

# SAS Bulletin

## Society for Archaeological Sciences

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### SAS News

#### New Book Reviews Editor

We are pleased to announce that Robert H. Tykot will take over the position of Book Reviews Editor. Rob is currently a Research Assistant in the Harvard Archaeometry Laboratories, responsible for the processing of bone and ivory samples for dietary and provenience information. Rob is finishing up his Ph.D. in the Department of Anthropology at Harvard. His thesis is entitled "Prehistoric Trade in the Western Mediterranean: The Sources and Distribution of Sardinian Obsidian" under the direction of N. J. van der Merwe. His research interests are in the emergence and interrelations of Bronze Age civilizations; exchange systems; subsistence and diet; metallurgy; ancient technology; and archaeometry. He is a member of SAS, SAA, AAA, and AIA.

If you have a particular book that you would like to review yourself or to have reviewed for the Bulletin, send the title to Rob. The reviewer is entitled to a complimentary copy of the book, publisher willing, and the kudos due to all contributors to the Bulletin.

Rob and I have also discussed the possibility of doing an occasional software review as well. We'd be interested in feedback from our readership.

#### SAS Phytolith Symposium - Call for Papers

An SAS-sponsored symposium on phytolith analysis is being organized for the 57th Annual Meeting of the Society for American Archaeology to be held April 8-12, 1992, at the Pittsburgh Hilton & Towers, Pittsburgh, Pennsylvania, USA.

Symposium title: Phytolith Analysis in the 90s: Applications in Archaeological Interpretation  
Organizers and chairs: Susan C. Mulholland and Amy L. Ollendorf

Symposium abstract: Continuing research in phytolith analysis increasingly shows the wide applicability of the discipline to archaeological questions. Diet, farming techniques, animal husbandry, domestication processes,

site formation processes, and climatic reconstruction are a few of the various topics able to be addressed through phytolith analysis. This symposium will focus on the interpretation of phytolith data in relation to archaeological objectives and goals. Short abstracts (100 words), participant information, and registration information are due by SEPTEMBER 1, 1991, to Dr. Susan Mulholland, Archaeometry Laboratory, University of Minnesota-Duluth, 10 University Drive, Duluth MN 55812, USA. Phone: 218/726-7957; fax: 218/726-6556; BITNET: SMULHOLL@UMNDUL; Internet: smulholl@ub.d.umn.edu .PLEASE NOTE: SAA requires all presenters to submit registration form and fee at the time the symposium package is submitted.

#### News Flash - SAS Election Results

In one of the closest elections in SAS history, Erv Garrison has been elected as Vice President/President-elect. Congratulations to both candidates on a clean race! Chris Pryor was unanimously elected (unopposed) as Secretary/Treasurer. The current slate of officers will be inaugurating our two-year terms of office. All the more time to generate a coherent and effective leadership.

#### Request for Assistance

The purpose of this letter is to interest someone with the necessary skills to come to the Northwest Territories this summer and excavate (without destroying) a few unoccupied wolf dens. I am interested in the denning ecology of wolves. Wolves bring bones of prey animals to the den and those bones accumulate over time because wolves tend to use dens repeatedly. In one case, the first use may have been over 700 years ago. Like packrat and hyrax middens, wolf dens may also provide a record of changes in prey species abundance and the history of occupancy among dens in the high arctic, low arctic and taiga regions.

*Doug C. Heard, Caribou/Wolf Biologist, Wildlife Studies Section, Wildlife Management Division, Government of the Northwest Territories, Yellowknife, N.W.T. Canada X1A 2L9/ telex: 034-45528.*

## Research Report: Ancient DNA Studies

Pediatric Research Genetics Laboratory

Hershey Medical Center, Penn State University

The mission of the Pediatric Research Genetics Laboratory at the Milton S. Hershey Medical Center of the Pennsylvania State University is the study of human molecular genetics. Although the primary focus is on inherited developmental anomalies, there is a vigorous research program devoted to nucleic acid analysis of ancient preserved remains.

Our principal studies in molecular archeology involve the analysis of mummified remains from coastal Peru and Chile. This work is a collaborative effort with Dr. Joseph Salvo, a molecular biologist at the Biological Sciences Division of General Electric Corporate Research and Development. A variety of tissues from over 50 individual specimens (dated between 500 and 3000 B.P.) have been provided to us by Drs. Marvin Allison of the Medical College of Virginia and Arthur Aufderheide of The University of Minnesota at Duluth. These paleopathologists have also made probable diagnoses on individuals where autopsies were possible. This information can be extremely useful in selecting particular tissues for subsequent molecular analysis.

### A Typical Project: Origins of American Indians

Allan Wilson and his colleagues have developed a possible human lineage based on private and shared DNA polymorphisms in the mitochondrial genomes of descendent populations. The identification of informative polymorphisms in mummified specimens may potentially reveal ancestral relationships among different populations. Muscle tissue, which is frequently well-preserved in our specimens, is highly enriched in mitochondria. Since these sequences represent internal nodes in the human phylogeny, they may improve the accuracy of the tree topology based on contemporary sequences. In other words, on ancestral sequence (with associated geographical and chronological information) may be able to resolve ambiguous dendrogram bifurcations in cases where the descendant clades cannot be distinguished on the basis of mutational distance alone.

The proposed prehistoric human migration models can be evaluated by comparing DNA polymorphism distributions in contemporary and ancient Indian populations. Of the more than 3000 polymorphic nucleotide sites in the mitochondrial genome, only a small proportion of these workers have been shown to be correlated with Asian ancestry. For example, 20% of contemporary individuals of Asian ancestry carry a single copy of a 9 base pair (bp) sequence in the mitochondrial genome, while most of the world's population contains an exact

duplication of this sequence. Although this marker could have dispersed across the Asian continent subsequent to the migration of peoples to North America, the presence of this marker in DNA isolated from ancient (or contemporary) Indians would create a possible link to the Asian subgroup. Mitochondrial DNA sequences from a prehistoric North American Indian from the 8,000 year old

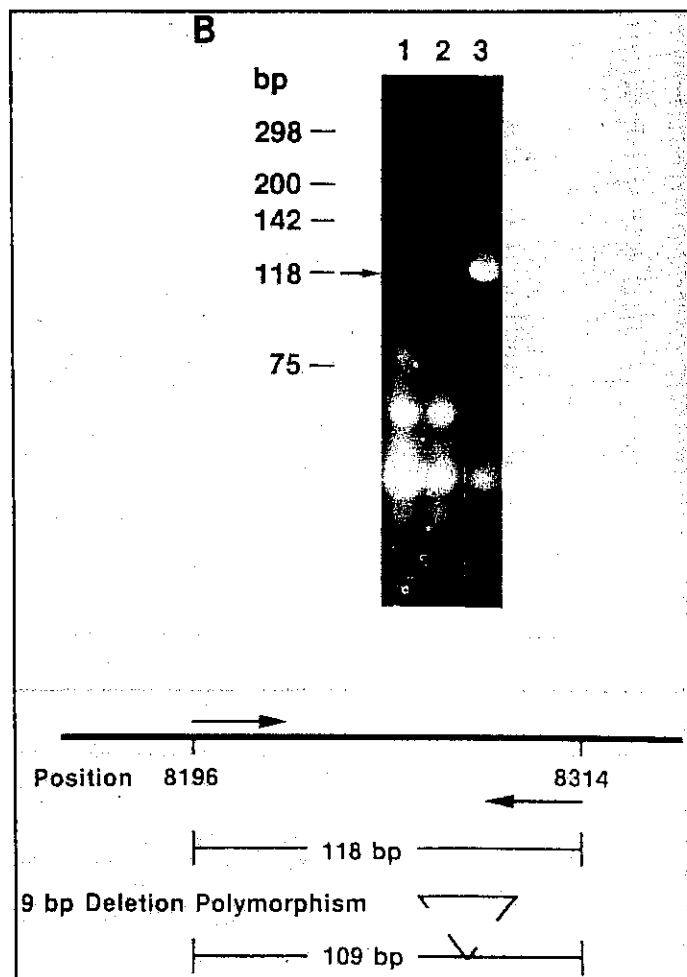


Figure 1. Amplification of a polymorphic mitochondrial sequence in Chilean mummified remains. *Above:* Lanes 1 and 2 represent PCR reaction products derived from mitochondrial DNA amplification of 2 different individuals excavated from a pre-Columbian site ( $^{14}\text{C}$  analysis:  $600 \pm 15$  yrs. BP) near Arica, Chile. Lane 3: Control amplification with a contemporary DNA template (P.K.R.). Markers are given in base pairs (bp). *Below:* Schematic depiction of reaction products. Approximately 20% of the contemporary Asian population carries a 9 bp deletion which would generate a 109 bp amplification product.

Windover site in central Florida and several pre-Columbian Chilean mummies have been found to retain the common duplication (Fig. 1). Analysis of a greater number of samples will be required to pursue this potential link to Asia. In contemporary populations of South American, Central American and Northwestern Indians, the single 9 base sequence element has been observed. The Windover specimen did, however, include several informative sequence variants that are known to exist in a small group of Japanese lineages. More extensive mitochondrial sequence information will be needed, however, to define the number and extent of early migrations into the new world.

#### Methodology: Modification of Conventional Molecular Biological Techniques

Nucleic acid can be isolated from ancient remains using methodologies similar to those developed for contemporary, living tissue. Necrotic processes generally diminish DNA yields more than 100-fold, even where decomposition is not immediately evident. The reduced yields are likely to be due to both endogenous biochemical activities and exogenous chemical reactions promoted by the environmental context. Cellular autolysis increases the activity of nucleases which act on DNA by digesting it into small fragments. The rate of autolysis correlated with both the moisture context of the tissue and the storage temperature. The remarkable preservation of long DNA molecules at low temperatures or in arid environments most likely is due to the constant inhibitory conditions that prevent decomposition.

Nucleic acid yields and sizes may also be affected by chemical reactions that occur independently of autolysis. Oxidative damage can introduce lesions which, for example, can lead to strand scission. The effects of nucleic acid oxidation can, by themselves, make the analysis of DNA sequences more difficult, since the enzymes used to perform this analysis are often inhibited by these modifications. While DNA damage is clearly prevalent, there must be stretches of uncorrupted sequences present in ancient specimens because we can retrieve some DNA sequences.

The polymerase chain reaction (PCR) has had a major impact on many facets of molecular biology, but ancient DNA analysis, in particular, has been revolutionized. PCR embodies many challenging technical requirements in a single, simple procedure. The polymerase chain reaction can amplify specific domains of preselected DNA sequences from a small number of template molecules. The major reaction product is a double-strand DNA fragment that can be purified, sequenced, cloned or restriction mapped.

Amplification of ancient DNA via PCR does not routinely generate the predicted products, since oxidatively damaged nucleic acids can inhibit the reaction. Dr. Salvo and I have modified the standard PCR conditions by incorporating a repair synthesis step prior to amplification. This made it possible to overcome inhibition in 70% of the individual tombs that we surveyed. This approach also appears to overcome the size limitation previously observed in some PCR amplifications since products as long as 250 bp were routinely obtained. Finally, we have found that the pre-repair of ancient nucleic acids improves the fidelity of the amplification reaction, as judged by the analysis of a highly conserved, known human ribosomal gene sequence.

DNA (continued on p. 6)

## News of Archaeometallurgy

This is not a happy period for archaeometallurgy. We have lost two very active contributors to the field and, at this writing, Cyril Stanley Smith is seriously ill but at his home, 31 Madison Street, Cambridge, Massachusetts 02138, telephone (617) 491-1916. In 1990 in addition to the loss of Ronnie Tylecote on June 16th, Ken Barraclough passed away October 15th and Bill Rostoker December 19th. Obituaries for them will follow in the next issue.

Meetings scheduled for the near future include the Second Annual Conference of the Mining Museum in Leadville, Colorado. For information write Duane Smith, Arrangements Chairman, Mining History Association, P.O. Box 150300, Denver, Colorado 80215.

An International Conference on Medieval Archaeology to be held September 21-24 at the University of York will include metalworking and mining. The registration fee is £75, with residence included £175. For information write Medieval Europe 1992, 1 Pavement, York YO1 2NA United Kingdom, telephone (0904) 643211.

The Annual Conference of the Historical Metallurgy Society will be held September 20-22 at the University of Glasgow. Optional excursions in the area are being planned. For information and reservations write Miss S.J. Cackett, Science Museum, South Kensington, London SW7 2DD, telephone (07) 938 8047.

Archaeometallurgy (continued on p. 10)

## Conference Reports

### Categories of evidence from human remains

### Biological Anthropology and the Study of Ancient Egypt; British Museum Colloquium, London, July 1990

*Reviewed by Delwen Samuel, University of Cambridge*

This colloquium was sponsored by the Department of Egyptian Antiquities, British Museum, and the Bioanthropology Foundation, Sausalito, California. The first two days covered a variety of topics concerned with physical anthropology, while the final day was devoted to bioarchaeology (zoology and botany). Although the geographic and cultural theme was ancient Egypt, studies from other regions illustrated approaches which could be usefully applied. The final session was an appraisal of bioanthropology in general for the study of ancient Egypt.

#### Groups of Human Remains

The first papers discussed skeletons, from whole populations of varying dates in Sudanese Nubia (Prof. George Armelagos, U. of Florida), to a specific group of four skeletons buried close together in Abusir (Eugen Strouhal, National Museum, Prague). These studies concentrated on the relationships between individuals, using the information which each yielded to make broader deductions about the group. Comparisons between skeletal material and grave goods from Naga-ed-Der were made to discuss burial practices (Patricia Podzorski, Lowie Museum). Simon Hillson and W.A. Scott (Institute of Archaeology, London) illustrated a new statistical model for describing the range of variation within a population, using ancient skulls from Sedment (9th Dynasty) and Badari (predynastic).

Incidence of disease and injury and their effect on individuals and populations was discussed by several participants. The diseases looked at in detail were: tuberculosis (Dr. Jane Buikstra, U. of Chicago), schistosomiasis (Dr. Robert Miller, U. of Cambridge), and cranial injuries of Canary Islanders (Drs. Martin, Anton, and Gonzalez, Tenerife, while a survey of incomplete ancient Nubian remains excavated early this century from Aswan covered a variety of rather gruesome ills and injuries (Theya Molleson, Natural History Museum, London). In the course of this session, Corinne Duhig described the very large collection of ancient Egyptian human remains held at Cambridge, and appealed for investigators to come and study them.

Dr. Benson Harer (San Bernadino) began the second day with a well presented overview of health in ancient Egypt. The next two papers dealt with dental evidence. These were a general discussion of dental anthropology (Prof. Jerome Rose, U. of Arkansas), and an interesting study relating tooth development to growth (Simon Hillson again). Prof. Fawzia Hussien (National Research Center, Cairo) presented a reassessment of the controversial skeletal remains which some have thought to be those of Akhenaten (tomb 55, Valley of the Kings). She concluded that the bones are not those of the so-called heretic pharaoh.

The remainder of the day was given over to Dr. Svante Pääbo (U. of California), Dr. Robert Hedges and Dr. Robin Sykes (U. of Oxford), and J.H. Goudsmit (U. of Amsterdam) discussing a relatively new field: the study of ancient DNA. These were challenging presentations for the non-specialist. Nonetheless, the speakers made clear both that this technique is still very much in the process of development, and that DNA analysis will be a valuable tool for many of the questions which are asked about human remains.

#### Zooarchaeology and Archaeobotany

The first session on Friday illustrated the range of techniques which can be applied to the study of archaeobotany. Taking advantage of the excellent preservation in Egypt, combined with modern collecting work, a survey is being compiled of the development of Egypt's flora, from the Holocene to the present day. This valuable work is under the direction of Dr. Nabil el-Hadidi (Herbarium, U. of Cairo). Dr. John Edmonson and Dr. Piotr Bienkowski (Liverpool Museum) followed with the results of chemical analysis, a technique only recently used in archaeobotany, to identify essential oils from a Greco-Roman funeral wreath. The final paper of the morning was presented by Alan Clapham (U. of Cambridge), on the wide-ranging goals for archaeobotanical research which can be applied to a settlement site.

Bioarchaeological case studies comprised the second session. A wealth of animal remains in graves and village contexts from Kerma has allowed some fascinating cultural conclusions (Dr. Louis Chaix, Natural History Museum, Geneva). The next two papers looked at preliminary work on the archaeobotany (Mary Ann Murray) and zooarchaeology (Dr. Barbara Ghaleb) of Memphis (both Institute of Archaeology, London). Finally, an interdisciplinary approach to the study of bread and beer in ancient Egypt was described by Delwen Samuel (U. of Cambridge).

## Conference Reports

### Final appraisal

A theoretical paper (Friedrich Rösing, U. of Ulm) and a deliberately provocative discussion by field director Dr. Mark Horton (U. of Oxford) presented two very different overviews. As with all the papers, these provoked questions and comments, although the latter sparked particularly lively debate.

Several themes emerged over the three days of presentation, and these were further developed during the final discussion. Many people emphasized the need to apply standards to data recovery, recording, and analysis. This is a prerequisite for cross-comparison between sites, otherwise it is difficult for any individual study to be set in a wider context. However, before broad comparisons can be made, it is essential to establish the range of variability within populations or assemblages of biological material. It was suggested that physical anthropologists should concentrate on small local populations, before trying to compare widely dispersed individuals or groups. Much attention was given to the problem of aging human remains, and the desirability of conducting a study of an ancient and documented population as was done for Spitalfields in London. However, this leads to another problem: the frequent lack of suitable material available for study, and the difficulty of post-excavation research on Egyptian material.

It is unusual to find the broad spectrum of bioanthropology presented in one conference, and valuable for participants to hear of work which is normally outside their immediate reference. As the colloquium progressed, it became clear that information exchange amongst all specialists, and between specialists and archaeologists, is crucial. Breadth of outlook was strongly advocated by many participants throughout. After such stimulating discussion, it is good to hear that the colloquium will be published. Speed is aimed for, particularly because the field is changing so rapidly

**Archaeological Integration: Association for Environmental Archaeology (AEA), Autumn conference 1990.**

*Reviewed by Delwen Samuel, University of Cambridge.*

This conference, held in Cambridge, England, was organized by Dr. Peter Rowley-Conwy and Dr. Rosemary Luff, and attended by about 75 people altogether. The theme was the contribution of environmental archaeology to the interpretation of sites, and the integration of all aspects of archaeology. With these goals in mind, papers

were divided among four sessions: (1) Successful case studies and methods; (2) The specialist as project director; (3) Integrated studies; and (4) Integration: current achievements and problems. The conference structure was good, in general the papers of a high standard, but the audience often insipid. The proceedings are to be published.

The first session was opened, unconventionally for an environmentally-based group, by a ceramicist. Problems of data collection which so often plague the environmental archaeologist are common to other specializations. Chris Going graphically described how things can go drastically wrong when the specialist is not involved from the start. He contrasted this with successful examples of communication and pooling of ideas: numismaticists, ceramicists, vulcanologists, seismologists and historians working together were able to time the destruction of Chorion, Cyprus, to within twenty minutes. The theme of coordination and communication was constantly repeated throughout the two days, both as an approach which yields far more detailed results, and for the unfortunates among us, as a desperate hope for an ideal archaeological world.

From there we were taken to the daunting total organic preservation at Qasr Ibrim, Egypt. Peter Rowley-Conwy showed that artefacts assumed to relate to occupation, as on any "normal" site with little organic preservation, may actually be later abandonment debris. This surely has very important implications for interpretation. To a very different climate next; Paul Buckland talked about Bessastadir, Iceland, and the various classes of artefact which have suggested differential status and activity areas. (He talked briefly first on evidence for body paint on Lindow Man.) Beautiful landscape shots of the Outer Hebrides were included in Alix Powers' slides, illustrating her study of phytoliths ancient and modern to learn about ecological areas used by past inhabitants. We also had a look at some bone assemblages from Neolithic and Bronze Age sites on Down Farm, England (Tony Legge), and what happens to fish bones when they get digested (Andrew Jones). The morning session ended with Nick Winder demonstrating the data base he has developed to record animal bones efficiently (Faunal Remains Unit Database - FRUD). It looked good to me. Could anyone do the same thing for seeds, insects, shells, soils, pollen, and everything else?!

The afternoon session featured "the specialist as project director". We heard Geoff Bailey talking about Klithi in Greece; Mark Robinson describing excavations at Mingies Ditch, by the River Windrush; Frank Green and Kris Lockyear discussing an urban site in Romsey; J. Innes' pilot study to locate wetland sites by non-destructive means; and further geographic variation with Umesh Chattopadhyaya who took us to the earliest known sites in

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the Ganges Valley and Vindhya in India. Bob Wilson also gave a paper on spatial patterning of bones and artefacts in the Upper Thames Valley.

Most people, both presenting and commenting, took exception to references to "the excavator" and "the specialist", as this implies specialists are not archaeologists, and the two roles are completely separate. Several speakers agreed that having first studied environmental artefacts, they were more aware than many directors about proper recovery, study of environmental remains and natural (as opposed to human-created) deposits, as well as the coordination of all sources of data afterwards. Geoff Bailey encouraged constant trial of excavation techniques, to develop the strategy best suited for each site. A willingness to learn from techniques which were not entirely successful, in order to improve future excavations, was advocated by several speakers. A good attitude, it seems to me.

Sunday morning and the third session started rather early for some, with James Rackham on the problems encountered when trying to integrate different types of archaeological data. He brought up the topic of developer funding, an issue which is causing particularly grave concern amongst English archaeologists (more of which below). The emphasis, repeated throughout the day, was the necessity of including environmental work as an integral part of any excavation, from the very first planning and costing stages. The remainder of the morning was taken up with site case studies where integration is actively and successfully pursued: Amarna in Egypt (Rosie Luff - animal remains; Delwen Samuel - bread and beer project); Tofts Ness, Sanday, Orkney (Steve Dockrill - director; Ian Simpson *in absentia* - soils; Annie Milles - snails; Janet Ambers - carbon isotope analysis; J. Bond and G. Davis - plant and animal remains); and Abu Salabikh in Iraq (Nicholas Postgate - director; Wendy Matthews - soil micromorphology; Keith Dobney - animal remains).

In the final session, various excavators and specialists were asked to discuss current achievements and problems with integration. Achievements were little examined; the focus was on problems. Very necessary to deal with, I suppose, but depressing. Two points emerged most strongly.

First of all, environmental archaeologists working in Britain are on the defensive. Again and again people spoke of their work being considered peripheral, not part of the general research strategy, an afterthought, or being given lip service, with nothing behind the fine words. Some made outright denials of specialization. There are many archaeological administrators and even, still, directors of sites who undervalue the environmental contribution.

However, this conference can leave no doubt that people who specialize, in whatever branch of archaeology, produce more interesting and meaningful results if they can: i) be actively involved from the beginning and spend at least part of the time on-site (not necessarily digging); ii) be personally familiar with where their material comes from; iii) know how it relates to stratigraphy, architecture, and other classes of artefact; and iv) share and coordinate their findings with other members of the team.

The second point which arose from the final session and particularly during general discussion was the perennial problem of funding. Everyone feels underfunded. Part of the inferior status some participants experience comes from this. Intensive discussion was stimulated by the changes in funding now being implemented. In England, English Heritage has been responsible for funding, but the government wants rescue archaeology to be entirely funded by developers. As Phil Dixon pointed out, this means that budgets must include environmental work as an integral part of excavation, and that there will be an end to extra dollops of money after digging is over and the samples have piled up. Is this not a challenge, and an opportunity? A big concern was the lack of obligation for developers to get excavations published.

I personally was disappointed in the final discussion. From the first it was directed to the subject of funding (with nearly total focus on the situation for archaeology in England). The conference theme, integration, was completely lost. Many of the case studies and examples were inspiring. A discussion of them, and how to encourage integration as a standard archaeological goal,

### DNA (continued from p. 3)

#### Summary

We, and others, have developed new nucleic acid analytical methodologies that have made it possible to retrieve ancient mitochondrial and genomic DNA sequences. These studies have contributed to knowledge about the patterns of human population migration. The potential of ancient nucleic acid analysis to make contributions in paleopathology, molecular evolution and population genetics depends on improved methods, which in turn, requires a more comprehensive understanding of post-mortem chemical processes.

Peter K. Rogan, Department of Pediatrics, College of Medicine, The Milton S. Hershey Medical Center, PO Box 850, Hershey, PA 17033.

## Book Reviews

**Photography in Archaeology and Conservation.**  
Peter G. Dorrell. Cambridge University Press,  
1989, 262 p., illus., biblio., index, \$39.50 (cloth).

*Reviewed by Martha S. Joukowsky, Center for Old World Archaeology & Art, Brown University.*

It is fortunate that I was asked to review this book just as I was preparing to train two new field photographers for my upcoming Corfu excavation. Peter Dorrell, a veteran of 30 years' field experience in archaeology, has provided a safe and informative guide to photography in the field and the museum. This guide will enable photographers and field workers to understand better the complexities of field archaeology. Although the author assumes a basic knowledge of the principles of photography (p. 8), he speaks directly to the demands of, and problems inherent in, field archaeology. He further addresses the unique needs of the archaeologist in recommendations of equipment and materials that take cost, time constraints, and personnel into consideration. Dorrell's book is a greatly needed volume that I recommend highly, with very few reservations.

Peter Dorrell approaches archaeological photography thematically and chronologically in exploring the complexities of the subject. In the first chapter, on "the early days of archaeological photography," the author reviews its development from the daguerrotypes made of North African monuments by the French in the mid-nineteenth century to the first use of photographs over engravings or lithographs in the 1880 publications of Samothrace by Conze et al. Dorrell adeptly gives us the interesting history of the hundred years since "photography in America became the tool of field archaeology."

Following this introduction to the field, Dorrell tackles in the next chapter the subjects of forming an image, perspective and distortion, focusing, and exposure. Strong treatment of "depth of field" and depth of focus reiterates the basic principles of field photography. The chapter also discusses commonly known rules that can bear repetition for most of us who have to compensate for the months we are out of the field, and serves as a fine introduction to the subject at hand.

Chapter 3 is devoted to the cameras and lenses used by archaeologists and conservationists including dark slides, shutters, light meters, and filters. Camera movements are given favor and are discussed in detail, as is the control of the plane of focus (the Scheimpflug principle), which might have been better placed later in the text along with

site photography. The chapter also covers a useful and practical portion on scales and information boards; some illustrations here would have helped to clarify Dorrell's instructions. Also, I might add to this discussion that scales and information boards should be placed in the photograph where they can later be cropped for publication. Finally, this chapter might have addressed use of the gray card and color correction panels, both of which Dorrell does mention later, and suggested the number and necessity of cameras, backs, lenses, and photographic accessories to have on hand for minimal coverage.

Dorrell's next discussion, lighting by flash and stand lights equipment, continues his discourse on equipment in the field and museum. Particularly helpful is his treatment of the use of flash and its position in relation to the camera and the object, and the use of reflectors. The use of more than one flash, diffusion of light, and its use to supplement other lighting are also covered. His advice and cautions in this chapter are words of an experienced archaeological photographer and will probably save many a novice from costly mistakes.

"Photographic materials, processing, and printing" is truly geared toward the frustrations of the archaeological photographer in the problem of field processing. He tackles the role temporary darkrooms play as part of the influence on the excavation. Film processing has an enormous effect on work capability, productivity, and excavation performance issues that impact the whole excavation and its process. Dorrell skilfully analyzes darkroom equipment specifics. Segments on film, processing chemicals, printing materials and quantities of materials, their handling, filing, cataloging, and the long-term storage of processed material leave no question unanswered. All of these topics are absolutely integral to excavation and the treatment of these subjects is important to consider for a successful photographic record.

With Chapter 6, "Architecture and Standing Monuments," and Chapter 7, "Survey Photography," Dorrell shifts from examination of equipment to technique and subject, zeroing in even more exclusively on the special concerns of the archaeological photographer. I take issue with Dorrell's suggestion in the chapter on site photography, however, that a camera left standing on a tripod should be covered with a plastic bag to keep it dust-free. In my experience, condensation successfully rusts the inner workings of equipment. Otherwise, his treatment of the elements of site photography, overall site photographs using towers, quadripods, bipods, monopods, inclined masts, and aerial photography is quite valuable.



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His very specific discussion of the photography of movable objects is well paired with a chapter that addresses the problems of this type of photography and suggests basic guidelines. The principle of ultraviolet and infrared photography are oddly inserted as Chapter 11, but Chapter 12, "Photographing Finds," has strong sections devoted to pottery, coins, glass, flints, tablets, inscriptions, and organic materials. In the discussion of museum materials, I would stress the importance of having a trained conservator on hand to consult the photographer on what aspects of the find are best emphasized. Final chapters on flat copy photographs, paintings, drawings, and plans, and a brief discussion of preparing for publication wrap up the book. Dorrell looks to the future and stresses the importance of the management of files and their preservation.

One of the main reasons this book works is because of Dorrell's integrated approach to tacking archaeological photography. His strategy employs both theory and practical discussion to achieve desired results. Second, he speaks from experience, using invaluable knowledge gained from the field to describe how to provide a better photographic record. Finally, the references, although selected and brief, provide supplementary resources for further information on this subject.

Archaeologists have long been accustomed to using photography, yet resources in this field are few. A useful compilation of sound and sometimes innovative ideas, the general reader will do well to remember that "this book is based on courses in archaeological and conservation photography given to students...when confronted with the progression of ideas." A full reading of the book would be a real boon to field archaeologists and photographers alike. Peter Dorrell's commendable work recognizes that not only excavation, but also the photographic coverage of all site and artifact records are as crucial as the procedures themselves.

Dorrell ends by noting that "Archaeologists and conservators must recognize a duty not only to preserve the past, but to conserve the record of its publication (p. 252)." In this book, he has provided us with a valuable tool toward that end.

*We are happy to be nearly back on schedule with this issue, but summer field work may again delay #3. Look for it later this summer! The SAS Bulletin Board, dormant but not dead, will be reactivated in the Fall. ... The Editor*

### **Aerial Archaeology: Recent Publications By Old World Authors**

**Into the Sun. Essays in Air Photography in Archaeology in Honour of Derrick Riley.** David Kennedy, editor. J.R. Collis Publications, University of Sheffield, Sheffield, England, 1989, x + 211 pp.

**The Emerging Past. Air Photography and the Buried Landscape.** Rowan Whimster. Royal Commission on the Historical Monuments of England, London, 1989, x + 101 pp., figures, tables, references, appendix, £16 (plus £5 shipping to USA).

**Aerial Photography and Geophysical Prospection in Archaeology, vol. 2.** Charles Leva, ed. Proceedings of the Second International Symposium, CIRA-ICL, Brussels, 1990, xi + 280 pp., figures, references, index, price 1380 BEF (incl. postage).

**Rome's Desert Frontier from the Air.** David Kennedy and Derrick Riley. University of Texas Press, Austin, 1990, 256 pp., figures, plates, references, appendix, index, \$42.50 (cloth).

*Reviewed by James I. Ebert, Ebert & Associates, Albuquerque, NM.*

Some American archaeologists, I think, are probably still using aerial photographs and remote sensor data and techniques in their work, but very few are writing and publishing much about it. English and European "aerial archaeologists," as they like to call themselves, have always been more prolific in writing about their work than their counterparts in the United States. Illustrative of this are a number of impressive monographs and edited volumes which have appeared in England, Belgium, and in Texas (the latter written, however, in England) within the last year.

Edited by David Kennedy, *Into the Sun* is a collection of sixteen essays written and compiled in honor of Derrick Riley. This is not, I should point out immediately, an "in memoriam" volume, for as will become apparent below, Derrick Riley is thankfully still with us, and publishing his own work. He is very much a man to be honored, however, having lent both his enthusiasm and scholarship to aerial archaeology for nearly fifty years. The essays included in this volume cover a wide range of subjects, in as wide a variety of styles. The majority of the authors focus on various aspects of surveying, photographing, and interpreting the British and European landscape from the



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air, complete with the many striking photographs that such papers almost always include. Unfortunately, it is this aspect of aerial archaeology that is probably the most difficult for us in this country to relate to our own archaeological problems, because its object is such a different sort of archaeology than we are used to: Roman forts and towns, Medieval field patterns, earthworks and mounds. Three of the essays cover historical topics. John Hampton chronicles the development of the Air Photography Unit of the Royal Commission on the Historical Monuments of England during his twenty years as its director (from 1965-1985), describing changes in the photo archive (which grew from none to nearly 700,000 photographs), in aerial methods, and also in the archaeological record being recorded, much of which has been blurred by modern activities during that time. Barri Jones traces the history of aerial archaeology in North Africa, while David Kennedy presents an analysis of Poidebard's work in Syria in the early 1930's.

Two somewhat more "technical" papers are included as well. Herzog and Scollar, from the Rheinisches Landesmuseum in Bonn, exhaustively illustrate geometric and computer methods for the rectification of oblique aerial photographs, an important topic in Old World aerial archaeology since most of their data are obtained with handheld cameras rather than from vertical mapping photographs. The use of remote sensing in archaeological "predictive modeling" is the subject of the only American contribution to the volume, which I myself wrote. There is some very good material indeed in these two technical chapters, but it is likely that many readers will be so daunted by Herzog and Scollar's equations and matrices (there are 159 in 50 pages), and by the verbiage and total lack of photographs or illustrations in my own essay, that they will miss most of it.

**The Emerging Past: Air Photography and the Buried Landscape**, is written by Rowan Whimster, who is the current head of the Air Photographs Unit of the Royal Commission on the Historical Monuments of England. It is a concise, well-written and edited, and superbly illustrated book focusing on a subject about which Rowan Whimster is undoubtedly the world's foremost expert: ditched earthen enclosures. During a four-year study, Whimster and other archaeologists explored the Welsh Marches and the Trent Valley, two areas in England where soils and crops are especially conducive to crop marks, using all existing aerial photographs of these areas in several extensive archives. They interpreted and mapped more than 1000 settlement enclosures, ring ditches, and shallow structures. Whimster's discussion of the principles of air photographic interpretation and the methods he used are comprehensive, clear, and their utility goes beyond simply interpreting ring ditches. The

photographs in **The Emerging Past** are intriguing and their printing is of the highest quality. Roughly the last two-thirds of the book is devoted to the development of a formal taxonomy of ditched enclosures, accompanied by many illustrations. Upon first consideration, this might seem a bit esoteric - it admittedly is - but it is no more so than just about anything else archaeologists do. The volume concludes with a series of illustrations and analyses of complexes of ditched enclosures and other crop marks, impressing at least this reader with how intriguing it would be to try to figure out what all of that really means. It also makes me just a bit jealous that we don't have much of that spectacular kind of archaeological evidence in North America to look at from the air.

Whimster's monograph illustrates in addition the painstaking care and completeness with which Old World aerial archaeologists approach their studies and their publications. My impression is that the book was written not so much for archaeologists as for the general public, to acquaint them with efforts being made to preserve their past. Government agencies in the United States, in their scramble to be doing something to prevent the destruction of the archaeological record in this anti-vandalism "theme year," might take a lesson from the presentation made by **The Emerging Past**. The public that it was written for is quite obviously approached as being intelligent and able to glean the message that this is a record that should be preserved without being assaulted with fairly mindless posters, leaflets, and book marks.

Another very recent European collection, of which I have not yet obtained a copy, is Volume 2 of **Aerial Photography and Geophysical Prospection in Archaeology**, edited by Charles Leva and published by the Centre Interdisciplinaire de Recherches Aeriennes (CIRA) in Brussels. It contains papers in English, French, and German which seem largely to be case studies involving the use of aerial photographs for the discovery and mapping of structures or other features. Some of the more potentially interesting papers, to judge from their titles, discuss combining magnetometer and photographic evidence digitally, and the rectification of data from oblique photos using PC-based software. Many of the aerial archaeologists familiar from the aerial archaeological literature have contributed (including Derrick Riley and Rowan Whimster), but some names that I at least have not seen before are there as well. A paper by two of these, Daels and al Saadi, "The Detection of Old Irrigation Patterns in Mesopotamia Based upon the Interpretation of Aerial Photographs and Satellite Images," sounds particularly interesting. Another promising title is "Prospektionsmassnahmen im fruhmittelalterlichen Herrensitz Duna/Osterode am sudwestlichen Harzrand," by Klappauf and Wilhelmi.

## Book Reviews

**Rome's Desert Frontier from the Air**, by David Kennedy and Derrick Riley, is a spectacular example of what an "aerial archaeology" publication should be. It is not a collection of short reports, but an exhaustive treatment of what for these two aerial archaeologists is obviously a "labor of love," the exploration of Roman vestiges in the Middle East from the air. Unlike many aerial archaeological publications, which should have many photographs but do not, this book is full of them, and its 188 illustrations in and of themselves could occupy a reader (or more properly, looker?) for many nights. I know that archaeology is supposed to be a science, but the sheer imaginative possibilities of the products of aerial archaeology become obvious when one leafs through the photographs presented here - projecting one back through time to that of the Roman legions and their forts, roads, and walls. Imagine the colonial inspiration that caused them to inhabit the inhospitable deserts and boulder fields of the Mediterranean coast and Mesopotamia; imagine the living conditions, the hostile inhabitants who required huge earthworks and fortifications. Imagine soldiers away from home for years or decades, many of who probably never came "home," and the logistics that were required to support them. Imagine also that people have used the spectacular facilities created by the Romans as a framework for their subsequent communities for more than 2000 years. Derrick Riley's infatuation with discovering and recording archaeological sites from the air originated in his experiences as a Royal Air Force pilot in World War II, and one might only hope that this country's current military involvement in the Middle East spawns a few future aerial archaeologists, as well.

The preface and introduction to Kennedy and Riley's volume detail the history of Roman occupations of the Middle East as well as aerial archaeologists' exploration thereof. It may qualify as a short but definitive history of the Roman occupation there, but it also distinguishes itself as a history of the aerial exploration of that area. Chapter one, "Physical and Human Geography," and Chapter two, "Historical Survey," could serve as a text in classical archaeology by themselves. The third chapter, "History of Archaeological Air Reconnaissance and Photography in the Middle East," outlines the exploits of those who (borne aloft by their powerful Vincent aircraft) were adventurers the likes of whom we don't really have anymore. Indiana Jones threw his revolver into his suitcase, but I will bet that these early aerial archaeologists kept them on the belts of their flying suits.

The next chapters in Kennedy and Riley's book cover water supply (extensive dry wells or *foggara*), double-lined roads through boulder fields extending dozens of miles, camps

and siege works, fortresses, forts, towers, and "miscellaneous" encampments and earthworks. They conclude saying that it is difficult to assign dates and building sequences to these sites, and that aerial reconnaissance is just an initial stage of investigation. Be that as it may, their aerial reconnaissance and their photographs of these vestiges of the Roman frontier are one of the most thought-provoking presentations of "raw" data I have seen recently. Add to that the fact that this book is available here in the USA, which means that you won't have to get a bank draft for British pounds or Belgian francs. (Why do the European presses always require bank drafts, which cost again as much to obtain as the amounts they are made out for? Do they think we are going to speculate on changing exchange rates?)

The Old World aerial archaeological literature that has appeared during this last year provides evidence of an energetic enthusiasm for this subject that we cannot come close to matching in the United States. It is my suspicion that our lack of attention to archaeological remote sensing may be due to a shift, among archaeological scientists here, towards geographic information systems technologies. Geographic information systems are only as good as the data they are used to integrate and analyze, however, and much of these data will eventually come from remote sensing sources. It is to be hoped that we can keep our interest in such data collection alive; the work of the British and European aerial archaeologists, as explicated in the literature they are producing, may provide the inspiration for this.

It may be that I am overlooking work done by American "aerial archaeologists." I would urge those SAS members who are currently using photointerpretation and remote sensing methods in their work to contact me so that I can report on their research in future columns.

### News of Archaeometallurgy (continued from p. 3)

A conference on New Perspectives in Western Mediterranean Archaeology: Models from Sardinia and Iberia will be held October 4-6 at Tufts University in Medford, Massachusetts, near Boston. For information write Professor Miriam S. Balmuth at Tufts or telephone (617) 381-3216.

There will be more and, let us hope, happier news in the next issue. If you have any archaeometallurgical news to contribute, please call or write:

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

## 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.

### May 1991

- May 23-25. Modern Tools in Archaeometry; sponsored by the Scandinavian Archaeometry Center. Gothenburg, Sweden. Dr. Peter M. Fischer, SAC Chairman, Department of Physics, Chalmers University of Technology, S-142 96 Gothenburg, Sweden (tel 46-031-723431; fax 46-031-723436; Email(EARN) F8BUE@SECTHF51).
- 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 28-June 1. American Geophysical Union Spring Meeting. Baltimore, Maryland, USA. AGU Meetings, 2000 Florida Avenue NW, Washington, DC 20009, USA (tel 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 (tel 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 (tel 47-5-318414; fax 47-5-324555).

- + June 10-14. 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 10-14. 5th International Symposium on Radiation Physics. Dubrovnik, Yugoslavia. A. Ljubicic, ISRP-5, Ruder Boskovic Inst, P.O. Box 1016, 41001 Zagreb, Yugoslavia (tel 41-434-426).
- June 11-13. Geophysical Techniques in Archaeology, Training Course. Las Animas County, Colorado, USA. Steven De Vore, National Park Service, Rocky Mountain Regional Office, PO Box 25287, Denver, CO 80225-0287 (tel 303-969-2875). 14(1):14.
- 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 21-27. 103rd Annual Meeting, Astronomical Society of the Pacific. Laramie, Wyoming, USA. Wyoming Meeting Information, ASP, 390 Ashton Ave., San Francisco, California 94112, USA (tel 415-337-1100).
- \* June 22-28. Course on Advanced Techniques in Magnetic-Resonance Imaging. Kiawa Island, South Carolina, USA. G. Allan Johnson, Dept. Radiology, Box 3302, Duke University Medical Center, Durham, North Carolina 27710, USA (tel 919-660-2711).
- 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 (tel 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 (tel 44 1 589 5111)
- \* July 2-5. International Conference on Complexity: Fractals, Spin Glasses, and Neural Networks. Trieste, Italy. International Centre for Theoretical Physics, P.O. Box 586, Miramare, Strada Costiera 11, I-34100 Trieste, Italy.

## Meetings Calendar

- 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. (tel 06-249-9737; fax 06-257-6465)
- \* July 8-12. 2nd International Conference on Industrial and Applied Mathematics (ICAM 91). Washington, D.C., USA. SIAM Conference Coordinator, Dept. CC0990, 3600 University City Science Center, Philadelphia, Pennsylvania 19104, USA. (tel 215-382-9800; fax 215-386-7999; email [siamconfs@wharton.upenn.edu](mailto:siamconfs@wharton.upenn.edu))
- \* July 10-13. Former ENSO Phenomena in Western South America: Records of El Nino Events. Lima, Peru. ENSO 1991 International Symposium, ORSTOM, Apartado 18-1209, Lima 18, Peru (fax 51-14-40-87-73).
- \* July 15-18. 4th Interdisciplinary Conference on Natural Resource Modeling and Analysis. Barcelona, Spain. P. Rubies, Inst. de Ciencias del mar, P. Nacional s/n, 08039 Barcelona, Spain (tel 3-310 64 16; fax 3-319 98 42; email [ccicm@ceab.es.bitnet](mailto:ccicm@ceab.es.bitnet)).
- 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 (tel 312-644-6610).
- Burlington House, London, W1V 0BN, United Kingdom (tel 071-437-8656; fax 071-437-8883; telex 268001).
- Aug. 11-24. International Union of Geodesy and Geophysics, 26th General Assembly. Vienna. F. Wiederstein, BM für 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 Res. Div., Zurich Res. Lab., CH-8803, Rueschlikon, Switzerland.
- + Aug. 13-16. Sedimentary and Paleolimnological Records of Saline Lakes. Saskatoon, Saskatchewan, Canada. Robin W. Renaut, Department of Geological Sciences, University of Saskatchewan, Saskatoon, S7N 0W0, Canada (tel 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. Secretariat, International Symposium on Engineering Geology in a Desert Environment, Rock-Water Interaction, PO Box 50006, Tel Aviv 61500, Israel. 13(1),18.
- \* Aug. 22-28. 1st International Meeting of Young Geologists. Budapest, Hungary. Anna Balog, Dept. of Geology, Technical University of Budapest, H-1521 Budapest, Hungary (tel 36-1-16-67-370; fax 36-1-16-66-808; telex 225931).
- \* Aug. 25-30. 202nd American Chemical Society National Meeting/4th Chemical Congress of North America. New York, New York, USA. ACS Meetings, 1155 16th St. NW, Washington, D.C. 20036, USA (tel 202-872-4396).
- Aug. 26-30. 12th International Mass Spectrometry Conference. Amsterdam. RAI Organisatie Bureau Amsterdam, Europaplein 12, NL-1078 GZ Amsterdam, The Netherlands.

### 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. 4-8. 42nd American Institute of Biological Sciences Annual Meeting. San Antonio, Texas, USA. Meetings Department, AIBS, 730 11th St. NW, Washington, D.C. 20001, USA (tel 202-628-1500).
- \* Aug. 4-9. 15th International Congress of Biochemistry. Jerusalem, Israel. 15th IUB Congress, P.O. Box 50006, Tel Aviv 61500, Israel.
- \* Aug. 4-10. 5th International Conference on Bioinorganic Chemistry. Oxford, United Kingdom. Dr. John F. Gibson, The Royal Society of Chemistry,

### 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.

## Meetings Calendar

October 1991

- \* Sept. 2-6. International symposium on Computer Applications in Geoscience. Beijing, China. Zhang Bojun, 31 Xue Yuane Road, Beijing 100083, China (tel 2012233, ext. 312; fax 2024674; telex 222484 GBCC CN).
- \* Sept. 3-6. 17th International Conference on Very Large Data Bases. Barcelona, Spain. VLDB '91 - DIFINSA, Av. Republica Argentina, 63, Ent. 4a, E-08023 Barcelona, Catalonia (Spain) (tel 34-3-418.80.67; fax 34-3-418.44.07)
- Sept. 6-11. Paleocology, 2nd International Congress. Nanjing. Ma Yu-Ying, Nanjing Institute of Geology and Paleontology, 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. 11-13. 6th Meeting of the Working Group on Bone Modification. Paris, France. Susanne L. Miller, Paleontology Laboratory, Idaho Museum of Natural History, Idaho State University, Campus Box 8096, Pocatello, ID 83209-0008. 14(1):10.
- 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. 16-18. 2nd International Conference on the Abatement of Acidic Drainage. Montreal, Quebec, Canada. Pamela Friedrich, Centre des Recherches Minerales, 1665, boulevard Hamel, Edifice 2, 1er etage, Montreal, Quebec G1N 3Y7, Canada.
- 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.
- \* Sept. 24-29. 2nd Panamerican Chemical Congress. San Juan, Puerto Rico. G.A. Castillo, Colegio de Quimicos de Puerto Rico, Apartado 1183, Caparra Heights 00922, Calle Penuelas 658, Esq. Hatillo, Hato Rey, Puerto Rico (tel 809-763-6070 or 6076).
- + Sept. 26-29. 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.
- 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. 6-11. Federation of Analytical Chemistry & Spectroscopy Societies. Anaheim, California, USA. Division of Analytical Chemistry, S. Fleming, Du Pont, Experimental Station Bldg. E357, P.O. Box 80357, Wilmington, Delaware 19880, USA.
- 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. 15-18. High Resolution Imaging by Interferometry II. Garching, Germany. Interferometry '91, c/o Christina Stoffer, ESO, Karl-Schwarzschild-Str. 2, D-8046 Garching bei München, Germany.
- \* Oct. 16-19. American Institute of Professional Geologists Annual Meeting. Gatlinburg, Tennessee, USA. Lawrence I. Benson, ERC/EDGE, P.O. Box 22879, Knoxville, Tennessee 37933, USA (tel 615-966-9761; fax 615-966-4155).
- \* Oct. 18-20. Midwest Archaeological Conferene. La Crosse, Wisconsin, USA. Continuing Education Registration, 227 Main Hall, UW-La Crosse, 1725 State St., La Crosse, WI 54601. Symposia topics include geoarchaeology; new techniques in archaeology. Abstract deadline: 9/1/91.
- \* Oct. 21-23. American Association of Stratigraphic Palynologists, Annual Meeting. San Diego, California, USA. Roger Witmer, Unocal S&T, 376 S. Valencia, California 92621, USA.
- Oct. 21-24. Geological Society of America Annual Meeting. San Diego, California, USA. Vanessa George, GSA, Box 9140, Boulder, CO 80301, USA (tel 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 (tel 608-273-8080).

## Meetings Calendar

1992

- \* Oct. 27-Nov. 1. ISA '91: International Conference & Exhibition on Instrumentation, Systems, and Automation. Anaheim, California USA. Meetings Administrator, Instrument Society of America Headquarters, P.O. Box 12277, Research Triangle Park, North Carolina 27709, USA (tel 919-549-8411; fax 919-549-8288).

### 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. 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 (tel 415-329-5430).
- 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. 20-24. American Anthropological Association, Annual Meeting. Chicago, Illinois. American Anthropological Association, 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. 2-7. 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. NW, Washington, D.C. 20009, USA (tel 202-462-6903).

- \* Jan 8-11. Joint Mathematics Meetings. Baltimore, Maryland, USA. H. Daly, AMS, P.O. Box 6248, Providence, Rhode Island 02940, USA.
- \* 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. 23-27. 1st South Asia Geological Congress - GEOSAS-1 Islamabad, Pakistan. Hilal A. Raxa, GEOSAS-1 Secretary General, Hydrocarbon Development Institute of Pakistan, 230-Nazimuddin Road, F-7/4, P.O. Bos 1308, Islamabad, Pakistan (tel 9251-823690 or 821417; telex 5516 HDIP PK; fax 9251-8287730).
- \* 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 Art, 5905 Wilshire Boulevard, Los Angeles, California 90036, USA
- \* April 5-10. 203rd American Chemical Society National Meeting. San Francisco, California, USA. ACS Meetings, 1155 16th St. NW, 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).
- 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).
- 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).

## Meetings Calendar

- \* Aug. 1-14. Meeting to Focus on Global Change. Washington, D.C. 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. NW, 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).
- 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.
- \* Sept. 7-10. European Anthropological Association, 8th Congress. Madrid, Spain. Maria Dolores Garralda, Seccion de Antropologia, Facultad de Biologia, Universidad Complutense de Madrid, Ciudad Universitaria, 28040 Madrid, Spain.
- \* Sept. 21-25. Paleo-oceanography and Global Change International Meeting. Kiel, West Germany. ICP IV Organizing Committee, c/o GEOMAR Wischhofstrasse 1-3/Building 4, D-2300 Kiel 14, 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).
- \* 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).
- \* 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).
- \* 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)

## Position Announcement

The University of Wisconsin-Madison, Radiocarbon Laboratory. Seeking applicants for *Laboratory Manager* or *Assistant Scientist* position. Position available 1 June 1991.

REQUIRED QUALIFICATIONS. Degree and Area of Specialization: *Laboratory Manager I* title - MS in lab-related discipline, or related knowledge and experience; *Assistant Scientist* title - PhD in lab-related discipline with demonstrated research program.

Minimum number of years and type of relevant work experience: 1-2 years of laboratory experience; knowledge of electronics and low beta radiation instrumentation helpful.

PRINCIPLE DUTIES: Coordinate and be responsible for the operation of the radiocarbon dating laboratory. The lab is responsible for the preparation, burning, and reducing of samples submitted for dating by UW researchers and outside researchers. Activities include maintaining documentation/information on samples, processing of samples, and result write-ups for publication of date lists in the journal *Radiocarbon*. Laboratory personnel coordinate billings, reporting, and publication of results with the Center for Climatic Research departmental office.

Provide occasional guest lectures on dating techniques to students enrolled in courses in Anthropology, Geography, Geology, and Meteorology. Conduct lab familiarization sessions and hands-on sample preparation instruction.

Develop federally-funded projects in collaboration with UW faculty and academic staff.

An individual hired as an Assistant Scientist in this position will, as appropriate, identify research problems, design research methodologies, conduct and participate in research activities. Prepare research results for publication.

TO APPLY: Send resume, and three references to Professor John E. Kutzbach, Director, Radiocarbon Search Committee, Center for Climatic Research, 1225 W. Dayton Street, Madison WI 53706. Phone: 608-262-2839; Fax: 608-262-5964.

Applications must be received by 1 July 1991 for full consideration.

The University of Wisconsin-Madison is an Equal Opportunity Employer.





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