989 Historic Mining Conference held in Death Valley has been published as *Death Valley to Deadwood: Kennecott to Cripple Creek*, edited by Leo R. Barker and Ann E. Houston (San Francisco 1990, 219 pp.) Copies are available while supplies last from the Division of National Register Programs, Western Regional Office, 600 Harrison Street, Suite 600, San Francisco CA 94107.

The catalogue for the exhibition held last spring at the China House in New York, *Ancient Chinese Bronze Art: Casting the Precious Sacral Vessel*, by W. Thomas Chase (New York 1991, ISBN 0-295-97126-6, 110 pp., 8 color plates) focuses on the technology of bronze casting in China from ca. 1900 BC-200AD and includes a number of examples of molds and mold fragments. It can be ordered from China House Gallery, 125 East 65th Street, New York City 10021 for \$28 plus \$3 postage and handling.

David Killick, S. Terry Childs and Candace Goucher have compiled a detailed 41-page guide to researchers in African metallurgy, *Metallurgy and Metallurgists in African Societies: An International Directory of Researchers*. Copies can be obtained from the Archaeometry Laboratory, Department of Anthropology, Harvard University, Peabody Museum, 11 Divinity Avenue, Cambridge MA 02138, telephone 617-495-4388, fax 617-495-8925, for \$10 postpaid. Make cheques payable to Harvard University.

### News

The Archaeometallurgy column in the *Journal of Metals* being conducted by Vincent Pigott presented *A Little-known Extractive Process: Iron Smelting in Natural-draft Furnaces* by David Killick in April (pp. 62-64).

## News of Archaeometallurgy

David Killick has accepted a joint appointment as Assistant Professor in the Departments of Anthropology and of Materials Science at The University of Arizona. He can be reached c/o Department of Anthropology, Building 30, University of Arizona, Tucson AZ 85721, fax 602-621-2088.

Professor Michael L. Wayman of the University of Alberta in Edmonton, Canada, is spending a sabbatical year with Paul Craddock at the Department of Scientific Research of the British Museum. They have collaborated with J.C.H. King, keeper of North American collections at the Museum of Mankind in London, on British Museum Occasional Paper No. 79, *The Metallurgy of Early Metal Objects from North America in the Collections of the Museum of Mankind*, which is due to be published this year.

As mentioned in the last issue, archaeometallurgy has lost two very active contributors to the field: Ken Barraclough passed away October 15th, 1990 and Bill Rostoker December 19th, 1990.

### Kenneth Barraclough

Dr. Kenneth Charles Barraclough spent his entire working life in the steel industry of Sheffield and upon his retirement in 1981 earned a Ph.D. from Sheffield University for his work on the history of steelmaking. His thesis resulted in the two volumes of *Steelmaking Before Bessemer*, volume 1 on *Blister Steel: The Birth of an Industry* and volume 2 on *Crucible Steel: The Growth of a Technology*, published in 1984. He completed the story with *Steelmaking: 1850-1900*, published by The Institute of Metals shortly after his sudden death on October 15, 1990.

His great interest in the history of Sheffield steelmaking was sparked by the reminiscences of crucible steel workers who had been transferred to work on high frequency furnaces, then being introduced. Dr. Barraclough had joined Brown Firth Research Laboratories in Sheffield in 1936. In 1945 he set up the Processing Department of Firth Brown Ltd and in 1973 became Works Manager for Special Products. He was a Fellow of the Institute of Metals and the Royal Society of Chemistry and a founding member of the Historical Metallurgy Society, serving as its president in 1982-83.

He is survived by his wife Mary, who lives at 19 Park Avenue, Chapeltown, Sheffield S30 4WH England.

### William Rostoker

Professor William Rostoker died December 19th after a brief illness. He had just published *Pre-Industrial Iron*, which he had written with Bennet Bronson of the Field Museum in Chicago, and left a draft of a companion volume on copper and its alloys.

He was born in Canada and received both a BS and MS in Metallurgical Engineering at the University of Toronto before coming to the United States in 1946 to take a Ph.D. in metallurgy at Lehigh University. A post doctoral fellowship took him to the University of Birmingham in England. He held faculty appointments at the Illinois Institute of Technology before he became professor of metallurgy at the University of Illinois in 1965. He published more than a hundred research papers and five books and held a dozen patents. He was elected a Fellow of the ASM International for his contributions to the understanding of phase equilibria, titanium transformations, vanadium metallurgy, embrittlement processes, metallography, and biomedical prostheses. In all these activities he seemed to have boundless energy and enthusiasm.

A nearly fatal heart attack during his return from a lengthy tour of mainland China in 1981 provoked major changes in his life. He resigned his professorship, divorced, founded his own research firm, Rostoker Inc., and established the journal *Archeomaterials* under the editorship of Tamara Stech, to which he became a major contributor. An obituary by Dr. Stech and ZoAnna Carrol is published in the Winter 1991 issue (5 (1) 1-2).

If you have any archaeometallurgical news to contribute, please call or write:

*Martha Goodway, CAL MSC, Smithsonian Institution, Washington DC 20560; phone 301-238-3733; fax 301-238-3709.*

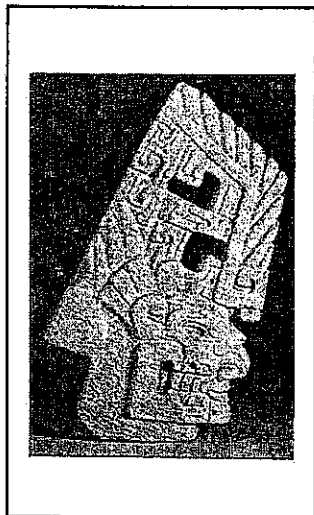
*Contributions to the Bulletin may be transmitted to the editor or to the appropriate associate editor. Electronic submissions are strongly encouraged. The editor can handle: E-mail files; Macintosh WriteNow/Word/text files; IBM-compatible ASCII files; most disk types.*

## Meeting Announcement

### Archaeometry 92 - International Symposium on Archaeometry

The 28th International Symposium on Archaeometry will take place in Los Angeles, 23-27 March 1992. The scientific sessions will be held at the new Fowler Museum Of Cultural History at the University of California, Los Angeles (UCLA).

About 350 responses to the first announcement have been received of which 240 listed intent to submit one or more papers.



Single sessions of oral presentations will be held every day from 23 March through 27 March. Special time slots will be allocated for sessions of poster presentations which will be important parts of the Symposium.

The following scientific sessions will be included: 1. Prospection; 2. Geoarchaeology; 3. Dating of organic materials; 4. Dating of inorganic materials; 5. Study of human remains; 6. Mathematical methods and data management; 7. Ancient technology and provenance of: (a) metals or (b) non-metals (ceramic, glass, stone, plaster, cement, pigments) or (c) organics.

A full day theme session, Archaeometry of Pre-Columbian Materials, with invited contributions as well as submitted papers, will be a symposium highlight commemorating the 500th anniversary of Columbus' discovery of the American continent and, emphasizing the important civilizations in the New World.

In addition to the scientific program, various social activities are planned; we expect to have receptions at the Los Angeles County Museum of Art, at the J. Paul Getty Museum and at UCLA, our host institution. The symposium dinner promises to be a special event not to be missed.

A travel service will be available to arrange for the least expensive travel to and from Los Angeles and for special sightseeing arrangements, before, during and after the symposium. Hotel reservations have been made at a number of hotels near UCLA at rates starting at approximately \$40.00 per room.

The symposium organizers hope to provide limited financial aid to qualifying applicants in the following categories: (1) Archaeometry researchers from South and Central America; (2) Archaeometry students (from USA and abroad); (3) non-U.S. researchers who can prove financial hardship and who plan to submit significant research papers.

All those interested in financial aid should request application forms from the symposium correspondence address. Details on the social program, hotels, travel, sightseeing, etc., will be mailed in January 1992 together with the symposium registration forms and the preliminary symposium program.

*We regret that this issue of the Bulletin post-dates the abstract deadline.*

*The Bulletin Editor*

#### Instructions for Abstracts

Abstracts should be submitted in English to the Symposium correspondence address by those wishing to present a paper. The length of the abstract should be between 200-300 words and must be *sufficiently informative* to allow a fair evaluation by the section convenor.

Four copies of the one-page abstract must be received by: **November 1, 1991**. The abstract should clearly list: The title, the author (s), affiliations(s), the abstract. References, if used, should be in the format of the journal *Archaeometry*. In a cover letter, please, indicate the name and address of the corresponding author.

All abstracts will be reviewed by a session convenor who will make recommendations for acceptance of the paper and whether the paper should be presented in the oral or in the poster sessions.

#### Publication

The papers in the theme session: Archaeometry of Pre-Columbian Materials will be published by the Getty Conservation Institute. The publication may also include relevant papers from different symposium sessions. However, papers not relating to Pre-Columbian materials are *not* expected to be published.

## Meetings Calendar

Susan Mulholland, Archaeometry Laboratory, University of Minnesota-Duluth, 10 University Drive, Duluth MN 55812 SMULHOLL@UMNDUL; tel:218-726-7957; fax: 218-726-6556

New listings are marked by a \* ; new information for previous listings indicated by a +. More information on some meetings is given in previous bulletins as indicated, e.g., "12(4):13" for volume 12, number 4, page 13.

### November 1991

- Nov. 1-2. Fort Defiance Conference - Contest for the Old Northwest: The United States, Canada, and the Ohio Country Indian Wars, 1790-1795. Larry L. Nelson, Fort Meigs State Memorial, Ohio Historical Society, P.O. Box 3, Perrysburg, Ohio 43551, USA.
- Nov. 3-8. Optical Society of America Annual Meeting and OPTCON '91 Technical Exhibit. San Jose, California, USA. Optical Society of America, 2010 Massachusetts Ave. NW, Washington, D.C. 20036, USA.
- \* Nov. 6-8. European Simulation Symposium (ESS 91). Ghent, Belgium. SCS International. c/o Philippe Geril, European Simulation Office, Coupure Links 653, B-9000 Ghent, Belgium (tel/fax 32-91-23-49-41).
- Nov. 7-10. American Society for Ethnohistory Annual Meeting. Tulsa, Oklahoma, USA. Dr. Garrick A. Bailey, Dept. of Anthropology, Univ. of Tulsa, Tulsa, OK 74104, USA.
- Nov. 11-15. 38th Annual Symposium, American Vacuum Society. Seattle, Washington. Richard Colton, Program Chair, Naval Research Laboratory, Code 6170, Surface Chemistry, 4555 Overlook Avenue, Washington, D.C. 20375 (tel 202-767-0801).
- Nov. 11-28. 5th International Circum-Pacific Terrane. Santiago, Chile. D.G. Howell, USGS, M.S. 902, 345 Middlefield Road, Menlo Park, California 94025, USA (tel 415-329-5430).
- \* Nov. 12-14. KEMIA '91 - Finnish Chemical Congress. Helsinki, Finland. Association of Finnish Chemical Societies, Programme Secretary, Eeva Kota-aho, Hietaniemenkatu 2, SF-00100, Helsinki, Finland (tel 358-0-408-022; fax 358-0-408-780).
- Nov. 13-16. 49th Plains Anthropological Conference. Lawrence, Kansas. Abstracts due Sept. 14, 1991. William B. Lees, Kansas State Historical Society, 120 West 10th, Topeka, KA 66612, USA (tel 913-296-2625).

Nov. 14-16. Archaeological Stone - Scientific and Technical Studies. London, UK. Dr. A.P. Middleton, Research Laboratory, British Museum, London, WC1B 3DG, UK.

Nov. 15-18. 1st International Colloquium on the Role of Chemistry in Archaeology. Hyderabad, India. The Director, The Birla Institute of Scientific Research, Asmangadh Palace, Malakpet, Hyderabad - 500 036 (A.P.), India.

\* Nov. 18-22. Supercomputing '91. Albuquerque, New Mexico, USA.

Nov. 19-21. Conservation of Monuments in the Mediterranean Basin, International Meeting. Geneva. D. Decrouez, Muséum d'Histoire naturelle, CP 434, 1211 Genève 6 (tel 022-735-91-30).

Nov. 20-24. American Anthropological Association, Annual Meeting. Chicago, Illinois. American Anthropological Assoc., 1703 New Hampshire Ave. N.W., Washington D.C. 20009, USA (tel 202-232-8800)

Nov. 30-Dec. 1. Modern Methods of Analysis of Wood and Annual Plants. New Orleans, Louisiana, USA. Cellulose, Paper & Textile Division H.L. Chum, Solar Energy Research Inst., 1617 Cole Blvd., Golden, Colorado 80401, USA (tel 303-231-7249).

### December 1991

Dec. 2-6. Workshop on Statistical Methods in Imaging. Berkeley, California, USA. Mathematical Sciences Research Institute, Berkeley, CA.

+ Dec. 2-6. Materials Research Society Fall Meeting. Boston, Massachusetts, USA. John Ballance, MRS, 9800 McKnight Road, Suite 327, Pittsburgh, Pennsylvania 15237, USA (tel 412-367-3003).

Dec. 9-13. American Geophysical Union Fall Meeting. San Francisco, California, USA. Brenda Weaver, AGU, 2000 Florida Ave. N.W., Washington, D.C. 20009, USA (tel 202-462-6903).

### January 1992

\* Jan. 6-11. 1992 Winter Conference on Plasma Spectrochemistry. San Diego, California, USA. Dr. Ramon Barnes, c/o ICP Information Newsletter, Department of Chemistry, LGRC Towers, University of Massachusetts, Amherst, MA 01003, USA (tel 413 -545-2294; fax 413-545-4490).

## Meetings Calendar

Jan 8-11. Joint Mathematics Meetings. Baltimore, Maryland, USA. H. Daly, AMS, P.O. Box 6248, Providence, Rhode Island 02940, USA.

\* Jan 8-12. Society for Historical Archaeology Conference on Historical and Underwater Archaeology. Kingston, Jamaica. Douglas V. Armstrong, Chair, SHA 92, Anthropology Department, 308 Bowne Hall, Syracuse University, Syracuse, New York 13244, USA.

\* Jan 12-16. 179th Meeting of the American Astronomical Society. Atlanta, Georgia. Dave Wingert, AAS Registration, CHARA, Georgia State University, Atlanta, GA 30303-3083, USA (tel 404-651-2932; fax 404-651-2013; e-mail aas@chara.gsu.edu). Papers on archaeo-astronomy will be included in the Historical Astronomy Division.

\* Jan. 21-24. 11th Australian Geological Convention: Earth Sciences, Computers and the Environment. Victoria, Australia. 11th AGC, Bloomsbury Conference Services PTY Ltd., 232 Bridge Road, Richmond, Victoria, Australia (tel 61-03-429-4322).

### February 1992

\* Feb. 1-2. The Anthropology of Human Behavior Through Geographic Information and Analysis; sponsored by the National Center for Geographic Information and Analysis. Santa Barbara. Herbert Maschner, Department of Anthropology, University of California, Santa Barbara, California 93106, USA (e-mail 6500herb@ucsbuxa.bitnet/maschner@alishaw.ucsb.edu). This conference seeks to bring together anthropological users of GIS to describe research that was either too difficult or impossible using any other tools.

Feb. 6-11. American Association for the Advancement of Science, Annual Meeting. Chicago, Illinois, USA. AAAS, 1333 H St. N.W., Washington, D.C. 20005, USA (tel 202-326-6400).

\* Feb. 19-24. Electronic Imaging: Science and Technology, Symposium and Technical Exhibit. San Jose, California, USA. Society of Photo-Optical Instrumentation Engineers, P.O. Box 10, Bellingham, WA 98227, USA (tel: 206-676-3290).

\* Feb. 24-28. IEEE Computer Society COMP-CON. San Francisco, California, USA.

Feb. 23-27. 1st South Asia Geological Congress - GEOSAS-1. Islamabad, Pakistan. Hilal A. Raza, GEOSAS-1 Secretary General, Hydrocarbon Development Institute of Pakistan, 230-Nazimuddin Road, F-7/4, P.O. Box 1308,

Islamabad, Pakistan (tel 9251-823690 or 821417; telex 5516 HDIP PK; fax 9251-8287730).

### March 1992

\* March 9-13. PITTCON '92 (43rd Pittsburgh Conference & Exposition on Analytical Chemistry and Applied Spectroscopy). New Orleans, Louisiana, USA. W. Richard Howe, Exposition Chairman, Pittsburgh Conference, 300 Penn Center Blvd., Suite 332, Pittsburgh PA 15235, USA. Includes a symposium on Exploration and Preservation of Ancient Art with Chemistry (Archaeometry), organized by G.L. Vassilaros.

March 11-14. International Colloquium on the History of Knowledge of Animal Behavior from Earliest Times to the Present Day. Liege, Belgium. Colloque "L'histoire de la connaissance du comportement animal," c/o Service "Colloques et Congres," Universite de Liege, place du 20-Aout 32/6e etage, B-4000 Liege, Belgium.

+ March 23-27. International Archaeometry Symposium. Los Angeles, California, USA. Dr. Pieter Meyers, Los Angeles County Museum of Art, 5905 Wilshire Boulevard, Los Angeles, California 90036, USA. (See announcement, this issue.)

\* March 25-28. 15th Annual Conference, Society of Ethnobiology. Washington, DC, USA. Bruce D. Smith, Department of Anthropology, National Museum of Natural History, Smithsonian Institution, Washington, DC 20560, USA (tel: 202-357-1572; fax: 202-357-2208).

\* March 27-29. Computer Applications and Quantitative Methods in Archaeology. University of Aarhus, Denmark. Torsten Madsen, Institute of Prehistoric Archaeology, Moesgard, Dk-8270, Hojbjerg, Denmark (tel 45-86272433, ext. 225; fax 45-86272378).

### April 1992

April 5-10. 203rd American Chemical Society National Meeting. San Francisco, California, USA. ACS Meetings, 1155 16th St. N.W., Washington, D.C. 20036, USA (tel 202-872-4396).

April 6-10. 17th General Assembly of the European Geophysical Society. Edinburgh, Scotland. EGS Office, Postfach 49, 3411 Katlenburg-Lindau, FRG (tel 49-5556-1440; fax 49-5556-4709; telex 965564 zil d; SPAN: LINMPI::EGS; EARN: U0085@DGOGWDG5).

## Meetings Calendar

April 8-12. Society for American Archaeology, Annual Meeting. Pittsburgh, Pennsylvania, USA. Society for American Archaeology, 1511 K St., N.W., Suite 716, Washington D.C., USA (tel 202-223-9774)

April 13-17. Association of American Geographers Annual Meeting. San Diego, California, USA. AAG, 1710 16th St. N.W., Washington, D.C. 20009, USA (tel 202-234-1450).

\* April 18-21. Association of American Geographers Annual Meeting San Diego, California, USA. Association of American Geographers, 1710 16th Street, N.W., Washington, DC 10009, USA (tel 202-234-1450).

### May 1992

\* May 10-15. Imaging '92: IS&T's 45th Annual Conference. East Rutherford, New Jersey, USA. Society for Imaging Science and Technology, 7003 Kilworth Lane, Springfield VA 22151, USA (tel 703-642-9090; fax 703-642-9094).

\* May 17-23. International Work-Group for Paleoethnobotany. Kiel. Dr. Helmut Kroll, Institut für Ur- und Frühgeschichte, Olshausenstrasse 40, D-2300 Kiel 1, Germany (tel 0431-880-2338).

May 25-27. Geological Association of Canada/Mineralogical Association of Canada, Annual Meeting. Wolfville, Nova Scotia, Canada. Aubrey Fricker, Atlantic Geoscience Centre, Bedford Institute of Oceanography, Box 1006, Dartmouth, Nova Scotia, B2Y 4A2, Canada (tel 902-426-6759).

### Summer 1992

\* June 7-12. American Nuclear Society Annual Meeting. Boston, Massachusetts, USA. Meetings Department, ANS, 555 N. Kensington Ave., La Grange Park, IL 60525, USA (tel 312-352-6611).

\* July 12-18. International Working Meeting on Soil Micromorphology. Townsville, Queensland, Australia. Colin Chartres (IWMSM), CSIRO Division of Soils, GPO Box 639, Canberra ACT 2601, Australia (tel 61-6-246-5965; fax 61-6-246-5953).

Aug. 1-14. Meeting to Focus on Global Change. Washington, D.C., USA. ASPRS, Don Hemenway, 210 Little Falls St., Falls Church, Virginia 22046, USA.

Aug. 16-21. 9th International Biotechnology Congress. Crystal City, Arlington, Virginia, USA. Division of Biochemical Technology, ACS Meetings, 1155

16th St. N.W., Washington, D.C. 20036, USA (tel 202-872-4402).

Aug. 22-27. 206th American Chemical Society National Meeting. Chicago, Illinois, USA. ACS Meetings, 1155 16th St. NW, Washington, D.C. 20036, USA (tel 202-872-4396).

Aug. 24-Sept. 3. 29th International Geological Congress. Kyoto, Japan. Secretary General, IGC-92 Office, P.O. Box 65, Tsukuba, Ibaraki 305, Japan (tel 81-298-54-3627; fax 81-298-54-3629; telex 3652511 GSJJ).

\* Aug. 31-Sept. 4. XIII International Congress on X-ray Optics and Microanalysis. Manchester. Mr. P.B. Kenway, Manchester Materials Science Centre, University of Manchester/UMIST, Grosvenor Street, Manchester M1 7HS, United Kingdom (tel 061-200-3581; fax 061-200-3585).

### Fall 1992

Sept. 1-7. 8th Congress of the European Anthropological Association. Madrid, Spain. Maria Dolores Garralda, Sección de Antropología, Facultad de Biología, Universidad Complutense de Madrid, Ciudad Universitaria, 28040 Madrid, Spain.

\* Sept. 14-18. International Conference on Liquid Scintillation Spectrometry. Vienna, Austria. Dr. Franz Schonhofer, Austrian Society for Liquid Scintillation Spectrometry, Schopenhauerstr. 71/11, A-1180 Vienna, Austria.

Sept. 21-25. Paleoceanography and Global Change International Meeting. Kiel, West Germany. ICP IV Organizing Committee, c/o GEOMAR Wischhofstrasse 1-3/Building 4, D-2300 Kiel 14, West Germany.

Sept. 27-Oct. 1. American Institute of Professional Geologists Annual Meeting. Lake Tahoe, Nevada, USA. Jon Price, AIPG, P.O. Box 665, Carson City, Nevada 89702, USA (tel 702-784-6691).

\* Sept. 28-30. Mediterranean River Environments. Cambridge, U.K. Dr. J.C. Woodward, Department of Geography, Amory Building, Rennes Drive, University of Exeter, Exeter EX4 4RJ, United Kingdom.

Oct. 5-10. INTERKAMA 92 - 12th Market for Innovations in Measurement and Automation. Dusseldorf, Germany. Dusseldorf Trade Shows, Inc., 150 North Michigan Ave., Suite 2920, Chicago, Illinois 60601, USA (tel 312-781-5180; fax 312-781-5188).

## Meetings Calendar

## Announcements

Oct. 26-29. Geological Society of America, Annual Meeting. Cincinnati, Ohio, USA. Geological Society of America, 3300 Penrose Place, Boulder, Colorado 80301, USA. (tel 303-447-2020)

### Winter 1992

Nov. 15-20. Optical Society of America Annual Meeting/ OPTCON 92. Boston, Massachusetts, USA. OSA, 2010 Massachusetts Ave. NW, Washington, D.C. 20036, USA.

Dec. 2-6. American Anthropological Association, Annual Meeting. San Francisco, California, USA. American Anthropological Association, 1703 New Hampshire Ave. NW, Washington, D.C. 20009, USA. (tel 202-232-8800).

### 1993

Feb. 11-16. American Association for the Advancement of Science, Annual Meeting. Boston, Massachusetts, USA. AAAS, 1333 H St. NW, Washington, DC 20005, USA (tel 202-326-6400).

July (dates unknown). Pithecanthropus Centennial: International Congress and Exhibition on the Environmental Context of Human Evolution. The Netherlands and Indonesia. Hans Beijer, Geological Survey of the Netherlands, P.O. Box 157, NL-2000 AD Haarlem, The Netherlands.

\* Aug. 23-29. 3rd International Conference on Geomorphology. Hamilton, Ontario, Canada. Derik C. Ford, Department of Geography, McMaster University, 1280 Main St. West, CDN-Hamilton, Ontario L8S 4K1, Canada.

Sept. 10-17. 13th Congress, International Union of Anthropological and Ethnological Sciences. Mexico, D.F., Mexico. "Cultural and Biological Dimensions of Global Change." Linda Manzanilla, Instituto de Investigaciones Antropológicas, Universidad Nacional Autónoma de México, Ciudad Universitaria, Coyoacán, D.F. 04510, México.

Oct. 25-28. Geological Society of America, Annual Meeting. Boston, Massachusetts, USA. Vanessa George, GSA, Box 9140, Boulder, CO 80301, USA (tel 303-447-2020).

## Pilot Project for Archaeologists

Bruce Rippeteau (South Carolina Institute of Archaeology) and Jim Judge (Ft. Lewis College) are compiling a list of archaeologists who are (or once were) pilots for the general purpose of a registry and interaction group. This listing would be based upon voluntary self-identification. No immediate use of this database registry is anticipated, but there could be possible value for scheduling aerial photography or special trips. Since some pilots may receive use of government planes, and others own theirs, such availability would vary. Forms may be obtained from the address below. The data desired are: name; business address, phone, and fax; pilot ratings, and related ratings comments; airplane availability, and related airplane comments; related aviation organization memberships; ideas; signature and date. For further information and data forms, contact: Bruce Rippeteau, South Carolina Institute of Archaeology and Anthropology, 1321 Pendleton Street, Columbia, SC 29208-0071, tel 803-777-8170.

## Position Announcement

Southern Methodist University Radiocarbon Laboratory has an opening for a research-oriented laboratory technician with a background in soil or earth sciences, or who is familiar with chemical or biological analytical techniques. The person employed will be required to participate in the operation of the laboratory (benzene synthesis and scintillation counting, supervising student assistants in sample pretreatment and other routine activities) and to conduct research in sample preparation techniques. Research in soil humate dating is of particular interest to us.

For further information contact:

Dr. Herbert Haas  
Director, Radiocarbon Laboratory  
308 Heroy  
Southern Methodist University  
Dallas, Texas 75275 U.S.A.  
phone (214) 692-3429  
fax (214) 692-4289  
Email BITNET: H1N#i001@SMUVM1

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