

SAS Bulletin

Society for Archaeological Sciences

Volume 14

Number 1

January - March 1991

SAS News

Editor Changes at the Bulletin

After struggling long and hard with my first issue, I can now truly appreciate Pat Martin's service as editor of the *Bulletin*. The learning process has been slow, but future issues should come out in a more timely fashion.

We are also losing the services of Pru Rice as our Book Reviews editor. Pru has shepherded many reviews through the process of acquiring noteworthy books and getting them critiqued for the *Bulletin*. We are now looking for someone new to take over this position. Please contact one of the officers or the editor if you are interested.

This issue also welcomes Sue Mulholland of the Archaeometry Laboratory at the University of Minnesota, Duluth, as our new associate editor for the Meetings Calendar. Please forward information about meetings that should be covered to Sue.

New ArchSci E-mail Bulletin Board

The Society for Archaeological Sciences is beginning an electronic bulletin board of sorts, to be moderated by yours truly. The purpose is to promote discussion about the Society, the *Bulletin*, and issues of concern to archaeological scientists. An initial list of E-mail addresses has been obtained from Jim Burton.

The E-mail address for the bulletin board is BITNET: ARCHSCI@FANDM. You may request that your name be deleted or added to our distribution list at that address. Messages that are sent in will otherwise be assumed for general distribution, and after screening will be forwarded to the entire mailing list.

My idea is to try to initiate discussion on issues of interest to the Society and to myself, and of course the subscribers are free to do the same. I would like to extract some of the more interesting comments for inclusion in the *Bulletin*. I will seek the approval of the contributor before I do this.

The initial question I would like to pose is: What do you like/dislike about the *Bulletin*? What would you like to see more/less of?

SAS at the SAA

The Society for Archaeological Sciences will hold its 1991 business meeting during the annual meeting of the Society for American Archaeology, to be held in New Orleans from April 23-28, 1991. Join us at 5pm on Thursday April 25 in the Cajun Room of the Clarion Hotel.

The SAS will also be sponsoring a symposium at the SAA meeting, entitled "Analysis of Large Archaeomagnetic Data Sets", scheduled for the morning of Thursday April 25. The symposium abstract reads as follows: "Much of the earlier work in archaeomagnetic dating involved reporting of dates for individual features. Now there are large amounts of archaeomagnetic data and archaeomagnetic dates from several culture areas, from related sites within culture areas, and from several individual sites. These studies provide databases that now permit us to examine the quality of archaeomagnetic data and the precision and accuracy of archaeomagnetic dates. Large archaeomagnetic data sets can also be used to examine chronology in different ways than individual results are used in the traditional archaeomagnetic dating paradigm."

The convenors are R.S. Sternberg (Franklin & Marshall College) and W.L. Deaver (University of Arizona). The papers to be presented are: J. L. Eighmy (Colorado State University), D. L. Blakeslee, and D. R. Mitchell - Chronometry of archaeomagnetic and radiocarbon dates from Pueblo Grande; R.S. Sternberg, R. C. Lange, and B. A. Murphy - A large archaeomagnetic data set from Las Colinas: factors affecting precision and accuracy; W.L. Deaver - A chronology of the Hohokam Pioneer Period and a model of archaeomagnetic secular variation during the first millennia A.D. for the U.S. Southwest; D.E. Doyel (Arizona State University) and J. L. Eighmy - Refining the archaeomagnetic chronology for the Bonito phase in the Chaco Canyon region, New Mexico; D. Wolfman (Museum of New Mexico), K. G. Hirth, and G. Hasemann - Archaeomagnetic dating in the Cajon Dam Project area, central Honduras; D. H. Tarling (Polytechnic South West, U.K.) - The British directional archaeomagnetic data base. Discussants will be M.E. Evans (University of Edmonton) and R.E. Taylor (University of California, Riverside).

Laboratory Profile

Paleoethnobotanical Laboratory

Texas A&M University

The Paleoethnobotanical Laboratory at Texas A&M University is located in a newly renovated facility and contains 1,500 square feet of space. The facility consists of a core of two wet labs and a complex of offices and research areas. Each wet lab is sealed from outside contamination, has large fume hoods, hot and distilled water outlets, acid resistant plumbing, fume scrubbers to remove toxic chemicals, and telephones. Included in the lab complex are four offices each with computer lines and phone outlets, a fireproof chemical storage room, a sediment-core and sample storage room, a microscope analysis room, and a large open work area equipped with several 40-MB hard disk desktop computers and printers. The microscope room has built-in sand-filled counters for stability and microscopic photographic work. It is equipped with the latest JENA, WILD, and NIKON dissecting and compound microscopes. The microscopes have interference phase, light and dark field contrast, Nomarski Phase, polarized light, and epi-illumination capabilities. Three of the microscopes are equipped with built-in cameras for photographic work and one is connected directly to a TV monitor for taping VCR images for classroom use. Each wet lab has large sink areas, vortex stirrers, large and small centrifuges, hot plates, metric balances, and large counter top work areas with shelving and cabinets. A large, five gallon capacity Delta 5H sonicator is shared between the two labs.

Supporting Facilities

Next door to the Paleoethnobotanical Laboratory is a fully equipped photographic and darkroom facility. Several buildings away laboratory personnel have access and full use of Jeol T-330A and Jeol 6400 Scanning Electron Microscopes with image analysis, a new Zeiss LMS Laser Scanning Confocal Microscope, a Zeiss 10C Transmission Electron Microscope, and electron x-ray probes. In addition, the laboratory has direct computer lines to the Data Processing Center and can take advantage of the large Cray Y-MP2 computer. The S.M. Tracey Herbarium housing over 180,000 plant specimens is less than one block from the lab and is available for use by lab personnel. FAX facilities are available a few doors away.

Laboratory Collections

Exceptional laboratory reference and library collections enable the staff to research a wide range of topics. Specific collections include: 1) the Eric O. Callen Coprolite Collection containing over 6,500 slides and samples prepared by Dr. Callen, the scientist who pioneered coprolite research during the 1960s; 2) the Kathy Cushman

Wood and Seed Collection containing over 100 taxa of charcoal and wood and nearly 300 seed taxa from the American southwest and west; 3) the Mobil Oil Corporation Modern Pollen Reference Collection containing 7,000 pollen taxa of modern plants from all areas of the world but with special emphases on tropical taxa and pollen types of the Southern Hemisphere; and 4) the William Elsik Fossil Fungal Spore Collection consisting of a wide variety of slides of fossil and modern fungal spore types covering time periods from the early Mesozoic through the Quaternary era. Other special collections maintained by the laboratory include a herbarium of vouchered plant specimens, a collection of over 1,500 floral and raw pollen samples, extensive modern reference collections of wood and charcoal taxa native to North and Central America, a working seed collection of over 500 taxa, a modern pollen collection of over 3,500 taxa mostly from North America, a collection of over 2,000 fossil coprolite samples from North and South American archaeological sources, and an extensive reprint and library collection. The pollen reference collections are entered in dBase programs for easy informational retrieval and we use software programs for wood identification and statistical quantification. We are just beginning to build a phytolith reference collection of modern plant taxa.

Staff

Director: Dr. Vaughn M. Bryant, Jr. (PhD 1969) is director and department head of Anthropology. He is a palynologist with extensive experience in paleo-environmental analyses, archaeological palynology, and prehistoric coprolite analysis. His current research emphasis includes melissopalynology, forensic palynology, and entopalynology.

Assistant Director: Mr. John G. Jones (MA 1988) is responsible for the day-to-day operation of the laboratory facility and plays a key role in grant writing and coordinating applied and contract work undertaken by the laboratory. Mr. Jones has worked for nearly a decade in Central and South America and is most noted for his Peruvian coprolite analyses, phytolith studies of cacti, fossil pollen studies of Tertiary lignites, and his current fossil pollen studies of archaeological and paleoenvironmental records in Belize, Central America.

Laboratory Personnel: Hope Camper (BS 1986) is a palynologist working on the reconstruction of paleoenvironments in central Texas during the last 20,000 years. Judith Gennett (MA 1983), a palynologist, has focused her research emphasis on paleoenvironmental

reconstructions of Texas vegetational sequences during the early Tertiary Period. Gretchen Jones (MS 1987), a taxonomist and SET/TEM microscopist, is using her skills to establish the first palynological quantification and verification standard for honey production throughout Texas. Robert E. Murry (MA 1983) is a palynologist currently examining the food economy of the prehistoric Anasazi cultures in the American Southwest. James Parrent (MA 1983), a specialist in the Caribbean, is preparing the first melissopalynology study of Jamaica honey production and is working on a photographic pollen reference key of major North American plant taxa. Michael Pendleton (MA 1980), who has extensive training in SEM techniques, is examining the prehistoric diets and food economy of the Mimbres Region in New Mexico and is conducting pioneering research in the emerging field of entopalynology. Kristin Sobolik (MA 1988), a paleo-nutritionist, is focusing her research on a reconstruction of cultural dietary patterns during the last 10,000 years in the Lower Pecos region of the American Southwest. Peter Warnock (BA 1986), a plant macrofossil specialist, is using seed and charcoal analyses to reconstruct records of early plant usage during the Bronze and Iron Age periods in the Middle East. Eri Weinstein (MA 1985), a nautical archaeologist, is playing a major role in developing underwater techniques for the recovery and analysis of pollen and other paleoethnobotanical samples from submerged archaeological sites and shipwrecks. Laurie Zimmermann (MA 1985), a paleo-nutritionist, has recently returned from field studies in Ecuador where she conducted fossil pollen studies of the paleoenvironment and the record of use and spread of South American agriculture.

Basic Research

On-going research projects include:

Reconstruction of Texas Paleoenvironments: For over 20 years personnel at the laboratory have been examining fossil pollen from a variety of archaeological sites, peat bogs, and lake deposits in Texas. Additional fossil data have come from seeds, wood, and charcoal specimens recovered from a wide range of Texas archaeological sites. These combined data have enabled us to propose a 30,000 year record of vegetational cycles for most regions of Texas.

Coprolite Studies: Using the Eric O. Callen collection and specimens from the laboratory's collection, personnel have conducted coprolite studies ranging from the first studies of prehistoric coprolites recovered from Andean sites in Peru to an examination of ancient Eskimo coprolites collected from sites at Point Barrow, Alaska. Other coprolite studies have focused on analyses of specimens from: 1) coastal archaeological sites in Peru and Chile, 2) rockshelter sites in arid regions of northern Mexico, 3) open sites in southern Canada, 4) Neanderthal cave sites

in southern France, 5) a *Homo erectus* site at Nice, France, 6) a single sample from an Early Man site in South Africa, 7) multiple studies of coprolites from sites throughout west Texas, 8) coprolites from numerous pueblo sites in the American Southwest, and 9) privy deposits excavated at colonial sites in eastern North America and from pre-Civil War plantations in Louisiana. Through these studies we have been able to develop and refine techniques used in coprolite analyses and have broadened our knowledge of prehistoric dietary and paleonutrition patterns.

Nautical Paleoethnobotany: For the last decade personnel in our laboratory have been in the forefront of underwater paleoethnobotany and have pioneered many of the recovery techniques now being used to sample and collect seeds, pollen, wood, charcoal, phytoliths, and sediment samples from underwater archaeological sites and shipwrecks. These efforts have helped underwater archaeologists recognize the vast wealth of information potentially available from botanical materials recovered from submerged sites and shipwrecks. Recent discoveries by lab personnel include the first records of plant materials used as cargo in Arab, Greek, and Byzantine ships that sailed the Mediterranean Sea, and the identification of woods used in the construction in one of the earliest diptychs (wooden book) ever recovered. In North America, other nautical studies are discovering some of the dietary reasons responsible for the defeat and eventual surrender of the British forces at Yorktown during the Revolutionary War. Another study still in progress in Jamaica involves the search for botanical evidence of the diet eaten by Christopher Columbus and his sailors while marooned on the island of Jamaica during his last voyage to the New World in 1503.

Melissopalynology: The United States is the third largest producer of honey in the world yet it is alone in lacking data that could be used to quantify and verify the contents of domestically produced honey. This absence of data has hampered export of U.S. honey and has enabled unscrupulous merchants to market honey without legal need to prove the floral type indicated on the label. A study now in progress by lab personnel is designed to correct this problem. Using over 650 honey samples from locales in all 50 states, we are conducting extensive chemical and pollen studies to produce the first comprehensive database of compositional information about U.S. domestic honey. Once completed, these data will enable the enforcement of strict labeling laws and will promote the export of domestic U.S. honey to other nations.

Entopalynology: Pioneering efforts by our personnel, in cooperation with USDA scientists, are perfecting methods for tracing the migration and feeding habits of two major agricultural insect pests. Using pollen analyses, we are

Paleoethnobotany (continued on p. 5)

News Of Archaeometallurgy

Meetings and Courses

The "Slag Day" scheduled for York on 17 September 1990 was cancelled, but another regional "Slag Day", for Wales, was being organized by Peter Crewe in mid-February 1991. For information write Peter Crewe at the Snowdonia National Park Study Centre, Plas Tan y Bwlch, Maentwrog, Blaenau Ffestiniog, Gwynedd LL41 3YU Wales.

There will be an international symposium on "Ancient Jewelry and Archaeology" to be held at the Indiana University Art Museum in Bloomington 26-28 September 1991. It is being held in memory of Burton Y. Barry, and a selection of gold jewelry from the collection he donated to the museum will be on exhibition at the same time. For information write Ms. Adriana Calinescu, Curator of Ancient Art, Indiana Art Museum, Bloomington, Indiana 47405; telephone 812-855-1033.

Publications

The proceedings of the "Early Mining Workshop" which took place at Plas Tan y Bwlch, the Snowdonia National Park Study Centre on 17-19 November 1989 has been published as *Occasional Paper No. 1, Early Mining in the British Isles*, and is edited by Peter and Susan Crewe. It covers surface remains, underground exploration, tools and their hafting, and reports of experimental smelting of arsenical copper ores and of three different experiments in fire setting. Copies can be obtained from Plas Tan y Bwlch, Snowdonia National Park Study Centre, Maentwrog, Blaenau Ffestiniog, Gwynedd LL41 3YU, Wales; telephone 0766-85-324. Make checks payable to Gwynedd County Council. The price is £10 including postage and packing; £11 surface and £12 air overseas. Add £3 for bank charges if not paying in sterling.

The meeting on zinc production organized in Bristol in 1985 by Joan Day and Paul Craddock has resulted in a publication which its editor, Paul Craddock, correctly describes as "the first comprehensive technical history of the production of zinc and brass." It is *2000 Years of Zinc and Brass, British Museum Occasional Paper No. 50*. It contains reports on brass in antiquity, zinc production in India including the results of excavations at Zawar, and an unexpected paper on zinc production in China translated from the Chinese. J.K. Almond contributed an exhaustive review of the modern technology since 1801. Copies of Occasional Paper No 50 are £15, available from British Museum Publications, Ltd., 46 Bloomsbury Street, London WC1B 3QQ, England. They accept Access, American Express, and Visa.

Volume 24 of *PACT, The Journal of the European Study Group on Physical, Chemical, Biological and Mathematical Techniques Applied to Archaeology, is Geology and Palaeoecology for Archaeologists* (1989) and is edited by Tony Hackens and Urve Miller. It reports on one of the European Postgraduate Courses conducted under the auspices of the Council of Europe at the European University Study Centre for Cultural Heritage in Ravello, and contains a number of reviews of methods such as pollen and diatom analysis and the pitfalls of the ¹⁴C dating method. This volume is 2000 Belgian francs, available from T. Hackens, 28a av. Leopold, B-1330 Rixensart, Belgium. PACT publications may be paid for in US dollars at the current rate of exchange with a check on a US bank.

Interesting information on the early development of puddling iron can be found in *The Letterbook of Richard Crayshay, 1788-1797*, edited by Gwilym Hayes and Chris Evans and published by the South Wales Record Society. It is available for £20.50 including postage from the Hon. Treasurer, South Wales Record Society, 8 Grove Court, Birchgrove, Cardiff CF4 4QS Wales.

The Institute of Metals has reprinted *Sir Henry Bessemer FRS - an Autobiography* (1989, 380 pp.) It is available for £16.95 from the Sales and Marketing Department, the Institute of Metals, 1 Carlton House Terrace, London SW1 Y 5DB England.

A volume on *Pre-Industrial Iron, Its Technology and Ethnology* has just been published by William Rostoker and Bennet Bronson. It is available for \$55 (234 pp., hardbound; \$100 to libraries and institutions) from Rostoker, Inc., 3333 East 143rd Street, Burnham IL 60633.

Outokumpu Corporation in Finland is distributing a history of the corporation, which includes development of the flash furnace. For a free copy (240 pp., hardbound) write Outokumpu Corporate Communications, P.O. Box 280, 021 01Espoo, Finland.

The "Archaeometallurgy" column in the *Journal of Metals* edited by Vincent Pigott presented "Prehistoric metallurgy in Southeastern Europe" by P.D. Glumac and J.A. Todd in October 1989 (pp. 54-55), "The interplay of bronze and ritual in ancient south-west China" by Robert E. Murochick in February 1990 (pp. 44-47), "The development of ancient Mesoamerican metallurgy" by Dorothy Hosler in May (pp. 44-46), "Considering the impetus for the bronze-to-iron transition in prehistoric Britain" by Robert M. Ehrenreich in July (pp. 36-38), and "A study of traditional lost-wax casting in India" by Lee Horne in October (pp. 46-47.)

News Of Archaeometallurgy

News Briefs

A new institute for the study of the history of metal production, the Institute of Archaeometallurgy, has been founded at the Bergbau Museum in Bochum. Its director is Andreas Hauptmann and it is receiving support from the Volkswagen Stiftung. The purpose of the institute is to offer archaeologists analyses of metallurgical remains and to conduct research in early metallurgy. Research projects include early iron metallurgy in Germany, mining in Wadi Feinan, Jordan, the copper trade in the Near East, and the beginnings of metallurgy in the Pre-Pottery Neolithic. Dr. Hauptmann announced a change of address in October. The new address is Lorheidestrasse 57, D-4630 Bochum 6, Germany; telephone (0 23 27) 370-4, 5, 6.

His many friends throughout the world mourn the passing of Ronald Tylecote, Professor of Archaeometallurgy, this past June. An obituary appears below. He is remembered for his establishment of archaeometallurgy as a scholarly discipline and for his generous help and encouragement to other workers in the field.

Professor Robert Gordon of Yale has accepted appointment as the Regents Fellow at the Smithsonian Institution for 1991.

The Mining History Association holds sessions during the Western History Association Conference, and publishes a newsletter. For information write P.O. Box 150300, Denver CO 80215.

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

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

Paleoethnobotany (continued from p. 3)

examining the diets of insects (i.e., the boll weevil and corn earworm) for clues about their life cycles, feeding habits, and migrational patterns. The resulting data are already being used to develop new techniques to control these pests.

Forensic Palynology: Funding from the U.S. Customs Agency has enabled laboratory personnel to perfect palynological techniques for verifying the geographical origin of goods imported into the United States. These techniques were recently incorporated into a one-week

Customs Agency labs and are now being used as part of their forensic studies. Laboratory personnel are also assisting other agencies (FBI, DEA, state and local police) learn how to use forensic palynology to detect the origins of illegal drug shipments and use pollen evidence to link criminals to the scene of crimes or with stolen goods.

Plant Macrofossil Analyses: For 20 years our laboratory personnel have played an active role in the recovery and analysis of plant macrofossils recovered from archaeological sites. These include seeds, wood samples, charcoal, phytoliths, pollen, and plant fibers. These studies have provided insights about prehistoric vegetational conditions and environmental changes as well as clues about the diets and nutritional standards of ancient cultural groups. Several studies under investigation include an examination of food resources used by early settlements in the Middle East, a detailed look at 10,000 years of plant macrofossil remains from sites in southwest Texas, and a reconstruction of cargoes carried by storage ships used to resupply the British forces at Yorktown during the Revolutionary War.

Phytolith Analyses: Although a new research area for our lab personnel, we are developing a phytolith reference collection and are beginning to conduct research studies in this field. Our first study was an examination of phytoliths from desert succulents in southwest Texas and a taxonomic study of Texas cacti taxa using phytolith analyses.

Students and Research

During the past 20 years, 10 Texas A&M students have used the laboratory's facilities to conduct research leading to doctoral degrees. Currently, there are 10 additional doctoral students working in the laboratory. Other students who might be interested in pursuing paleoethnobotanical studies at Texas A&M are encouraged to write to us at the above address.

Laboratory staff are interested in working on collaborative research efforts with other scientists. In addition, we perform a wide range of applied and contract services for other researchers ranging from processing pollen and phytolith samples from archaeological and geological sediments (from all time periods) for analysis by other personnel to complete field collection and laboratory analyses of all types of paleoethnobotanical samples. Fees for applied and contract research will vary with the number and type of materials to be examined, deadline dates, and the availability of trained personnel to conduct the work. Those interested in our services are encouraged to contact us at the above address.

Vaughn M. Bryant, Jr., Department of Anthropology, Texas A&M University, College Station, Texas 77843-4352.

Ronald Tylecote

Ronald Frank Tylecote, the scholar who more than any other established the field of archaeometallurgy, died on June 17 in Wantage, Oxfordshire, England at the age of 74.

He was born in Manchester on June 15, 1916, and was educated at Oundle School before going to Cambridge to study mechanical engineering. While mountain climbing in Wales at the age of 19 he had a crippling accident which cost him a leg, the hearing in one ear and the strength of one arm, injuries which dictated a change of subject to metallurgy, then considered less strenuous. He was awarded the MA in 1938 and went on to the University of Manchester for an MSC awarded in 1942. During this period, in 1939, he took part in his first excavation, under Professor H. Fleure. He took his PhD at the University of London in 1952, settling in at the University of Newcastle upon Tyne, which eventually recognized his growing international reputation by creating a Readership in Archaeometallurgy for him.

The year 1962 was pivotal in archaeometallurgy for in that year Ronnie Tylecote brought out his first book on the topic, *Metallurgy in Archaeology*, and also, along with G.R. Morton and others, founded the Historical Metallurgy Group, and became the editor of its *Bulletin*. The Group and its publication were a success and the Group was later chartered as the Historical Metallurgy Society and the *Bulletin* became *Historical Metallurgy*. Until this June, when Ronnie handed over the responsibility to Justine Bayley and David Crossley, he had been the journal's sole editor for the whole of its 27 years. Its scholarly stature owes much to his good judgment and his generous encouragement of others' research.

Metallurgy in Archaeology (known as the blue book from its binding) became a textbook of the new subject. It was followed in 1976 by *A History of Metallurgy* (the red book). Before his death Ronnie had revised all but two chapters for a second edition. So much work had been done in archaeometallurgy since 1962 that revision of the blue book resulted in two volumes: *The Prehistory of Metallurgy in the British Isles* in 1986 (the green book), and *The Early History of Metallurgy in Europe* (the black book). Less well known are *The Solid Phase Welding of Metals* (1969) and *The Metallurgy of Early Ferrous Edge Tools and Edged Weapons* (1986), which he wrote with his student at the Institute of Archaeology, Brian Gilmour.

He was Visiting Professor of Archaeometallurgy at the Institute of Archaeology, the University of London, and also metallurgical consultant to the Ancient Monuments Laboratory of English Heritage.

In this very productive life he had the support of his wife, Dr. Elisabeth Tylecote, herself an art historian, whom he credited with locating for him much of the relevant literature he required, however obscure the source. She survives him, as do two sons by an earlier marriage, and continues to live at Yew Tree Cottage, East Hanney near Wantage, Oxfordshire OX12 0HT, England.

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

General Announcements

Positions

University of Arizona, Culture-Science-Technology Program. Faculty search for a tenure track assistant professor with a focus of scholarly interest in the anthropology of technology and technological change in its social and cultural context. Applicants should have a strong background in archaeology or cultural anthropology and also a strong background in some field of science or engineering. If appropriate a joint appointment may be arranged. Teaching responsibilities will focus on the development and teaching of undergraduate general education courses on the cultural and social context of technology as part of the University's program on Culture, Science and Technology. Doctorate required, salary competitive. Send resume, publications list, summary of research interests and three references to Professor W.D. Kingery, Rm. 338E, Mines Building #12, University of Arizona, Tucson AZ 85721. Closing date for application is March 15, 1991. The University of Arizona is an Equal Opportunity/Affirmative Action Employer. (Due to our publication delay, we regret that this announcement post-dates the deadline.)

Awards

Rinita A. Dalan, a graduate student working towards a Ph.D. in ancient studies at the University of Minnesota, Minneapolis, has been named a recipient of a \$1,000 scholarship from the International Society of Exploration Geophysicists. The scholarship was one of 64 awarded, for a total of \$80,450, by the SEG Foundation for the 1990-91 academic year. SEG is an international scientific and education organization based in Tulsa, OK with over 15,000 members in more than 100 countries. The Society's Foundation provides scholarships each year to deserving students entering the study of the earth sciences. The deadline for application for SEG scholarships for the 1990-91 academic year was March 1, 1991. Earth science students attending accredited colleges and universities can write to the SEG Foundation, P.O. Box 702740, Tulsa OK 74170 for information and a scholarship application form.

Book Reviews

Archaeological Chemistry IV. Ralph O. Allen, editor. *Advances in Chemistry Series Number 220* (M. Joan Comstock, series ed.), American Chemical Society, Washington, D.C., 1989, xiii + 508 p., figures, tables, references, indices, \$89.95 (cloth).

Reviewed by Prudence M. Rice, University of Florida.

Archaeological Chemistry IV is the latest in a series of publications of symposia on archaeological chemistry sponsored by the American Chemical Society. The volume contains 27 contributions, including the editor's introduction, and these are divided into five sections: Lithic and Ceramic Materials (seven papers), Metals (three papers), Art Objects (four), Organic Materials (seven), and Fibers (five). As is the case in earlier volumes, the papers exhibit considerable diversity in topics, methods, and geographic context, resulting not only in a lack of thematic coherence but also a difficult task for the reviewer. What follows is a brief topical summary of the articles, and an effort to put this volume into an historical context.

Editor Ralph Allen's introduction provides the reader with an overview of the papers in the book, and calls attention as well to the broader contributions chemistry can make to archaeology: "...the role of chemists is more than just discovery of the past; it includes investigation that may help preserve the artifacts for future generations to enjoy and study" (p. 1). While the field of "archaeological chemistry" may be seen by some as a hybrid, Allen describes it (p. 3) as "a marriage between two disciplines." To judge from the papers in this and earlier volumes, however, the relationship is not truly a twosome; rather it can be more accurately characterized as a threesome—i.e., chemistry, archaeology, and art history—each with its own methods, data, and goals. Nonetheless, like any marital union, the field of archaeological chemistry "requires ongoing cooperation and interaction" in order to be stable and productive ... and this is no mean feat considering that the nuptials took place at least a century ago. If the authorship of the papers in this volume is any indication, the cooperation and interaction seems to have been satisfactorily achieved: 17 of the 26 research papers have three or more authors, and the volume represents the work of 75 authors at 48 institutions.

The papers in **Archaeological Chemistry IV** cover a broad range of topics, time periods, cultural regions, and techniques. The section on Lithic and Ceramic Materials contains only one paper on lithics; INAA of five different types of rocks used for Mesolithic and Neolithic tools in Portugal. The remaining papers demonstrate a broad

range of methods employed in characterization and provenience study of ceramics or their raw materials. These include: an overview of the methodology of compositional analysis; INAA to differentiate complex deposits of Nile sediments in the region of Hierakonpolis; x-ray diffraction analysis of high-temperature products of clay mineral mixtures; NAA of Mexican majolicas (illustrated in color photographs) from Spanish Colonial sites in Mexico and Florida; NAA of Neolithic Iranian pottery to determine temporal and spatial differences; and two techniques of atomic absorption analysis of three types of Pueblo pottery from the American Southwest.

The three papers in the Metals section treat problems of identifying sources of ores, technology of manufacture, and political context of changes in coin compositions. These chapters include a study of the role of lead isotope studies in understanding Bronze Age metallurgy in the Aegean, INAA of metallic residues in ceramic crucibles in Israel, and XRF analysis of copper-based Roman Republican coins.

The section on Art Objects has two papers dealing with the Medieval period: one on XRF analysis of a twelfth century enameled copper cross and copper reliquary, and the other an infrared microspectroscopic analysis of pigments on Byzantine manuscripts. In another study, PIXE analysis was used to identify "chrysocollo" (greenockite) in Iranian gold solders. A variety of techniques was employed in a "macroarchaeometric" study of the environment of a monument: exploring the chemistry (temperature and humidity conditions) of Nefertari's tomb in Egypt in order to develop a plan for its conservation.

The sections on Organic Materials and Fibers could logically have been combined, because of course the fibers of the pre-polyester era that are of interest to archaeologists and art historians are all organic. Indeed some of the same objects—e.g., the Shroud of Turin—are discussed in both sections. In the part titled Organic Materials, two papers treat recent developments in dating. One of these discusses the use of small samples for carbon-dating the Shroud of Turin (to the fourteenth century); the other evaluates the feasibility of the relatively new technique of radiocalcium dating for Middle Pleistocene hominds. Human bones and human blood samples are the subject of three articles; one using INAA and XRF to detect levels of contamination in human bone from burials and mummies; an ESR examination of faunal bone from Zhoukoudian, China, to evaluate thermal history and age; and a report on a new monoclonal antibody technique for identifying the species of origin of blood stains, heretofore untested archaeologically. Another paper in the section treats the identification of pine pitch residues in Mediterranean

Book Reviews

amphorae via IR and chromatography, while carbon-13 NMR spectroscopy was used to characterize amber from Chiapas, Mexico, and compare it to Dominican and Baltic samples.

The Fibers section might more properly have been titled "textiles," because that is what is covered in five papers. One paper addresses the provenience of the Shroud of Turin, while the remainder treat the degradation or alteration of textiles through time. Two of these focus on deterioration of historical silk objects, such as flags and clothing; one uses elemental content and distribution as a basis for investigating the archaeological contexts of recovered fibers; and another investigates textile pseudomorphs on a Shang bronze spearpoint.

A bit of historical research reveals that *Archaeological Chemistry IV* is not really the fourth but actually the eighth in a series of "Symposia on Archaeological Chemistry" sponsored by the Division of History of the American Chemical Society. The first such symposium was held in 1950 and was published as a series of journal articles in 1951 (see Caley, *Journal of Chemical Education* 28:64-66), the third in 1962 was published as *Archaeological Chemistry* (Levey, ed., 1967), and the fourth in 1968 was published as *Science and Archaeology* (Brill, ed., 1971). For some reason all record of the second symposium seems to have been lost. Beginning with the fifth symposium in 1972, the papers have been collected into volumes published in the *Advances in Chemistry* series sponsored by the society. The first, titled simply *Archaeological Chemistry*, was edited by Curt W. Beck and published in 1974; the second in the series was edited by Giles F. Carter and published as *Archaeological Chemistry II* in 1978; the third, *Archaeological Chemistry III*, was edited by Joseph B. Lambert and published in 1984.

It is interesting to compare the context of *Archaeological Chemistry IV* with that of the earlier volumes published in the series, as well as with the published papers from the two earlier symposia before the series was started. It may be possible to discern some trends...but on the other hand, any apparent tendencies may merely be products of historical serendipity.

Of the 35 published papers from the 1950 and 1962 symposia, nearly one-third (12) focus on analysis of metals, while pottery and general methodological discussions follow in frequency. Geographical distribution of sources of objects discussed is relatively balanced. In the three *Archaeological Chemistry* volumes, there is a notable increase in the number of methodological papers, with nearly one third (17) of the 55 contributions devoted to consideration of methods, and at least five of these cover dating techniques. Analysis of organic materials is

likewise much more prominent in the later sets of papers, and glass is a subject of several contributions. Metals and ceramics are correspondingly de-emphasized. With respect to geographical area, the New World seems to see a greater increase in contributions than do other areas. In this most recent volume, *AC IV*, the growing emphasis on study of organic materials appears to continue (no doubt because of the presence of five papers on textiles), and geographically most of the materials reported on come from Europe or the Mediterranean.

It is tempting—but perhaps dangerous—to speculate on why these trends or pseudotrends may exist. Perhaps over the last ten years or so more publishing outlets have developed for dissemination of research findings of metals and ceramics analysis, because they are so common. (An example would be the *Ceramics and Civilization Series* published by the American Ceramic Society.) Or, the "trends" may reflect changing patterns of development of and access to the necessary instrumentation to conduct the studies. In addition, it is not unlikely that these differences reflect scholarly changes within the fields of chemistry, archaeology, and art history, changes that facilitate the conjoining of new methods and materials in order to answer new questions. A history of the field of archaeological chemistry would itself be an intriguing topic for a paper in a future volume. As a final note on trends, it should come as a pleasant surprise to interested readers that the trend of sharply increasing prices of these volumes has been arrested; *AC IV* costs no more than does *AC III*.

The papers in these collections are typically authored collaboratively, and directed primarily toward an audience of chemists. They are highly technical, and an archaeologist might quibble that anthropological interpretations are often slighted. However, it must be remembered that the papers are published as part of a chemistry series, and anthropological contexts and inferences can be (and usually are) detailed elsewhere. It is somewhat exasperating that, as a consequence of bibliographic style, these volumes do not serve well as introductions to the broader literature on analysis of the diverse materials covered in the papers. The books use an abbreviated style for references in which the titles of journal articles are omitted, and only the journal name is given. Nonetheless, *Archaeological Chemistry IV* and the other books in the series are extremely valuable reference tests representing the most recent advances in the field of archaeological chemistry, and are eminently deserving of careful reading.

Book Reviews

Greek and Cypriot Pottery: A Review of Scientific Studies. R. E. Jones. British School at Athens, Athens, Greece, 1986, xxxi + 938p., figures, tables, plates, appendices, references, microfiche, £45 (cloth).

Reviewed by Ronald L. Bishop, Conservation Analytical Laboratory, Smithsonian Institution.

About 30 years ago the Eastern Mediterranean area became the focus of long-term ceramic compositional studies, particularly through the application of optical emission spectrography (OES) and more limited use of instrument neutron activation analysis (INAA). These compositional studies, supplemented by observations on ceramic petrography and technology, are the subject of a detailed review and synthesis by R.E. Jones. Centered about the archaeology of the Greek and Cypriot area, the analytical data reported in this volume are important to an Americanist readership, not necessarily because of their substantive contributions, but because of the methodological lessons that they illuminate.

Until fairly recently, the application of physico-chemical techniques to the study of archaeological ceramics by numerous physicists, chemists, and ceramic technologists might best be described as a period of technique development and exploration. The involvement of several laboratories, personnel, and archaeological projects has yielded data that vary widely both in quality and purpose. The disparateness of the data leads Jones to conclude that the research has arrived at a conceptual watershed. The emphasis in ceramic research in the area has shifted from a stage of analytical observation toward more systematic attempts to understand variability in physico-chemical data and the relationship of that observed variation to cultural materials and processes. But when the accumulated analytical data are evaluated relative to the "standards" or objectives of contemporary archaeology, archaeologists can rightly question what has been gained.

No other part of the ancient world has been the recipient of so much scientific analysis of archaeological ceramics as the Aegean and Cypriot areas in the Eastern Mediterranean. The analytical programs have addressed questions regarding the range of materials exploited for local ceramic production, the relationship of the mainland to nearby islands, and the indication of economic relationships at the extra-regional level. While many laboratories have been involved in the research, continuous activity in the region is due to the effort of the Research Laboratory for Archaeology and the History of Art at Oxford (RLAHA) and, since its establishment in 1974, the Fitch Laboratory in the British School at Athens.

The Fitch Laboratory, in particular, pursues the characterization of archaeological materials, especially ceramics, throughout the Eastern Mediterranean as a primary objective of its research program. The author's previous affiliation with RLAHA and his role as Director of the Fitch Laboratory provide him with an excellent position from which to evaluate developments in Aegean and Cypriot ceramic analysis and to assess the contribution of the analytical activities relative to the regional archaeological interests.

The book was written as a "stock taking" of the literature through 1983. It attempts to bring together, in a critical review, all scientific studies of Greek and Cypriot pottery and to assess what has been gained in increased archaeological understanding. From a practical standpoint, this was a Herculean task, for the data are dispersed in journals, books, and reports in both the scientific and archaeological literature. No less a task was that of organizing the information. Despite the difficulties, Jones has met the challenge well. The contributions by W.W. Phelps, C.B. Mee, H.W. Catling, and J. Boardman to the volume assist in placing the analytical work in an archaeological perspective.

Chapter 1 defines the scope of the book and places physico-chemical analysis within an evolving archaeological science. Here, as elsewhere, Jones notes that the future progress of technical ceramic analysis will depend upon not just the potential of the scientific applications but on how well the archaeologists and their scientific collaborators are prepared to "grasp" the potential.

Jones has organized the chemical or petrographic characterization of pottery through reference to 1) the *production center* with its associated kilns, wasters, accessible clays, or concentration of pottery in a range of "related fabrics"; 2) *local pottery* that has been produced at or near the site under investigation, usually occurring in abundance; and 3) *imported pottery* whose source of production may be poorly understood, if at all. Emphasis has often been placed on the characterization of the local pottery of a particular ceramic class that will serve as "controls" or compositional references against which the compositional similarity of other pottery can be evaluated by various statistical procedures.

Jones realistically questions the representativeness of any selected sample for analysis when viewed against the full range of ceramic materials and the generally limited understanding of the regional archaeology. He notes that a bias existed in many earlier analytical efforts when the fine, highly decorated wares were more frequently the focus of chemically-based investigations. The Fitch results

Pottery (continued on p. 15)

Meetings Announcements

The 1991 Society for American Archaeology Meeting includes the following symposia on archaeometric topics: Folsom archaeology: Early Holocene paleoecology (organized by M. Jodry); Analysis of pollen and microfossils (general session); Folsom archaeology: Early Holocene human adaptation (D. Stanford); Quantitative methods: Expert systems and sampling (general); Computers, statistics, sampling, and pattern recognition (general); Techniques for spatial analysis: New World (general); Physical anthropology and demography (general); Method in the madness: Capturing and assessing variation in the archaeological record via exploratory data analysis (R.A. Hawkins); Ceramic paste characterization: Methodology, techniques, and recent applications (H. Neff); An archaeological perspective on geophysical prospection, or when not to dig (J. Weymouth and R. Dalan); Using archaeometry: The role of physical sciences in archaeology (C. Pierce); Cave and rockshelter formation processes (D.T. Nash and M.D. Petraglia).

The upcoming Scandinavian Archaeometry Center Symposium on Modern Tools in Archaeometry (Gothenburg, Sweden, May 23-25; see listing below) includes the following presentations: DNA and archaeology (Pääbo); The brittle sound of ceramics - Can vases speak? (Åström and Kleiner); Asbestos vessels in northern Scandinavia during Bronze and Iron Age (Hulthén); Reconstructing ceramic technology of Ganges Valley: Some problems (R.N. Singh); A quantitative approach towards understanding the Narhan ceramic assemblage (A.K. Singh); Ground penetrating radar and its use in archaeometry (Sigurdsson); Archaeomagnetic investigations in Denmark (Abrahamsen and Breiner); Archaeological surveying with the Topometer (Lund); Application of radar and magnetic methods at medieval Kalö (Sigurdsson and Abrahamsen); Direct dating of ancient rock paintings (Rowe, Russ and Hyman); Dendrochronology: Three pieces of medieval wood (Bråthen); SIMS and its application in archaeology (Fischer, Odelius and Lodding); Early medieval copper-alloy artifacts: chemical and technical analysis (Mortimer); Trace element studies by Laser/DC-arc OES of some bronze artifacts from the Roman import to Scandinavia (Bollingberg); Advanced image processing and digital mapping as a tool for quantitative analysis in the SEM and electron microprobe (Northover and Salter); Antike Längenmasse - deren Genauigkeit und Entwicklung auseinander (Rottländer); Neolithic flora and fauna from the Kashmir Valley, India (Naseem); Computer-aided radiography analysis in forensic odontology (Borrman and Rydmark); DNA in bones from the Rössberga megalith (Persson).

The European University Centre for the Cultural Heritage announces the following remaining events in its 1990-91 program: Pompeii and archaeometry; Laminated sediments and archaeology (June); Data processing in classical archaeology (Sept.); Mediterranean archaeoceramics (Sept.); Vulcanology and archaeology III - 50th anniversary of the Vesuvius Observatory (Sept.); Underwater archaeology and archaeometry (Autumn, 1992). Contact Eugenia Apicella, General Secretary, European University Centre for the Cultural Heritage, Villa Rufolo, I 84010 Ravello, Italy; phone 39 (0)89-857669; fax 857711.

An international symposium on "Data Management and Mathematics in Archaeology" will be held at the 12th Congress of the Union Internationale des Sciences Préhistoriques et Protohistoriques, 1-7 Sept., 1991, in Bratislava, Czechoslovakia (see listing below). The symposium, sponsored by UISPP Commission 4, will consist of four half-day sessions. Contact: A. Voorrips, President, UISPP Commission 4, I.P.P., University of Amsterdam, Singel 453, 1012 WP Amsterdam, The Netherlands. In the U.S., contact: K. Kintigh, Secretary, UISPP Commission 4, Department of Anthropology, Arizona State University, Tempe, Arizona, 85287.

The 6th meeting of the European-based "Groupe de Travail No. 1: Industrie Osseuse Peu Elaboré" (Working Group on Bone Modification) will be held at the Institut de Paléontologie Humaine, Paris, 11-13 Sept., 1991. The meeting will be held in a workshop format, with presentations, discussion, and inspection of archaeological and experimental bone materials. Discussion of multilingual, descriptive nomenclature is an important part of the workshop. Proceedings are normally published as an issue of *Artefacts*. For more information, contact Susanne L. Miller, Paleontology Laboratory, Idaho Museum of Natural History, Idaho State University, Campus Box 8096, Pocatello, Idaho 83209-0008.

The National Park Service announces a training course on "Geophysical Techniques in Archeology", 11-13 June, 1991 in Las Animas County, Colorado. It is designed to provide a practical application of geophysical instruments (electronic survey, magnetometer, terrain conductivity, ground penetrating radar) available for identification, evaluation, and ultimately the conservation and preservation of cultural resources. Contact Steven De Vore, National Park Service, Rocky Mountain Regional Office, (303)969-2875, or FTS 327-2875. Application deadline is May 3.

Meetings Calendar

Susan Mulholland, Archaeometry Laboratory, University of Minnesota-Duluth, 10 University Drive, Duluth MN 55812; email: SMULHOLL@UMNDUL; phone: 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.

April 1991

- * April 2-3. Annual Meeting of the Paleopathology Association. Milwaukee, Wisconsin, USA. Eve Cockburn, 18655 Parkside, Denver, Colorado 48221, USA.
- * April 3-6. 60th Annual Meeting of the American Association of Physical Anthropologists. Milwaukee, Wisconsin, USA. Lorna G. Moore, Program Chair, University of Colorado at Denver, Dept. of Anthropology Campus Box 105, P.O. Box 173364, Denver, Colorado 80217-3364, USA.
- * April 12-14. 1991 Northwestern Plains Archaeological Symposium: State of the Art. Billings, Montana, USA. John C. Rogers, Montana Archaeological Society, 535 Howard Ave., Billings, Montana 59101, USA.
- April 13-17. Association of American Geographers, Annual Meeting. Miami, Florida, USA. Linda Snyder, Conference Assistant, AAG, 1710 16th St. NW, Washington, DC 20009-3198, USA. (202-234-1450; fax 202-234-2 744).
- April 14-18. Institute of Mining and Metallurgy, 6th International Symposium and Exhibition. London. IMM, The Conference Office, 44 Portland Place, London W1N 4BR, U.K.
- * April 19-21. 2nd Southern-European Conference on Archaeometry; co-sponsored by the European Cultural Centre of Delphi. Athens. Dr. Y. Liritzis, c/o ECCD, Karneadou 13, 106 75 Athens, Greece (01-7226 913-15; fax 7230 676). Objective of the meeting is to address the status of applications of archaeometric methods to southern European archaeological problems.
- April 22-25. Geographical Information Systems - Multiple Representation and Multiple Uses; sponsored by the International Geographical Union. Dr. Milan Konecny, Department of Geography, Masaryk University, Kotlarska 2, 611 37 Brno, Czechoslovakia (05-740-500; fax 42-5-24680). Abstract deadline: 8/15/90.
- * April 22-24. Geological Society of America, Rocky Mountain and South-Central Sections. Albuquerque, New Mexico, USA. G. Randy

Keller, Dept. of Geological Sciences, University of Texas, El Paso, TX 79968-0555, USA. (505-277-4204)

- * April 22-26. European Geophysical Society 16th General Assembly. Wiesbaden, Federal Republic of Germany. EGS Office, Postfach 49, 3411 Katlenburg-Lindau, Federal Republic of Germany. (49-5556-1440; fax 49-5556-4709; telex 965564 zil d.)
- April 23-28. Society for American Archaeology, 56th Annual Meeting. New Orleans, Louisiana, USA. Timothy Kohler, Department of Anthropology, Washington State University, Pullman, WA 99164. Submission deadline: 10/1/90.
- April 29-May 3. Material Research Society Spring Meeting. Anaheim. Merry Geil, MRS, 9800 McKnight Rd., Pittsburgh, Pennsylvania 15237, USA (412-367-3003).

May 1991

- May 2-3. 22nd Annual Pittsburgh Conference on Modeling and Simulation. W.G. Vogt, Modeling and Simulation Conference, 348 Benedum Engineering Hall, University of Pittsburgh, Pittsburgh, Pennsylvania 15261, USA. Abstract deadline: 1/31/91. Topics include social, economic, geography, regional science, and global modeling and simulation.
- * May 8-11. Canadian Archaeological Association Annual Meeting. St. John's, Newfoundland, Canada. Dr. Ralph Pastore, Dept. of History, Memorial University of Newfoundland, St. John's, Newfoundland, A1C 5S7, Canada.
- * May 11. 14th Annual Spring Systematics Symposium: Origin of Anatomically Modern Humans. Chicago, Illinois, USA. Sophia L. Brown, Dept. of Geology, Field Museum of Natural History, Roosevelt Road and Lake Shore Drive, Chicago, Illinois 60605-2496, USA. (312-922-9410, ext. 298)
- * May 12-18. International Symposium on Land Subsidence. Houston, Texas, USA. Ivan Johnson, A. Johnson Inc., 7474 Upham Ct., Arvada, CO 80003, USA. (303-425-5610)
- May 20-24. 14th International Radiocarbon Conference. Tucson, Arizona, USA. Dr. Austin Long, Department of Geosciences, University of Arizona, Tucson, AZ 85721 (fax 602-621-2672; Bitnet: C14@ARIZRVAX). 12(4):10.
- May 20-24. Short Course on X-Ray Powder Diffractometry and Spectrometry. Austin. College of Engineering, University of Texas, Austin, Texas 78712, USA (512-471-3506).
- May 23-25. Modern Tools in Archaeometry; sponsored by the Scandinavian Archaeometry Center.

Meetings Calendar

Gothenburg, Sweden. Dr. Peter M. Fischer, SAC Chairman, Department of Physics, Chalmers University of Technology, S-142 96 Gothenburg, Sweden (46-031-723431; fax 46-031-723436; Email(EARN) F8BUE@SECTHF51).

- * May 26-30. 178th Meeting of the American Astronomical Society. Seattle, Washington, USA. AAS, 2000 Florida Ave. NW, Suite 300, Washington, D.C. 20009, USA (tel 202-328-2010). The Historical Astronomy Division includes contributed papers on archae-astronomy.
- * May 26-30. 53rd European Association of Exploration Geophysics Meeting. Florence, Italy. Conference Secretariat, EAEG/EAPG Florence 1991, ENIC, Via S. Caterina d'Alessandria 12, I-50129 Florence, Italy (39-55-477871; fax 39-55-495348). Includes archaeological applications.
- * May 27-June 22. XVII Pacific Science Congress. Honolulu, Hawaii, USA. XVII Pacific Science Congress, 2424 Maile Way, 4th floor, Honolulu, Hawaii 96822, USA (tel 808-948-5976).
- May 27-29. Geological Association of Canada Annual Meeting. Toronto. J. Fawcett, Department of Geology, University of Toronto, Toronto, Ontario, Canada M5S 1A8.
- May 28-June 1. American Geophysical Union Spring Meeting. Baltimore, Maryland, USA. AGU Meetings, 2000 Florida Avenue NW, Washington, DC 20009, USA (202-462-6900).
- May 29-June 2. European Association of Exploration Geophysicists, 53rd Annual Meeting. Florence, Italy. Evert van der Gaag, EAEG, Wassenaarseweg 22, NL-2596 CH The Hague, The Netherlands.
- May 30-31. Discussion Meeting on the Foraging Strategies and the Natural Diet in Monkeys, Apes and Humans. London. Scientific Meetings Secretary, The Royal Society, 6 Carlton House Terrace, London SW1Y 5AG, U.K.

June 1991

- June 2-6. Annual Meeting of the American Nuclear Society. Orlando, Florida, USA. ANS, Meetings Department, 555 N. Kensington Ave., La Grange Park, Illinois 60525, USA (312-352-6611).
- June 4-6. 5th International LIMS Conference. Egham, Surrey, U.K. Registrar, 5th LIMS Conference, PO Box 341, High Wycombe, Buckinghamshire HP11 2QG, U.K.
- June 9-14. 27th Colloquium Spectroscopicum Internationale. Bergen. Secretariat of XXVII, HSD Congress-Conference, PO Box 1721 Nordnes, N-5024 Bergen, Norway (47-5-318414; fax 47-5-324555).

- * June 10-12. Continental Isotopic Indicators of Climate. Chapman Conference, Jackson Hole, Wyoming, USA. Peter K. Swart, RSMAS/MGG, University of Miami, 4600 Rickenbacker Causeway, Miami, Florida 33149, USA.
- June 15-19. American Society of Mammologists, Annual Meeting. Manhattan, Kansas, USA. M.E. Hight, Department of Biological Sciences, Marshall University, Huntington, West Virginia 25755.
- * June 17-22. Maya Ceramic Workshop. San Ignacio, Cayo, Belize. Dr. Anabel Ford, MesoAmerican Research Center, Social Process Research Institute, University of California, Santa Barbara, California 93106.
- * June 22-28. CG International '91. Computer Graphics Society and MIT. Cambridge, Massachusetts, USA. N.M. Patrikalakis, Program Chair CG '91, MIT, Rm. 50428, 77 Massachusetts Ave., Cambridge, Massachusetts 02139, USA (617-253-4555; email-nmp@deslab.mit.edu)

July 1991

- * July 1-3. International Conference on Computing 1991. Imperial College of Science and Technology, London, U.K. General Chair E. Ash CBE FRS, Imperial College of London, Exhibition Road, London SW7 2AZ, United Kingdom (+44 1 589 5111)
- July 7-11. 47th International Conference of Americanists. New Orleans, Louisiana, USA. Secretariado ICA 1991, Roger Trayer Stone Center for Latin American Studies, Tulane University, New Orleans, LA 70118-5698, USA.
- * July 8-11. 11th International Symposium on Ostracoda. Warrnambool, Victoria, Australia. Peter J. Jones, Bureau of Mineral Resources, P.O. Box 378, Canberra A.C.T. 2601, Australia. (06-249-9737; fax 06-257-6465)
- * July 22-26. International Symposium on Biochemical Genetics and Taxonomy of Fish. Queen's University of Belfast, Northern Ireland. Dr. A. Ferguson, EE Biology, Queen's University, David Keir Building, Belfast BT9 5AG, Northern Ireland.
- July 29-Aug. 2. 18th Annual Conference and Exhibition on Computer Graphics and Interactive Techniques. Las Vegas, Nevada, USA. Smith Bucklin and Associates, 111 East Wacker Dr., Chicago, IL 60601, USA (312-644-6610).

August 1991

- Aug. 2-9. 13th INQUA International Congress on Quaternary Research. Beijing. Secretariat, 13th INQUA Conference, Chinese Academy of

Sciences, 52 Sanlihe, Beijing 100864, People's Republic of China.

- Aug. 11-24. International Union of Geodesy and Geophysics, 26th General Assembly. Vienna. F. Wiederstein, BM fuer Land-und Forstwirtschaft, Hydrographisches Zentral-buro, Marxergasse 2, A-1030 Vienna, Austria.
- * Aug. 12-16. International Conference on Scanning Tunneling Microscopy and Related Techniques. Interlaken, Switzerland. Ch. Gerber, IBM Research Division, Zurich Research Laboratory, CH- 8803, Rueschlikon, Switzerland.
- Aug. 13-16. Sedimentary and Paleolimnological Records of Saline Lakes. Saskatoon. Robin W. Renaut, Department of Geological Sciences, University of Saskatchewan, Saskatoon, S7N 0W0, Canada (306-966-5683; fax 306-966-8593).
- * Aug. 15-18. SEPM Mid-Year Meeting - Continental Margins: Tectonics, Eustacy and Climate Change. Portland, Oregon, USA. Susan Green, SEPM, P.O. Box 4756, Tulsa, Oklahoma 74159-0756.
- Aug. 18-23. International Symposium on Engineering Geology in a Desert Environment, Rock-Water Interaction. Jerusalem. The Secretariat, International Symposium on Engineering Geology in a Desert Environment, Rock-Water Interaction, PO Box 50006, Tel Aviv 61500, Israel. 13(1),18.
- Aug. 26-30. 12th International Mass Spectrometry Conference. Amsterdam. RAI Organisatie Bureau Amsterdam, Europaplein 12, NL-1078 GZ Amsterdam, The Netherlands.

September 1991

- Sept. 1-7. International Union of Prehistoric and Protohistoric Sciences, 12th Congress. Bratislava, Czechoslovakia. Archeologicky stav Slovenskij Akadmie Vied, Sekretarit XII Kongresu UISSP, 949 21 Nitra-hrad, Czechoslovakia. 12(4),4.
- * Sept. 2-4. Prospecting Glaciated Terrain. Edinburgh, Scotland. Conference Office, Institution of Mining and Metallurgy, 44 Portland Place, London W1N 4BR, U.K.
- Sept. 6-11. Paleoecology, 2nd International Congress. Nanjing. Ma Yu-Ying, Nanjing Institute of Geology and Palaeontology, Academia Sinica, Chi-Ming-Ssu, Nanjing 210008, People's Republic of China.
- Sept. 10-13. Conference on Advances in Instrumentation and Techniques for Electron and Other Microscopies. Bristol, U.K. Meetings Office, Institute of Physics, 47 Belgrave Square, London SW1X 8QX, U.K.
- * Sept. 15-19. 6th International Congress of Auxology. Madrid, Spain. Abstract deadline March 15, 1991. 6th International Congress of Auxology,

Companiz Hispaboamericana del Turismo, Edificio Espana, Gran via, 88, 28012 Madrid, Spain.

- * Sept. 16-21. 15th International Meeting on Organic Geochemistry. University of Manchester. Dr. D.A.C. Manning, Dept. of Geology, University of Manchester, Manchester M13 9PL, U.K.
- * 6th North American Fur Trade Conference. Mackinac Island, Michigan, USA. Dennis M. Au, Project Director, 6th North American Fur Trade Conference, 1221 Meadowbrook Dr., Evansville, Indiana 47712, USA.

October 1991

- Oct. 6-11. 8th International Congress on Human Genetics. Washington, DC, USA. John J. Mulvihill, M.D., Secretary-General ICHG, 9650 Rockville Pike, Bethesda, MD 20814, USA. Abstract deadline: Spring, 1991.
- * Oct. 7-11. International Conference on Archaeometrical Research Veszprem, Hungary. Mrs. Katalin Siman, Archaeological Institute Hungarian Academy of Science, Budapest, Pf. 14, H-1250, Hungary.
- + Oct. 21-24. Geological Society of America Annual Meeting. San Diego, California, USA. Vanessa George, GSA, Box 9140, Boulder, CO 80301, USA (303-447-2020).
- Oct. 27-Nov. 1. Soil Science Society of America Annual Meeting. Denver, Colorado, USA. SSA, 677 S. Segoe Road, Madison, WI 53711, USA (608-273-8080).

November 1991

- * Nov. 3-8. Optical Society of America Annual Meeting. San Jose, California, USA. Optical Society of America, 2010 Massachusetts Ave. NW, Washington, D.C. 20036, USA.
- * 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 (415-329-5430).
- * Nov. 14-16. Archaeological Stone - Scientific and Technical Studies. London. Dr. A.P. Middleton, Research Laboratory, British Museum, London WC1B 3DG, U.K. A symposium concerned with scientific approaches to the characterisation of stone materials and their procurement from the earliest times.
- * 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

Meetings Calendar

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

December 1991

- * Dec. 12-13. American Association for the Advancement of Science. Washington, D.C., USA AAAS, 1333 H St. N.W., Washington, D.C. 20005, USA (202-326-6400)

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- * 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
- * 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 (202-223-9774)
- * 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. (902-426-6759)
- * July 12-18. International Working Meeting on Soil Micromorphology. Townsville, Queensland, Australia. Dr. C.J. Chartres, CSIRO Division of Soils, GPO Box 639, Canberra ACT Australia 2601 (61-6-246-5953; fax 61-6-246-5965). Program may include micromorphology in archaeology).
- * Sept. 1-7. 8th Congress of the European Anthropological Association. Madrid, Spain. Maria Dolores Garralda, Seccion de Antropologia, Facultad de Biologia, Universidad Complutense de Madrid, Ciudad Universitaria, 28040 Madrid, Spain.
- * 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. (202-232-8800)

Pottery (continued from p. 9)

Laboratory, using the same approach as the RLAHA, embarked upon a project to compensate for such uneven coverage and extended analysis to a more representative range of ceramics in an effort to develop a "pottery map" of the Aegean area. Despite the efforts expended, the results of the extensively applied OES analytical approach

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were limited by an inability to differentiate effectively among the targeted production centers. Consequently, OES was abandoned by the Fitch Laboratory in favor of atomic absorption spectrometry. While these AAS data might not meet the original objectives of the researchers, they can provide a compositional framework that will contribute to the structuring of future investigations.

Data produced by other laboratories, several of them using neutron activation analysis, have contributed to the Aegean compositional mapping. Neutron activation analysis is acknowledged by Jones as being the most powerful approach for provenance studies. Petrographic investigations have also contributed but have been directed more toward the goal of characterizing a body of material rather than attempting to isolate a source of the ceramic paste. Although sections of the volume contain discussions of Aegean and Cypriot ceramic technology and ethnoarchaeological investigations, they are used, like the petrographic information, only to offer an additional perspective in which to view the chemical data that are at the heart of Jones' review.

Chapter 2 provides a condensed introduction to the different techniques that have been used for pottery characterization and provenance studies, including OES, neutron activation analysis, atomic absorption spectrophotometry, Mossbauer spectroscopy, and wet chemical analysis. Sampling procedures and choice of elements are discussed, followed by a useful discussion of the effects of burial of pottery in the Aegean region. Several methodological considerations underlying compositional investigations, such as the appropriate number of samples to consider, what constitutes an outlier, or the relative specificity of the reference group, are set forth.

Methods of data analysis are discussed in Section B of Chapter 2 by A.M. Pollard, a person well acquainted with the complexities of compositional data analysis. He outlines a numerical system used by the Oxford researchers; these general procedures form the basis for several reinterpretations of the data subsequently discussed in the chapters by Jones. Almost buried in Pollard's presentation, however, is the statement that no single system or approach can be considered as best for all occasions.

The 650 pages of Chapters 3-8 are presentation of the analytical data for Aegean and Cyprus and pottery, arranged by region and period. Individual chapters focus on the Regional Survey of Pottery Characterization Data (Chapter 3); Characterization and Provenance Studies of Greek Neolithic and Early Bronze Age Pottery (4); Provenance Studies of Aegean Middle Bronze Age Pottery (5); Provenance Studies of Aegean Late Bronze Age Pottery

(6); Cyprus, 2500-500 BC; the Aegean and the Near East, 1500-1050 BC (7); and Provenance Studies of Greek Pottery of the Historic Period (8).

A standardized mode of presentation is used in Chapters 4-8. A brief introduction to the archaeological background, which offers a context for the ceramic analyses, is followed by a report of the analytical results including the technique(s) employed, the laboratory that conducted the measurements, and reference to publications reported the raw data. The major part of each chapter involves setting forth the specific geological background and description of the individual samples: their analytical reference numbers, institutional source, traditional archaeological designation, and available museum accession numbers. As might be expected, the information varies somewhat depending upon the region, site, or project. Tables of actual compositional data are avoided when they are available in the cited publications. A microfiche that lists previously unreported OES data generated by the RLAHA and Fitch Laboratory is also included. Each geographic sub-section concludes with a short summary that offers an assessment of what has been accomplished through the analytical effort.

The summary sections contain important statements not only about the understanding of regional ceramic production and distribution but also about methodological considerations. Interpretative limitations are seen to be especially evidence for regional or site-specific compositional groups that are based on samples that are too few in number or too variable in composition to lend themselves to ready characterization. The frequent need for petrographic examination to aid in the ceramic characterization is a recurring theme.

Chapters 4-8 are meant primarily as works of reference and should be consulted for specific information. It would be unfortunate, however, if the volume were not read more generally. Anyone interested in ceramic compositional investigations will find that all sections have much to say about research design, methodology, and data interpretation. Especially enlightening, if not sobering, is Catling's discussion of physico-chemical studies of Cypriot pottery from the site of Idalion. He illuminates the interrelated nature of problem definition, applicability of comparative material, and sampling design; failure to consider each factor will severely compromise the analytical effort being made. Catling's comments could be applied to many other projects, in the Old or New World, where analytical zeal outraced the establishment of a firm characterization of locally produced pottery, where results were questionably interpreted, or where projects were undertaken by individuals insufficiently versed in the relevant archaeological information (p.574).

The specific focus of the volume on the ancient Aegean and Cypriot world is both a strength and weakness. It provides the necessary room to present the data but narrows the reading audience. Readership will be restricted by the book's physico-chemical emphases and by a price of over \$100.00. Several production flaws were found in the review copy including the fading of several pages, inconsistencies in the bolding of subject headings, and a weak backing that was starting to break by the end of this review. The general index is short, on a single page, suggesting that reader would be better served by referring to the index according to sites. Maps are abundant and of definite help to the reader and line drawings (frequently of principal component plots) are clear. The photographs of sherds, however, seem more obligatory than necessary and are often of poor quality.

An unfortunate convention of abbreviations is used throughout the book: laboratories, scientific techniques, types of numerical data analysis, chronological designations, pottery types, periodicals, books and papers are all abbreviated. Perhaps a reader of a single section would master the abbreviation conventions by the time the section was completed. The casual reader, however, will make frequent referral to the abbreviation table. Distraction caused by the numerous abbreviations is worsened by additional abbreviations being defined within the text. Not to have used abbreviations at all would have been an unsatisfactory solution and would have added greatly to the already prodigious volume. Some compromise, however, would have been welcome.

Notwithstanding the limitations and problems noted above, Jones has accomplished a formidable task, one that will surely result in the more effective use of previously dispersed data. He has reviewed the data within an archaeological context. He and his contributors have provided a critical assessment of what archaeological interpretations can be drawn from the data and how they were derived. If there is a lack of satisfaction with the volume it is likely to be due to the realization of how much research effort has been expended and how frequently only minimal archaeologically meaningful interpretations resulted. Fortunately, we are offered more than just a multiyear object lesson about the perils of poor design, inadequate sampling, or use of analytical approaches that are sufficient to meet archaeological objectives. Aegean and Cypriot specialists will find analytical data on the region's archaeological ceramics cited, summarized, and ably critiqued. Beyond the regional interests, Jones and his collaborators provide the reader with a clear, data-intensive, statement of directions in which scientific studies of archaeological ceramics must go if future investigations are to advance. There is much in this book that requires thought and for this Jones should be commended.



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Published quarterly by the Society for Archaeological Sciences.

Deadlines for Submissions:

No. 1 November 15 No. 2 February 15
 No. 3 May 15 No. 4 August 15

Distributed to subscribers: \$10.00/year individual, \$5.00 student, \$15.00 institution, \$150.00 lifetime. Payable with major credit cards: provide card number and expiration date. ISSN 0899-8922.