SAS Bulletin
Society for Archaeological Sciences

Volume 15  Number 2  April - June 1992

SAS Membership Reminder

Beginning in 1992, the cost for a regular SAS annual membership is $55.00. This now includes a subscription to the bi-monthly Journal of Archaeological Science (JAS), as well as a subscription to the quarterly SAS Bulletin. SAS members thus save over $200 for the regular subscription rates for JAS. The complete cost schedule is as follows:

<table>
<thead>
<tr>
<th>Membership Type</th>
<th>Direct Payment</th>
<th>Charge*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regular member (receives JAS and SAS Bulletin)</td>
<td>$55.00</td>
<td>$57.75</td>
</tr>
<tr>
<td>Life member (receives JAS and SAS Bulletin)</td>
<td>$45.00</td>
<td>$47.25</td>
</tr>
<tr>
<td>Life member without JAS (receives SAS Bulletin only)</td>
<td>no charge</td>
<td></td>
</tr>
<tr>
<td>Student member (receives JAS and SAS Bulletin)</td>
<td>$50.00</td>
<td>$52.50</td>
</tr>
<tr>
<td>Student member without JAS (receives SAS Bulletin only)</td>
<td>$5.00</td>
<td>$5.25</td>
</tr>
<tr>
<td>Institutional member (receives SAS Bulletin only)</td>
<td>$15.00</td>
<td>$15.75</td>
</tr>
</tbody>
</table>

*Credit/charge cards accepted by SAS include Access, American Express, Carte Blanche, Diners Club International, Eurocard, Mastercard, JCB Card, and Visa. We must add 5% to the rates for those charging their membership/subscription to adjust for the discount rate of credit/charge companies.

In This Issue

Archaeometallurgy
NSF Archaeometry
Phytoliths
Summer Reading
  Materials Issues in Art & Archaeology
  Archäologie & Chemie
  Pollen Analysis
  Archaeological Wood
  Lubbock Lake
  Domestication of Plants in Old World
  Central American Institute of Prehistoric & Traditional Cultures
Meetings Calendar

News of Archaeometallurgy

The Sixth Nordic Conference on the Application of Scientific Methods in Archaeology has been announced for 19-24 September 1993. It will be held at the Esbjerg Conference Centre in Esbjerg, Denmark, and will follow directly upon the 19th Nordic Archaeology Conference, being held 12-19 September in Munkebjerg, Vejle. Transportation between the two sites is being arranged.
The fee in Esbjerg including meals and accommodation will be 4050 Dkr. Registration fee alone is 800 Dkr, which includes the proceedings, the conference dinner and an excursion. Abstracts are due by 1 March 1993 and should be sent to Vagn Mejdlal, The Nordic Laboratory for Luminescence Dating, Riso National Laboratory, DK-4000 Roskilde, Denmark.

The meeting of the Comité pour la Siderurgie Ancienne held last August in Norway was such a success that a reunion in Budalen around 1 July 1994 has been proposed. Write to Professor Arne Espelund at UNIT/NTH Metallurgisk Institute, Alfred Getz vel 2b, N-7034 Trondheim, Norway with your suggestions.

A book list of works on early mining and metallurgy for sale by the Peak District Mining Museum is available by writing the Museum at Matlock Bath, Derbyshire DE4 3NR, England, telephone (0629) 583834. They are official stockists for the Historical Metallurgy Society. They stock the Journals of the Trevithick Society, the Bullets of the Northern Mines Research Society and the Peak District Mines Historical Society, and also many hard to find pamphlets.

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

Martha Goodway, MRC 534, Smithsonian Institution, Washington DC 20560, USA; tel 301-238-3733; fax 301-238-3709.
ARCHAEOLOGY AND THE NATIONAL SCIENCE FOUNDATION

John E. Yellen, Archaeology Program Director

HISTORY AND ORGANIZATION

In 1984 the National Science Foundation (NSF) established an annual archaeometric competition which was administered and funded through its Anthropology Program. Seven years, $6,119,251 and 221 proposals later it seems reasonable both to take stock of progress to date and to share this information with the anthropological community. In part the value of this presentation is historical. However, empirical data presented in this article should provide useful information for potential applicants and should serve as a basis for discussion between the NSF and the anthropological/archaeometric community.

"Over the last seven years significant advances have been made in anthropological archaeometry. The National Science Foundation has assisted in this development, believes the funds awarded were well spent, and plans to continue support to the extent its limited budget allows."

The Anthropology Program supported anthropologically relevant archaeometry research well before the inauguration of an archaeometry competition and such proposals were reviewed in the same context as their strictly archaeological counterparts. Several reasons underlay the decision to establish a named archaeometric competition. First, it served to emphasize the importance NSF attached to such research and the contribution it made to anthropological knowledge. It also signaled the Foundation’s increased financial commitment to such work. Finally, it changed in subtle but significant ways how many archaeometric proposals were evaluated. The Anthropology Program uses a two stage process to review all “senior” (as opposed to doctoral dissertation) research applications; each proposal is evaluated by a unique set of ad hoc reviewers who submit their comments by mail. A panel of ca. 5 members then reads the applications and accompanying reviews, and meets once or twice yearly to make recommendations. On this basis final decisions are made. Obviously the background and perspective of panel members will influence the direction a competition takes and the establishment of a separate “archaeometry” category allowed the creation of a panel which included the necessary expertise and relevant perspectives.

As part of the Anthropology Program, archaeometric proposals are limited to those directed towards questions of anthropological significance. While individual projects often include more than one goal, both “technique development” and “laboratory support proposals” are considered by the archaeometry panel, while requests to apply existing technologies to specific archaeological questions are reviewed by its archaeological counterpart. Thus a radiocarbon laboratory’s request to purchase new equipment or a biochemist’s proposal to explore the dating potential of non-collagenous bone protein both fall within the scope of the archaeometry competition. On the other hand a request for radiocarbon dates to resolve the issue of when cotton cultivation began in coastal Peru would be considered by the archaeology panel. The Program’s goal is to have each application evaluated by the most knowledgeable and potentially sympathetic panel, and since the relative availability of funds is approximately the same across anthropological panels, this distinction should not be a source of concern. The archaeometry panel meets once a year, usually in early April. Proposals should be submitted by the previous October 31 and funding is usually available by the following June. Applicants follow standard NSF grant application procedures and information may be obtained from Dr. John Yellen, Anthropology Program - Room 320, National Science Foundation, Washington DC 20550 (Bimnet: jyellen@nsf; Internet: jyellen@note.nsf.gov). Potential applicants should feel free to call Dr. Yellen directly (202-357-7804).

THE REVIEW PROCESS

Insight into how proposals are reviewed is valuable because it both reveals underlying competition goals and suggests how projects may best be formulated and presented. Although individual circumstances can vary widely, a typical proposal is evaluated for both technical competence and anthropological significance. Ad hoc reviewers are selected with both considerations in mind. If, for example, a researcher proposes to develop a new chemical means to source Southeast Asian jades, reviewers would be drawn from several categories. Technical experts would be selected to comment (hopefully) on whether the applicant had the expertise to develop this type of chemical analysis. Likewise the reviewer group would include a geologist or geochemist who understood the origins and chemical variability of jade materials. Finally archaeologists who could bring an anthropological perspective and Southeast Asian expertise to bear would also be included to consider whether there are significant anthropological questions which the technique might address. Panel members are likewise selected to provide a balance between archaeometric expertise and anthropological perspective. Three of the five panel positions are filled on a (normally) three-year rotating basis.
by individuals who possess both specific technical expertise and experience in interaction with anthropologists. The remaining two places are reserved respectively for a New World archaeologist knowledgeable in Neolithic or post-Neolithic "complex" societies and an Old World archaeologist who specializes in pre-ceramic hunting and gathering groups. In 1991 the panel consisted of Drs. Herbert Hass, William Farrand, Linda Kleppenger, Prudence Rice and Arthur Jelinek. To maximize their chance of success, applicants should be aware of these goals and perspectives and present their research accordingly.

**FACTS, FIGURES AND SPECULATION**

In fiscal year 1988 (FY88) a one-time "big laboratory" competition was held and 13 proposals were submitted. In the following tables and discussion, with the exception of Table 1, proposals submitted in response to the special announcement and dollars expended for this award are excluded.

<table>
<thead>
<tr>
<th>Table 1. Archaeometry Expenditures by Fiscal Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fiscal Year</td>
</tr>
<tr>
<td>1985</td>
</tr>
<tr>
<td>1986</td>
</tr>
<tr>
<td>1987</td>
</tr>
<tr>
<td>1988</td>
</tr>
<tr>
<td>1989</td>
</tr>
<tr>
<td>1990</td>
</tr>
<tr>
<td>1991</td>
</tr>
</tbody>
</table>

As Table 1 indicates, expenditures increased rapidly from an initial $660,825 to approximately $1,000,000 three years later and they have been held at this level. This represents 13% of the FY91 Anthropology Program budget. (The 16 archaeometry proposals constitute 7% of the senior applications submitted in FY91; the Anthropology Program also provides curatorial support for systematic anthropological collections and plays an important role in funding doctoral dissertation research.)

As Table 2 indicates, the number of submissions has decreased from a high of 55 proposals in the FY85 inaugural year to a low of 16 in FY91. The second column shows how many proposals were submitted by first-time applicants, and comparison of the two indicates that the declining submission rate results not from diminished interest by a "hard core" of applicants but rather from decreased recruitment of new individuals. This pattern may indicate both the limited size of the existing potential applicant pool and the slow rate at which individuals are being trained in or attracted to anthropological archaeometry. With the exception of FY89 in which a number of relatively small grants were made, awards have ranged between 5-8 per year and no trend is apparent. The overall FY85-91 success rate (# awards/# proposals x 100) is 23%, but this measure per se is not particularly meaningful since its yearly variation is great and primarily determined by the number of new applicants. If one lumps together yearly increments for multi-year awards, average award size is $129,226 and the average award length is 23 months.

There is both value and hazard which attaches to analysis of what types of proposal fare well and poorly in the evaluation process. Value rests on the fact that a clear pattern does emerge, and this may help to understand underlying decision criteria and to predict what kinds of projects are most likely to succeed. The danger lies in the possibility that creativity may be stifled. Individuals may shy away from submission of proposals which are not perceived as mainstream. This result would be most unfortunate, and at the outset it should be emphasized that a very broad range of projects has been supported. Subject areas include the following dating techniques: radiocarbon, K-Ar and Ar-Ar, uranium series, thermoluminescence, tree rings, ESR, tephrochronology, ostrich egg shell racemization, radiocalcium and rock varnish dating. The Program has supported a range of bone studies focused on isotopes, trace elements and organic components. It has also provided funds for the analysis of ceramics, metals, jade, amber, chert, obsidian and phytoliths.

Success rates, however, have varied markedly across areas. When compared to an overall rate of 23%, both ceramic and metallurgy projects have fared relatively poorly with success rates of 10% (3 awards from 29 applications) and 15% (3/15), respectively. Many, although not all, of these studies involved sourcing; the success rate of requests to source non-ceramic, non-metallic materials is also a low 13% (2/15). Surprisingly none of the 9 obsidian hydration proposals submitted over the years have been funded. This pattern does not reflect an unspoken or informal NSF agenda, but rather results from individual decisions made by a large number of ad hoc reviewers and panelists over 7 years. Post hoc one may suggest several reasons for it. First, such projects can be extremely difficult

<table>
<thead>
<tr>
<th>Table 2. Number of Submissions, New Applicants, Awards and Success Rates by Fiscal Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fiscal Year</td>
</tr>
<tr>
<td>1985</td>
</tr>
<tr>
<td>1986</td>
</tr>
<tr>
<td>1987</td>
</tr>
<tr>
<td>1988</td>
</tr>
<tr>
<td>1989</td>
</tr>
<tr>
<td>1990</td>
</tr>
<tr>
<td>1991</td>
</tr>
</tbody>
</table>

NSF (continued on p. 16)
Phytolith News

Society For Phytolith Research

We are pleased to announce the formation of a new society, The Society for Phytolith Research. The goals of this society are to disseminate new information in phytolith research and to promote interdisciplinary contacts among researchers. Dues have been set at US $10.00 per year for regular members and US $7.50 for students. Subscribers will receive The Phytolitharian Newsletter. Please make checks (US funds, please) payable to the Society for Phytolith Research. Please send your check to John G. Jones, Society for Phytolith Research Treasurer, Smithsonian Tropical Research Institute, Unit 0948, APO AA, Miami, FL 34002-0948, USA. For more information write to John G. Jones at the above address.

Call for Nominations - Preliminary Announcement

Two vacancies on the Board of Directors of the Society for Phytolith Research (SPR) will occur at the next annual business meeting: President-elect and Delegate-at-Large.

The office of President-elect is a term of one (1) year followed by one year as President and a third year as immediate past-President. The President-elect assists the President and performs the duties of the President if necessary. In addition, the President-elect takes notes at the annual business meeting and serves as the chair of the Nominating Committee. The President is the chief executive officer of the Society and presides over all meetings. The immediate past-President serves on the Board of Directors. A present President cannot serve as President-elect but the immediate past-President is eligible.

The office of Director-at-Large is a term of two (2) years. Of the two positions on the Board, one is up for election each year. Directors-at-Large are eligible for re-election. The Board of Directors is responsible for the management and control of the property and affairs of the Society.

All officers must be members of the Society. Please send nomination and/or volunteer information to the Nominating Committee:

Susan Mulholland, chair (President-elect), Archaeometry Lab, University of Minnesota at Duluth, 10 University Drive, Duluth MN 55812, USA; Bitnet: SMulholl@UMDUL; Internet: SMulholl@ub.d.umn.edu; telephone 218/726-7957; fax 218/726-6556.

William Middleton, Department of Anthropology, 5240 Social Science Building, University of Wisconsin, Madison WI 53706, USA; Bitnet: WDMO@WISCMACC.

Anita Buehrle, University of Toronto, Toronto, Ontario, Canada.

Symposium Report

Phytolith Analysis in the 1990s: Applications in Archaeological Interpretation). Society for American Archaeology Annual Meeting, 8-12 April, 1992, Pittsburgh, USA.

Contributed by Susan Mulholland.

A SAS-sponsored symposium, Phytolith Analysis in the 1990s: Applications in Archaeological Interpretation, was presented at the 1992 Society for American Archaeology meetings in Pittsburgh by co-chairs Susan Mulholland and Amy Ollendorf (University of Minnesota). The nine papers dealt with various aspects of phytolith analysis as applied to archaeological problems. Several concentrated on systematic information in cultivated plants. "Identifying Rice (Oryza sativa), Poaceae, through Phytolith Analysis" by Deborah Pearsall, Elizabeth Dinan, and Marcelle Umlauf (University of Missouri) reported on the results of an ongoing study of wild and domesticated Oryza and related general in Asia. "Phytoliths in the Reproductive Structures of Teosinte and Maize: Implications for Study of Maize Evolution" by Dolores Piperno (Smithsonian Tropical Research Institute; read by Deborah Pearsall) compared phytolith production in maize and teosinte. "Ches in the Search for the Millets of the Past: Opal Phytoliths and How They May Tell The Story" by Marsha Baeniger and Zhao Zhijun (University of Missouri) reported differences between Setaria and Panicum genera of millet.

Some extremely interesting research was reported on extraction procedures. "A New Procedure for Extracting Phytoliths from Soils" by Zhao Zhijun presented the results of analysis of sediment extraction procedures, including comparison of three heavy liquids. "Extraction of Phytoliths from Prehistoric and Contemporary Camelid Dental Calculus" by William Middleton (University of Wisconsin) reported on extraction of phytoliths from tooth calculus.

The remaining papers indicated some of the wide range of applications available. "Phytolith Analysis at Archaeological Sites for Recovery of Subsistence Data and Identification of Stains" by Linda Scott Cummings (PaleoResearch Laboratories) covered a wide range of studies including analysis of stains, grinding stones, agricultural fields, and knives. "A Preliminary Analysis of Past Vegetation in the Jama River Valley, Manabi Province, Ecuador" by Cesar Veintimilla and Deborah Pearsall (University of Missouri) presented a reconstruction of the vegetation, including slash and burn methods of land clearing. "Paleoenvironmental Implications from an

Phytoliths (continued on p. 19)
SPECIAL 33% DISCOUNT FOR SAS MEMBERS

Announcing a new series!

ADVANCES IN ARCHAEOLOGICAL AND MUSEUM SCIENCE

Published in cooperation with the Society for Archaeological Sciences

This new Plenum series will provide summaries of the latest advances in the fields of archaeometry, archaeological science, environmental archaeology, preservation technology, and museum conservation.

General Editors: Martin J. Aitken FRS, Edward V. Sayre, and R. E. Taylor


Volume 1

PHYTOLITH SYSTEMATICS
Emerging Issues
edited by George Rapp, Jr. and Susan C. Mulholland, University of Minnesota, Duluth

The application of phytolith systematics to archaeology is limited by the shortage of data on many plant groups as well as the lack of adequate keys and comparative collections. Contributions to this new reference detail the importance of phytoliths in solving archaeological problems related to human use of plants and the environmental context of human evolution and cultural change. With an annotated bibliography and numerous figures and tables, Phytolith Systematics is a comprehensive guide to these important plant groups.


0-306-44257-6 354 pp. illus. 1993/1994 $40.00 ($59.40 outside US & Canada)
text adoption price on orders of six or more copies: $32.50
Special SAS member price: $35.17

Forthcoming in late 1993/early 1994

Volume 2

SCIENCE AND TECHNOLOGY IN HISTORIC PRESERVATION
edited by Ray A. Williamson, Office of Technology Assessment, U.S. Congress

For information on the Society for Archaeological Sciences, please contact the Office of the General Secretary. Radiocation Laboratory, Department of Anthropology, University of California, Riverside, California 92521.

ORDER FORM

Please send

ADVANCES IN ARCHAEOLOGICAL AND MUSEUM SCIENCES—VOLUME 1: PHYTOLITH SYSTEMATICS

US & Canada/elsewhere

$46.50/$59.40

Special SAS member price: $53.17
Text adoption price on orders of six or more copies: $32.50

Plenum Text Policy
Single copies of Plenum books suitable for course work are available on a 60-day approval plan. Write to the Textbook Marketing Manager and include full course information.

Subscribe to any Plenum book series and receive a 15% discount!
New volumes will be shipped to you immediately upon publication, and you may cancel your subscription at any time. Discount available only in the U.S.

Please enter my subscription for
(series name)

beginning with Volume
New York state residents please add applicable sales tax.
Canadian residents please include the 7% GST with your order.
Book orders by individuals must be paid in full in advance.
All major credit cards accepted.

type of card
exp. date

account no.

signature

name

affiliation

address

city state/zip

Mail your order today.
Or call 1-800-221-9369
Fax orders and inquiries: 212-827-1047

PLENUM PUBLISHING CORPORATION
233 Spring Street, New York, NY 10013-1578
In the United Kingdom:
88/90 Middlesex Street, London E1 7EZ, England
Materials Issues In Art And Archaeology.
E. V. Sayre, P. B. Vandiver, J. Druzik, and C. Stevenson, editors. Materials Research Society, Pittsburgh, 1988, xii + 321 pp., graphs, tables, b/w photos, references, index. $53.00 (cloth), $45.00 (members).

Reviewed by Garman Harbottle, Brookhaven National Laboratory.

Three years ago in Reno the Materials Research Society organized a symposium on Materials Issues in Art and Archaeology. In the preface to this volume the editors trace the history of the meeting to earlier occasions where the strong interaction of the materials sciences with archaeology, fine arts, and museum conservation work was explored. Apparently they have struck a responsive chord: after all, materials science (though not always going by that name) has been a critical factor in object and architectural conservation and, in archaeology, in elucidating ancient technology. Superimposed on these traditional studies there is now a host of new hi-tech equipment coming from the "professional" materials scientists and their laboratories. A symposium like this can report the result, and give us the present status. There was a second MRS symposium on this same topic in San Francisco in 1990, which I attended. Coming so close to the "regular" Archaeometry symposium in Heidelberg, one is tempted to ask whether there is a real difference in outlook between the two. I address this question at the end of this review.

"It remains to be seen whether the MRS people can better solve the problem that perpetually agonizes the "traditional" archaeometry practitioners, and that is, how to have effective communication between the hard scientists on the one hand and the archaeologists and art historians on the other."

The present volume is divided into three large parts, each with several subdivisions. Under Part I: "Structural and Compositional Analyses" we find, logically enough, Studies of Structure and Compositional Analyses. Then Part II, "Ancient Materials Technology" has subdivisions dealing with Silicates and Metals respectively. Finally, the link to conservation is explicitly set forth in Part III: "Processes of Deterioration and Conservation", but here the main emphasis is on glasses. Each subsection is headed by an invited paper that serves to review the field and set the stage for the contributions to follow.

In the first section, following P. Meyers' introduction, there are three interesting studies of the use of radiation to "see inside" objects. Cheng and Mishara, and Ellingson et al. report two aspects of radiography-tomography of museum objects and x-ray examination (including xeroradiography) of ceramics. Both these techniques, and the well-known neutron-induced autoradiography of paintings (Olin et al.), are well worked out, and the papers presented are only peripherally concerned with materials science. Ellingson et al., however, also present a useful comparison of three different ways to record the x-ray image, and the kinds of ceramic technical (structural) information that can be obtained.

The Smithsonian neutron autoradiographic study by Olin et al., though brief, demonstrates once again the enormous power of this hi-tech technique. Coupled with x-ray examination, so much can be learned of the painter's individual methods that the images almost define an infallible signature. This has produced surprises: one recalls that when the new Berlin autoradiography unit studied the single most popular painting in Germany - Rembrandt's Man in a Golden Helmet - the results strongly suggested that another hand had been at work!

The section on Compositional Analysis is headed by Ed Sayre's essay. He touches upon both technological history, as typified by his seminal glass studies with Ray Smith among others, and provenience via analysis (Greek black-glaze pottery, and the multivariate study of lead isotope ratios in the Sackler bronzes). This theme is taken up in the Reedy and Reedy paper on the re-evaluation of the lead isotope data in the literature. Reedy and Reedy concluded that, "The isotopic data base for lead/silver ores in the Aegean region is currently inadequate to support many of the archaeological conclusions that have been made with it." I suppose that this was the opening gun of l'affaire Reedy, which ended with a lot of people angry and upset. The main point remains, however, how to interpret lead isotope data with due regard to good statistical practice.

Pam Vandiver's nice introduction to the technology of ancient ceramics traces out the subtle interaction between the history of materials science, the application of modern instrumentation, and our understanding of the sweep of human intellect in the successive innovations that have marked ceramic development. This is what the symposium was supposed to be about!

A series of more specialized studies by Blackman, Freestone, and Rigby, Kilikoglou et al., Wiedemann et al., and Palmer and Johnson deal with a number of aspects of archaeological ceramic science. I found the paper of Wiedemann et al. particularly interesting in that they employed several scientific methodologies (thermo-gravimetry, thermomagnetics, and "DCS", whatever that is) to come to the conclusion, certain to be controversial, that the famous Qin Dynasty "terra cotta" warriors from Xian
were probably not fixed at all, but only hardened by drying. Can this be true?

Luis Torres' paper on Maya Blue summarizes all that has come out of a number of studies including his own on the preparation, properties and replication of this remarkably beautiful, technologically superb blue pigment from pre-Columbian America. Talk about innovation! Although it is made from an organic dyestuff adsorbed on palygorskite clay, it can withstand strong acids, alkalis, solvents, oxidizing and reducing agents and heat; truly, a supercolor! It strikes me that there is room here for materials science research dealing with how this color can be so resistant; also, could this combination, natural dye plus clay mineral, be used to create other resistant colors? Was it so used in antiquity?

There are two papers in this section on the technology of ancient glass by Julian Henderson. One of these, dealing with a second millennium glass bead found in Britain, exactly matched the materials science orientation of this meeting. Because this bead, though it was buried for 3300 years, was in excellent condition, "No incipient or actual weathering was observable." Doesn't this relate to the use of glasses as a form for disposal of fission products? Many years ago M. Kaplan pointed out that the waste-disposal people could learn something from the archaeologists, and this paper bears it out.

In the Metals Technology section the paper of Demortier again raised the question of the use of cadmium in ancient gold solders, a point that surely calls for additional PIXE studies.

Part III: "Processes of Deterioration and Conservation" is heavily weighted toward obsidian hydration dating studies and the need to understand the chemistry by which obsidian (and other glasses) in contact with water form hydration rinds. No less then seven papers take up this theme. Jon Ericson's opening review nicely covers the nature of the studies, the rate measurements, the material (i.e., composition) and environmental variables that affect the hydration rate. One must conclude: that the many factors in addition to temperature that change the rate probably all need to be controlled; that the more studies that are made, the more complex the process appears to be; and that the only hope of reducing obsidian hydration to a practical dating tool for archaeology rests with a detailed study of the materials science involved. Taken as a whole, the group of seven papers amounts to the best available statement of where obsidian hydration dating stands today.

The final section is made up of a group of studies on the general theme of deterioration. The work of Burn's group on the salinization of Egyptian antiquities, and his measurements at the Tomb of Nefertari demonstrate the importance of scientifically-based field work as the underpinning of conservation.

Does the volume endorse the proposition that materials science makes significant contributions to studies in archaeology and fine arts? Certainly—was there any doubt? My observation of recent Archaeometry and MRSSymposia suggests to me that the field of archaeological science has simply become so big and diverse that the materials science portion shows signs of spinning off. This is certainly ok but it remains to be seen whether the MRS people can better solve the problem that perpetually agonizes the "traditional" archaeometry practitioners, and that is, how to have effective communication between the hard scientists on the one hand and the archaeologists and art historians on the other. That is the nut that is so hard to crack, and this volume does not convince me that the MRS people have done a lot better than the archaeometry folk.


Reviewed by Kim Dammers, Göttingen, Germany.

This is a good, concentrated book. It was produced to accompany a museum exhibition, so the audience appears to be the educated layperson. It is very clearly and simply, but accurately, written. The organization is likewise exemplary. The 180 illustrations (25 in color) add to the attractiveness of the volume.

The subject is the application of chemistry (and physics) to the analysis of archaeological objects. The first part of the book explains the method, goal, and application of 29 analytical and 14 dating techniques, with about one page devoted to each. In the next section, materials analysis is presented in somewhat more detail with background information or a case study for each of 8 metals and 17 other materials (e.g., leather, glass). To a lesser degree, antique processes of working materials, especially as they are relevant to chemistry, are also introduced. The greatest attention here is paid to the metals, a specialty of the author. The categorized bibliographies (30 pages) provide a valuable help for any archaeologist or chemist first looking into one of the subfields. In fact, here, as in the text, there is something for all but senior archaeometrists.

There is no consideration of chemistry in the field; pH, phosphate analysis and other primarily field tests are not mentioned. Some stable isotope techniques are very briefly explained. Otherwise, all major methods of (laboratory) chemical analysis applied to archaeological objects are presented.

Although the one-page discussions are too short for use as a text (nor were they intended as such), even in a short archaeometry survey course, they are nevertheless the best cribs one can offer to students, and which can be a pleasant, speedy, clear introduction for other archaeologists and chemists.
John Wiley & Sons, Inc., New York, 1989, x + 328 pp., figures, tables, identification key, glossary, references, indexes. $125.00 (cloth).

Reviewed by Vaughn M. Bryant, Jr., Texas A&M University.

I doubt there are more than a handful of professional palynologists in the world who have not seen, heard of, or purchased at least one of the four editions of this remarkable guide to the field of pollen analysis. Several generations of palynologists have relied on one of the editions of a Textbook of Pollen Analysis as their first introduction to pollen studies, as a textbook in a college course, or as a reference book on their library shelf. The first edition of this book was published in 1950 by Faegri and Iversen, two of the pioneers and early giants in the field of palynology. Iversen died before work began on this fourth edition, but he is still listed as one of the two primary authors because of his contributions to the first three editions. The first edition of the text was a bit thinner than the current 4th edition. Even so, one wonders how inflation could have taken such a heavy toll on the price difference between the two. The first edition, published 40 years ago, sold for $3.00. That is 1/42 of the current $125.00 cost, or an increase of almost $3.00 per year between 1950 and the present.

The focus of each of the earlier editions, and the current one as well, is Quaternary palynology. However, as the authors note, many of their chapters discuss applications that have relevance in many different fields of palynology besides Quaternary palynology. Many of the 12 chapters of the current edition are similar to ones that appeared in the earlier editions. Expanded discussions of earlier topics, new chapter names, a larger pollen key, the addition of new concepts in the field of palynology, and a larger page size format of the new edition makes it noticeably different from earlier editions.

The first few chapters include an introduction and other chapters with catchy titles and mottos on the beginning pages, such as “Where Does the Pollen Go?” Each chapter is nicely organized, and contains a mini table of contents on the first page. This makes finding any topic easy and quick. The introduction presents a handy background for new students and a refresher course for those who have forgotten the details of how the field of pollen analysis developed and the major changes that occurred since 1916, when the discipline was introduced by Lennart von Post.

The second chapter, “Where Does the Pollen Go?” is the first one the archaeologist should read carefully. Often, archaeologists are concerned about the sources of pollen recovered in cultural deposits. They want to know if the pollen is an accurate reflection of past vegetation, if it can reveal human subsistence patterns, and if the pollen can reveal functional patterns of artifact use. In most cases, the answers to those questions and the validity of the recovered pollen information is directly linked to the reliability of the pollen sources. Chapter two answers these questions by taking a thorough look at what can happen to pollen grains between the time they are formed in flowers until they are deposited.

The next two chapters, “Where Pollen is Found” and “How Pollen is Recovered,” are important chapters for Quaternary palynologists to read and study. Neither chapter directly discusses problems associated with pollen deposition or recovery from archaeological sites. The exception might be the discussions of lake, bog, and alluvial deposits. In some regions of the world, archaeologists might expect to find cultural deposits in these types of locations or might want to use paleoenvironmental data from those deposits to extrapolate conditions and possible cultural events at nearby cultural sites.

Chapter five, called “Finding the Grain,” discusses the many techniques used by palynologists to separate fossil pollen from the surrounding matrix material. The discussion of techniques presents a good summary, but does not address one of the most important processing problems confronting most archaeological palynologists, namely: examining soils from archaeological sites. The chapter contains one brief paragraph that suggests how one should remove tiny insoluble particles, such as charcoal dust, but does not discuss the scope of the problem. The authors admit (p. 81) that charcoal dust can be a major problem in some samples and suggest removing it through filtration techniques. From my own experience, I have found that charcoal removal from archaeological soils is difficult. My only successes in removing charcoal have been accomplished by using a combination of sonication and heavy density fluids. What seems to work best is a sonication using a Delta-5 Sonicator followed by several separation steps using zinc bromide heavy density fluids. I no longer use filtration to remove charcoal because experiments using NITEX nylon screens with pore openings of 15 μm revealed that some small pollen grains, in the size ranges of Salix and Castanea, often pass through the screens with tiny grains of charcoal dust. I also found that nylon screens with smaller openings clog too quickly to be effective. Charcoal removal remains one of the major problems associated with successful pollen recovery from archaeological deposits.

How to arrange the pollen data in graphs, charts, and diagrams, and how to interpret the pollen data are the subjects of the next three chapters. These are important subjects but in general will be of more interest to
palynologists than archaeologists. Nevertheless, archaeologists should glance through these chapters and become familiar with some of the pitfalls that can confuse the interpretation of fossil pollen data. Potential interpretation errors can result from events such as local pollen over-representation, long distance pollen transport, differential pollen destruction, pollen recycling, human and animal influences, and pollen concentration values. These are all important concepts archaeologists should consider when interpreting pollen data from cultural deposits. Even in studies where trained palynologists have conducted pollen analyses, archaeologists should still make sure that all potential sources of pollen error were thoroughly considered and eliminated before interpretations of archaeological deposits were made.

Chapter nine is titled “Archaeopalynology.” This was a new chapter and is the first time an edition of this book has treated the subject of archaeological palynology in detail. In the preface, senior author Faegri notes that Peter Kaland, one of the junior authors of the fourth edition, was primarily responsible for this chapter. Even so, the chapter leaves much to be desired. First, the chapter title is misleading. The term “archaeo” is defined in dictionaries as “ancient or primitive.” The geologic time period, Archeozoic, is an example of the correct use of this prefix. When the same prefix is linked to “palynology,” it suggests the study of “ancient or primitive” pollen. If one must combine the terms “archaeology and palynology,” a logical, and accurate, new work would be palynoarchaeology. Second, the chapter’s discussion focuses mainly on the problems archaeological palynologists will encounter while working on European sites. There are adequate discussions of how humans can alter a natural landscape and vegetation through forest clearing and the use of fire. The chapter also explains how cultural shifts to plant cultivation and animal husbandry can be identified in the pollen record. However, the chapter lacks adequate discussions of important topics such as: 1) how pollen can be used to identify subsistence patterns in sites utilized primarily by hunters and gatherers; 2) how pollen can be used to determine functional use of masonry rooms through an examination of fossil pollen trapped in floor surfaces; 3) clues pollen can offer about the functional use of pottery vessels, grinding stones, baskets, and lithic tools; 4) the range of data potentially available from pollen studies of human coprolites and latrine deposits; and 5) the types of data which pollen studies of human grave sites might offer. In spite of the chapter’s weakness, it concludes with a good discussion of some of the major problems and potential pitfalls associated with pollen sampling at archaeological sites. The authors stress, and I would echo, the importance of consulting a pollen analyst before field excavations are completed. They also stress the importance of taking more pollen samples than will be needed. This policy, they note, is far better than realizing too late which samples should have been collected during field excavations.

The rest of the book contains a pollen key of European flora and a discussion about other types of microfossils palynologists sometime encounter during sampling and analysis. Although of great interest to palynologists, I doubt these subjects are of much importance to archaeologists.

The book is well written, easy to read, and an essential reference guide for anyone seriously studying palynology. There are chapters in the book that archaeologists should read in detail and other chapters that they should skim. Only in this way will archaeologists be able to judge critically the pollen data they read in reports or the data from their own excavations. The high cost of the current fourth edition may discourage some from buying a copy. If so, it would be worth the effort to make sure your nearby library has a copy that can be checked out and read.


Reviewed by Lee Newsom, Florida Museum of Natural History.

Rowell and Barbour have edited this highly practical book of contributions by 22 leaders of the fast-developing field of archaeological wood preservation. I enthusiastically recommend it to all who are directly or tangentially interested in archaeological wood. For the purposes of this book, archaeological wood is defined as any wood that gives information about human development, culture, or climate conditions, or that is used to study the aging process of the wood itself. This definition extends to wood from wet environments, including freshwater bogs and swamps, and salt water deposits; dry environments, including tombs and dwellings; and what are termed “variable environments,” including historic buildings and outdoor artifacts exposed directly to the ravages of weather.
The volume has 17 contributions, which begin with a chapter by Florian that covers the scope and history of work with archaeological wood, and culminate with chapters by Rowell and Peterson, respectively, that discuss future trends and new techniques still in experimental stages of research and design. The intervening chapters deal with the nature and chemistry of waterlogged and dry wood, preservation treatments, and problems encountered during storage and exhibit.

Florian (ch. 1, “Scope and History of Archaeological Wood”) overviews the historical development of conservation treatments with a good explanation of how and why the popular PEG (polyethylene glycol) treatment works. She also makes it clear why PEG is not universally suitable. Florian sets the stage for succeeding chapters by discussing the ideal preservation environment, deviations from the ideal, and the destructive effects associated with exposure and removal of ancient wood from the burial environment.

Five chapters are grouped together under the heading “properties and chemistry” (of degraded wood). I found these exceptionally enlightening and well written. The contribution by Hoffmann and Jones (ch. 2, “Structure and Degradation Process for Waterlogged Archaeological Wood”) is a good example of this. Displaying a keen knowledge of wood anatomy and ultrastructure, the authors explain the stages through which cellular dissolution proceeds and its differential progress through various cell types and tissues. The use of stains and florescence to track cellular swelling and the sequential stages of cell wall breakdown is effectively detailed, and these methods clearly provide a relatively simple and convenient way to assess the condition and potential for collapse upon drying of a given specimen of waterlogged wood. The photomicrographs in this chapter are excellent and complement the text well. For example, progressive breakdown of cell walls from the S2 and S3 layers through to the compound middle lamelae, as well as the movement of the “degradation front” across a given specimen are clearly and systematically described and illustrated. I was surprised to learn, contrary to my intuitive thinking, that in some hardwoods, e.g., ash, fibers actually degrade at a faster rate than parenchyma cells and vessel members. This type of information is critical to preservation efforts.

Wood conservators will find Hoffmann and Jones’s comparative studies on the progress of structural and chemical damage very informative. Five common temperate woods were analyzed, including four hardwoods and one softwood, with resulting data that make a strong case for the need to identify the genus as well as the state of preservation of each artifact prior to initiating conservation measures. In addition, the comparative studies show that conservation must take into account the special problem of differential rates and patterns of decay within a single wooden artifact. Degradation typically seems to proceed inward from the outer surface of the artifact. Thus, tissue nearer the exterior of a piece may be significantly more degraded than wood farther removed from the surface. Treatment of such specimens with zones of highly versus slightly degraded wood is cited as a major challenge to conservation.

Several chapters deal specifically with dry wood. Interestingly, as Schneuwind (ch. 4, “Physical and Mechanical Properties of Archaeological Wood”) and other authors show, wood preserved in a dry state seems to undergo much less structural damage than wood from waterlogged environments. Dry wood is deceptive, however, and may appear better preserved than is actually true. This is thoroughly discussed by Nilsson and Daniel (ch. 3, “Structure and Aging Process of Dry Archaeological Wood”).

Chapter 6 (“Biological Degradation of Wood”), authored by Blanchette, Nilsson, Daniel, and Abad, is a lucid account of the agents and action of biologically-induced wood decay, including fungi, bacteria, and insects. Also discussed is how to recognize each of these forms of attack.

Hedges’s contribution (ch. 5) on the chemistry of archaeological wood is another that I found exceptionally informative. He begins with a readily comprehensible discussion of the chemical components of the cell wall and how they are integrated in sound wood. From this base, he proceeds to show how archaeological wood varies by explaining how the wall polymers differentially and progressively degrade under contrasting depositional environments. This chapter, as well as Barbour’s (ch. 7, “Treatments for Waterlogged and Dry Wood”), describe a number of ways to assess the state of preservation of degraded wood. Barbour goes on to describe the behavior of various treatments for archaeological wood in terms of their end result, that is, whether they function as protective surface treatment, provide structural bulking through integration with the cell wall or filling the lumens, and so on. The problem of drying waterlogged wood is also discussed.

The introduction to preservation technologies given by Barbour is supported through case studies presented in several succeeding chapters. Hafer’s overview work with the structural remains of the Swedish ship Wasa (ch. 8, “Polyethylene Glycol Preservation Method”). Chapters by Tran et al. and Schneuwind discuss the results of work with monomers and resins (ch. 9, “Impregnation with Radiation-Curing Monomers and Resins,” and ch. 13, “Consolidation of Dry Archaeological Wood by Impregnation with Thermoplastic Resins”). Ambrose gives an updated report on freeze-drying (ch. 10, “Application of Freeze-Drying to Archaeological Wood”) that includes a discussion of work under natural conditions (frozen environments). Feist (ch. 11, Outdoor Wood Weathering and Protection) reviews the natural weathering process and discusses ways to treat
Historic structures. Wernuth (ch. 12, "Consolidation Systems for Degrading Wood") and Rice (ch. 14, "Gluing of Archaeological Wood") deal with the problem of conserving complex large objects, including difficulties that arise when earlier conservation measures were undertaken. The case studies provide valuable insights and tests of different treatment methodologies. Museum curators will find Harvey and Freedland's (ch. 15, "Exhibition and Storage of Archaeological Wood") discussion very useful. Even lighting in museum exhibit areas can pose problems for the ongoing conservation of wooden artifacts.

The volume closes with chapters by Rowell and Peterson that explore future directions in wood preservation research. Rowell (ch. 16) discusses a set of techniques that theoretically work to chemically modify and repair or restore cell wall polymers. This treatment seems especially promising because it deals directly with the cause or source of structural failure in degraded woods by attempting to restore the tissue to a sound state rather than simply supporting the cellular structure.

Peterson's chapter ("New Directions in the Conservation of Archaeological Wood") is a general overview of work with archaeological wood. He includes a realistic discussion of the costs and time frame involved in conducting research on sites with quantities of preserved wood. To Peterson's list of "attributes that impart value to archaeological wood" I would add wood species. One correction should be made regarding Peterson's mention of the wooden tools from the Windover site in Florida. Whereas he gives the date of the artifacts as being older than 12,000 years, actually the peat deposit itself dates between 10,750 and 4,700 years before present, and the burials and associated wooden artifacts date between 7,000 and 8,000 years B.P. (G.H. Doran and D.N. Dickel, Radiometric chronology of the Archaic Windover archaeological site (8B246), The Florida Anthropologist 41 (3): 365-380, 1988).

It is clear to me, after having read this volume, why preservation measures have failed on a number of archaeological projects. The failure is owed to a lack of understanding of the chemistry, anatomical structure, and state of preservation of individual specimens of wood, and to the wholesale application of treatments to batches of wooden materials without considering carefully the suitability of treatment to a given artifact. This volume will go a long way toward correcting such shortcomings. My one disappointment in this collection of papers is that, with the exception of a brief mention in Peterson's chapter, no coverage of sucrose treatments, which seem to be gaining wider acceptance, was given. Peterson mentions the applicability of sucrose technology for Third World countries.

This volume is a must for archaeologists and conservators who work with wood and other organic remains. They would benefit by having at least an initial background in organic chemistry and wood anatomy, basic knowledge that anyone working in organics conservation should have.

Lubbock Lake. Late Quaternary Studies on the Southern High Plains.

Reviewed by Michael Clayton Wilson, Department of Geography, University of Lethbridge, Lethbridge, Alberta T1K 3M4, Canada.

Paleoindian studies have been blessed recently with sumptuous monographs about such classic sites as Lindenmeier, Agate Basin, and Homr, replacing incomplete early reports with long-sought descriptive data and new interpretations. In such a context, this uneven book about Lubbock Lake does not fare well and is better viewed as a progress report. At its best, it provides new insights; at its worst, it is a mass of partially digested data marred by misuse of fundamental concepts.

"Paleoindians and ancient faunas ... are the locality's main contribution to knowledge, along with the excellent geological/pedological sequence."

The locality was discovered in 1936 in excavations to restore Lubbock Lake after irrigation had lowered the water table. Intermittent studies from the 1930s to 1960s led to the Lubbock Lake Project (LLP) in the 1970s and 1980s, anchored at Texas Tech University and its museum, and to National Register designation and National Landmark protection. Remains at Lubbock Lake extend from Paleoindian to Historic times; artifacts once suggested to be pre-Clovis appear instead to have been worked down into turbed bedrock (p. 22).

An introduction by E. Johnson and V. Holliday is followed by chapters (the longest by far by the editor) about geology and soils (Holliday and B.L. Allen), cultural chronology (Holliday), flora (J.L. Thompson), pollen (V.M. Bryant Jr. and J. Schoenwetter), invertebrates (H.G. Pierce), vertebrates (Johnson), paleoenvironments (Johnson), artifacts (Johnson and Holliday), cultural activities (Johnson), and a closing summary (Johnson and Holliday).

Only 68 of 120 radiocarbon dates are accepted, on wood, humic acid, humin, and charcoal; shell and bone sample dates were distrusted. Unfortunately, readers must refer to another article for a full table with rejected dates.

Holliday and Allen (ch. 2) describe five major strata including alluvial and lacustrine sediments along the valley axis with flanking colluvial and aeolian sediments. These document moist Late Pleistocene conditions, early Holocene aridity, and fluctuating late Holocene conditions. The authors show soils to be as important as the deposits in which they have formed, documenting landscape stability
Book Reviews

and often longer periods of time than do the deposits. Archaeologists had originally and erroneously defined paleosols here as “substrata;” Holliday and Allen abandon this and name the soils to minimize confusion. Regrettably, one name (“Firstview”) is the same as that of a culture of different age, causing confusion anyway. Even the book’s organizers were confused by the Firstview Culture (ca. 8600 B.P.) and Firstview Soil (8500-6300 B.P.), despite efforts to clarify matters in Figure 2.7 (p. 21). It is not always clear that “Firstview Period” means the cultural period, despite its citation as such on p. 93.

Holliday (ch. 3, “Cultural Chronology” divides the Paleoindian Period into Clovis, Folsom, Plainview and Firstview Cultures, which become subperiods (p. 25). Equating “culture” with “subperiod” is fine, but in ch. 9 (“Artifact Assemblages”; Johnson and Holliday) the Paleoindian Period is divided into Clovis through Firstview Periods (e.g., captions, pp. 110-111). Johnson cites these “periods” in ch. 8 (“Paleoenvironments”), adding ambiguity by using them to organize paleoenvironmental data – an independent system. This shows a lack of concern for systematic procedures (e.g., Willey and Phillips 1958), and for the need to keep cultural and environmental time units distinct for correlation tests. Would Johnson talk of Old World “Paleolithic environments” instead of “Pleistocene environments”?

Small wonder that index references to “Firstview Period” lead to the Firstview Soil, but fail to include the Firstview points on p. 107! Even worse, one of the “periods,” the Archaic, is widely seen as a stage, not a period at all (Willey and Phillips 1958).

The end of the Paleoindian Period at Lubbock Lake is defined in terms of environmental changes because the cultural transition to Archaic is not represented. The poorly represented Archaic is subdivided on the basis of material culture, subsistence, and (again) environmental information into the predictable “Early, Middle, and Late,” a linguistic tyranny that rules “objective” classifications. Despite claims that the LLP sought to study the influence of environmental changes on cultural adaptations, environmental conditions were allowed here to influence if not control decisions as to subdivision of archaeological periods and subperiods. This is circular reasoning, if the subdivisions are to be tested against environmental changes.

Early Archaic groups, much like Paleoindians, hunted bison; evidence for plant preparation (an earth oven) appears at Lubbock Lake in the Middle Archaic. The Ceramic Period yields the smallest sample of all, even lacking potsherds. The Protohistoric is rich in occupation debris, part of which is Apache. Historic goods record the Apache demise and the transition to Anglo-American settlement.

Thompson’s analysis of plants (ch. 4) reveals how little is known of the pre-disturbance modern flora. Tall grasses reported by Coronado in 1541 gave way to shortgrass by the 1800s. Macrofossils include an unexpected halophyte from mesic Stratum 1; hydrophyte seeds in Stratum 2 may have blown in. Bulrush in the Firstview soil A horizon agrees with faunal and geologic evidence for a spring-fed marsh, with similar correspondences for Strata 3 and 5.

Pollen studies (Bryant and Schoenwetter, ch. 5) have been inconclusive. Contradictory interpretations may reflect varied lab and data-treatment procedures. Preservation is variable and large sediment volumes must be processed; counts of sufficient grains could take 10 hours per sample! Wendorf’s “Lubbock Subpluvial” (ca. 10,600-10,500 B.P.) may have been based on samples from a younger zone or may signal a differential taphonomic process; either way it must be discarded.

Pierce’s account of invertebrates (ch. 6) includes a valuable methodological discussion though, like Johnson (see below), he estimates paleoenvironments from “zones of sympathy” rather than species-by-species consideration of tolerances. Gastropods are abundant and diverse here, but life histories and tolerances are so poorly known that zones of sympathy are justifiable as a first approximation. High faunal similarity with Blackwater Draw opens possibilities for regional comparisons. Four taxa common elsewhere in Wisconsinan strata appear only in Stratum 1A, suggesting temperatures 10° cooler than present and moist conditions. Despite warming by Stratum 1B times, local woodlands remained; by Stratum 2 conditions were much as today. Strata 3 and 4 gastropods document early Holocene xeric conditions, the depauperate Stratum 4 fauna containing only the hardiest species. Moister conditions returned in Stratum 5 times.

“Hierps” and mammals are treated by Johnson (ch. 7); fishes have been published elsewhere and birds remain unpublished. Lubbock Lake boasts the most extensive southern Plains late Quaternary vertebrate sample, with at least 128 species (all groups), 14 of them extinct. Johnson discusses distribution, fossil record, and identification criteria, though for some examples (e.g., anurus or Sylviulus premolar patterns) illustrations would have aided comprehension. Reworking from older deposits is considered for large Geochelone (p. 66) but not for the purported latest geologic occurrence of Holmesina and first association with humans (p. 88). An admission (p. 121) that the Clovis “processing station” yielding the two Holmesina fragments was fluviually modified to an unknown extent on a point bar suggests caution if not skepticism.

Johnson’s basic assumption is that modern biotic distributions are the key to paleoenvironmental reconstruction (p. 10), an accepted uniformitarian concept. It is made operational through derived “zones of sympathy” rather than species-by-species investigation of tolerances. Although the approach is justified where absence of data about modern tolerances precludes other methods, it has many limitations (see Graham and Semken 1987:7-9). Johnson’s findings ironically constitute a strong argument
against the approach. Because no modern zone of sympathy could encompass all species in early assemblages, she arbitrarily divides paleofaunas into three elements, each providing its own zone of sympathy. The “zones of sympathy” are therefore influenced by the decision to assign a given species to one set or another. Why not five elements, or eight, or 128?

Johnson’s literature search reveals puzzling gaps. Distributional discussions should credit Hoffman and Jones’ (1970) extensive consideration of postglacial dispersal of plains mammals. The Arctodus map omits many finds mapped by Kurtén and Anderson (1980:181), a key resource not cited but filled with data for other species as well. McDonald’s (1980) Bison revision goes uncited despite discussion of synonymy of B. antiquus and B. occidentalis (p. 86). These lapses suggest spotty updating of a decade-old manuscript. The vertebrate fauna, like other data sets, suggest mild late Pleistocene winters, aridity by 8500 B.P., forest decline, and grassland expansion.

Johnson reconstructs environments in ch. 8 from all proxy data, concluding that environmental “zones” did not shift in space; rather, changed conditions brought a new ecological mosaic with new interaction systems. She names environmental “periods” after cultural complexes, giving the illusion that changes in both coincided. However, her data reveal environmental changes within “periods” as well. Some data invoked (e.g., dental abnormalities in bison, pp. 94–95) are not described and cannot be evaluated by the reader.

The faunal sequence is subdivided into “Local Faunas,” named after cultural “periods”: Clovis Local Fauna, Folsom Local Fauna, etc. (p. 91), indicating a complete lack of understanding of the local fauna concept. Local faunas should be named after their locality, not associated cultural complexes; the “Plainview Local Fauna” would be taken by paleontologists to be from the Plainview Site. Subdivisions of a local fauna are faunules. What Johnson describes are really faunules, showing continuity despite some changes, within a single local fauna: the Lubbock Lake Local Fauna.

It is distressing to see so little concern for systematic and taxonomic procedures. Imposition of cultural categories on the faunal sample gives two sequent “local faunas” that are virtually identical (Folsom and Plainview). It is evidently assumed that cultural units are established and inviolate; what happens when those names (like “Yuma”) are superseded? Percentages of “extinct species” used to compare “local faunas” at Lubbock Lake include Bison antiquus as extinct (p. 91), despite acceptance (p. 86) that its “disappearance” was phylectic.

Over 40 “features” (ch. 9, “Artifact Assemblages”, by Johnson and Holliday) represent camps, processing stations, and kill/butchering locales. Their definition as “features” (p. 100) violates archaeological terminology; features are “artifacts that cannot be removed from the ground, such as post holes and ditches” (Fagan 1985:99). Lubbock Lake is a locality, and the “features” listed are either sites or components of stratified sites. Artifact assemblages from these “features” reveal little that is new. Of over 2100 lithic items recovered by 1979, 6% were projectile points and other tools. Plainview points show resharpening and use as knives. Firstview incised bone items include a turtle plate and tubular bead. Diagnostics are rare in Archaic and Ceramic levels; a few Protohistoric potsherds are present. Reworking of tools in most periods to conserve lithic material is consistent with a local paucity of sources. The extent of selection of bone as a secondary raw material could relate to this.

Chapter 10 (“Cultural Activities and Interactions”, by Johnson) notes that site activities centered on subsistence and the technology of making tools for procurement and processing, mostly of large mammals. Emphasis by Clovis peoples on mammoth gave way to bison hunting, with pronghorn as secondary prey; horses were preyed upon in the Historic Period. Stacking of bones and minimal marrow processing typify Paleoindian processing areas whereas later examples show jumbled distribution and intensive marrow processing. Chapter 10 provides a classification of cut lines and of degrees of bone destruction. More illustrations are needed, but not along the lines of the nearly illegible maps (e.g., Fig. 10.18)! Oddly, neither here nor in the discussion of carnivore effects is Binford (1981) cited.

An extensive description of muscles, tendons, and ligaments relies on in-text descriptions and a table to get the picture across. Much effort is made to specify correct muscle names and their origins and insertions (though planter becomes “planter”) as a prelude to discussion of butchering patterns. These patterns show similarities within and differences between periods and are modified when bones were conserved for use as tools. Johnson states that “Limited experimental butchering (artiodactyls, elephant) was conducted” (p. 143) and concludes that for mammoths, “from experimental experience the same seven to eight major butchering units are those in ungulates were practical” (p. 150). The experiments are not described and the statements sound glib: it requires more than “limited experiments” to conclude what was “practical” for a Paleoindian butchering a mammoth. Quarrying of mammoth bones for flake production is discussed, but the small Lubbock Lake sample adds nothing to evidence from other sites. Post-Clovis bone technology centered on “expediency tools” made from animals being butchered. Discussion of bone breakage is jargonistic, obscure, and repetitious: “This technique, when applied to fresh long bones, produces a spiral morphology. The morphology is helical in nature and is the shape of a curve through a series of planes as it circles around the diaphysis” (p. 152).

Mammoth procurement strategies (ch. 10) at Lubbock Lake are inferred by analogy from other sites, which suggest kills of mammoth family units. Small- and large-scale bison drive kills began in Clovis times. With the early Holocene increase in grasslands, bison numbers increased and killed rose from large-scale to “scores of animals.” Paleoindian drive kills were largely in spring or late fall, as in historic times. Johnson talks of “scheduling and seasonality
Book Reviews

practices," again misusing terms: seasonality is an attribute of the resource, while scheduling is the human response (Flannery 1968:74). Although large-scale kills were possible, some small-scale kills were always being made around waterholes, again in spring and fall, possibly by small kin groups. Small-scale kills are also noted for horse and camel, which makes one wonder if that indicates the absence of large herds of these species. Paleoindians at Lubbock Lake did not venture far into the grasslands after bison but concentrated efforts around water bodies (p. 158), unless this is an artifact of different environments of preservation. Later groups foraged more widely and brought carcass segments back for processing.

Readers would agree that Lubbock Lake is important, but it is appropriate to ask "Why?" The repeated statement that a major stratified cultural sequence is present is tempered by comments about inadequacy or ambiguity of Archaic and Ceramic assemblages. Obviously Johnson is primarily interested in Paleoindians and ancient faunas; they are the locality's main contribution to knowledge, along with the excellent geological/pedological sequence. Are stratified sites needed at all, with radiocarbon dates available to order cultural sequences? Yes, they are, because several Paleoindian assemblages remain ambiguously resolved by dates. Lubbock Lake is historically important in terms of Paleoindian studies, although its most often cited product was a Libby radiocarbon date (9883±350 B.P.; C-558) erroneously assigned to Folsom. This aside, the locality is among the best dated in North America; its Firstview dates, for example, cast doubt upon the earlier date for Olsen-Chubbuck.

The volume itself is curiously outdated by reference to man and his activities (e.g., Johnson, p. 88), which engenders the feeling that most activities involved males. Its cultural reconstructions do not rise beyond economic considerations and speculations about band-level organization; the people emerge either as busy automatons maximizing food procurement efficiency or as taphonomic filters interfering with a bone assemblage. A manifesto for studies of cultural adaptation, process, and "transformations," (p. 8) is abandoned by chapter 11, where "changes" and "trends" are discussed less explicitly. The statement (p. 8) that "Transformations occur... to achieve adaptation" implies that "adaptation" is a threshold or state, not a process. Whereas theory behind cultural reconstruction is offered but discarded, a theoretical basis for paleoenvironmental inference is never completely laid. Lacking this, the book is further marred by Johnson's misuse of concepts and by the circular reasoning built into designation of cultural, geological, faunal, and paleoenvironmental time units.

Typographical or grammatical errors are few; "equitable" is used to describe an equable climate (pp. 8, 98) and Hemiauchenia is misspelled (p. 83). Overall, the book is not easy to read, even accepting that some of the tedious descriptions are necessary precursors to the analyses attempted. Little thought was given to the reader and to visual packaging of information; there are no skeletal diagrams, for example, that rival in effectiveness Todd's (1987) depictions in the Horner report. The volume's entertaining high points include Holliday's and Allen's contributions on geology, soils, and chronology as well as Bryant's and Schoenwetter's insights into palynological problems and Pierce's discussion of gastropods. The low points are Johnson's lengthy, repetitive chapters, which would have benefited from review and editing. The book is in many ways valuable; however, given its appalling price, it is much less than it could — and should — have been. It even makes the ancient people of Lubbock Lake sound a bit boring, when they emerge at all from the facts and figures.

REFERENCES CITED

Binford, L.L.

Fagan, B.M.

Flannery, K.V.

Graham, R.W. and H.A. Semken, Jr.

Hoffman, R.S. and Jones, J.K., Jr.

Kurtén, B. and E. Anderson

McDonald, J.N.

Todd, L.C.

Willey, G.R. and F. Phillips
Domestication of Plants in the Old World. The Origin and Spread of Cultivated Plants in West Asia, Europe and the Nile Valley.

Reviewed by Mark Nesbitt (associate editor for bioarchaeology), British Institute of Archaeology, Tahran Caddesi 24, Kavaklidere, Ankara, Turkey.

Comprehensive syntheses of the archaeological and botanical evidence for the origin and domestication of crop plants tend to appear at long intervals: by A. de Candolle in 1886, K. and F. Bertsch, and E. Schemmann in the 1940’s, and most recently Jane Renfrew’s Palaeoethnobotany (London, 1973). Since Renfrew’s book, much progress has been made by Zohary and others in elucidating the relationships of crops and their wild relatives, using careful genetic and morphological analysis of large numbers of living plants, and Zohary and Hopf’s book is a clear, compact guide to this work. It contains relatively little that is novel, but summarizes a large and widely scattered literature. Progress in archaeobotany - the study of seed remains from archaeological sites - has been much more fitful. The use of rigorous identification criteria, largely pioneered by German archaeobotanists such as Maria Hopf, is more common now, but the importance of adequate sample sizes is still not widely understood. The discussion of archaeobotanical records for each crop in the book demonstrates clearly the need for larger data sets from a greater number of sites, particularly those of later periods.

“This book can be enthusiastically recommended as an overview of the changes in plant exploitation in the Near East and Europe in the last 10,000 years.”

The first chapter outlines the types of archaeobotanical and botanical evidence available. This tightly compressed chapter could perhaps have been expanded. No mention is made of the problems of sampling and interpreting ancient seeds, nor of the development of the cheap and efficient water separation techniques in the late 1960’s that have dramatically enhanced the retrieval of charred seeds from archaeological sites. A fuller account of the techniques of genetic analysis would have been helpful, and the limitations of using modern distribution data as evidence for the distribution of plants in the past (heavily relied on in this book) are not discussed.

In the following six chapters the evidence from archaeobotany and from studies of living crop plants and their wild ancestors for the domestication and spread of the main Near Eastern and European crop plants is authoritatively outlined. This part of the book can be strongly recommended as an up-to-date guide to what is known. The discussion of the relationship between the breeding system of the plant and its domestication is particularly illuminating. Numerous well-chosen illustrations of archaeological material are provided, but the drawings of living plants are from old publications and are sometimes of poor quality. The discussion of the spread and relative importance of each crop species after domestication is wide ranging, but reads occasionally as a list of obscure places at obscure periods. More discussion of how these patterns relate to cultural changes in antiquity - for example, via migrations and trade routes - would perhaps have made these clearer. However some important periods of change are pointed out in the chapter of conclusions: the spread of the original “package” of Near Eastern crops from the Near East to Europe; the domestication of crops such as opium poppy and oats outside the Near East; the beginning of fruit cultivation in the fourth and third millennia, and the importance of the first millennium B.C. as a time when new crops such as millet, cotton and sesame arrived in the Near East. There is an additional chapter concerning fruits gathered from wild plants.

The short final chapter of conclusions is preceded by 24 pages devoted to lists of plant remains from various sites. Although this is in principle a good idea, this chapter falls below the high standards of the rest of the book. Plant remains from each site are listed by archaeological level and classified as prevailing, frequent, few or rare. These lists make difficult reading. Either tables or narrative accounts would make the patterns of change through time clearer. Even allowing for the sparseness of archaeobotanical reports from some areas, too many very short preliminary reports are used and given equal weight with far more informative final reports. One example is the treatment of a preliminary report on the Turkish site of Can Hasan I. Here the original report is on only two out of the numerous samples found, and describes only 21 grains of cereal and 12 peas. Zohary and Hopf translate this into “Scarce remains: wheat (few); six-rowed barley (frequent); pea (frequent).” In fact, the excavator’s reports make it clear that plant remains at Can Hasan I were very numerous, and the analysis of only 33 seeds is a completely inadequate basis on which to characterize the crops of a site. For the other sites in the list, the chronological periods concerned are sometimes given, sometimes absent, and some of the radiocarbon dates differ from those given in the original reports.

This book can be enthusiastically recommended as an overview of the changes in plant exploitation in the Near East and Europe in the last 10,000 years. A very full bibliography makes it easy to follow up information on particular crops. This is certainly an essential purchase for botanical and archaeological libraries, and if it becomes available in a cheaper, paperback form, will be a very useful desk-side companion for anyone interested in the subject.
Announcement

Central American Institute of Prehistoric and Traditional Cultures Established

The Central American Institute of Prehistoric and Traditional Cultures at Belize was established under a charter from the government authorities in Belize as a scientific, educational, and non-profit organization for the purposes of promoting the preservation of ancient and traditional cultural ethos and materials, and to act as a center for the dissemination of knowledge and interest in the study of such cultures. These activities include scientific research and archaeological investigations, preservation for public benefit of archaeological monuments and historical landmarks, as well as academic and educational programs on all aspects relating to prehistory, ethnohistory, and the ethnographic present.

Studies in the areas of ancient and indigenous cults and ritual practices are particularly encouraged. Plans are on the way to establish, as part of the Institute, a center for shamanistic studies.

Twenty-seven acres of jungle terrain, kept as a natural preserve, have been dedicated for an ethnobotanical field station, which is to serve as a research facility, where plants of ethnopharmacological interest and ritual importance can be studied in their native habitat. The Institute also encourages work in wildlife and tropical resource management, to be pursued from indigenous and traditional points of view.

Although Mesoamerica constitutes the focal point of interest, as indicated by the Institute’s name and location, nevertheless, research and academic pursuits, as well as educational programs, are not limited to any particular region or culture of the world. In addition, the Institute seeks cooperation with other scientific and cultural organizations established for a similar purpose.

Although presently, we are limited to issuing the Chac Mool Newsletter (available upon request at no charge), it is hoped that our plans to publish in the near future a regular journal, as well as monographs, will be realized fairly soon.

Like all institutions of this kind, we must depend on public and peer support. We extend warm invitations to new members to join our ranks!

Dr. Michael Ripinsky-Naxon has become the founding director of the Institute. He specializes in prehistoric and native religions, particularly in shamanism and sacred plants. His book, entitled The Nature Of Shamanism, is being published by the State University of New York Press in 1993. Two other books, Flesh of the Gods - Souls of Men (hallucinogens and ritual among the maya) and Ancient Belize (an archaeological volume edited by him) are also forthcoming.
Meetings Calendar

Susan Mulolland, Archaeometry Laboratory, University of Minnesota-Duluth, 10 University Drive, Duluth MN 55812; e-mail SMULHOLL@UMNDDL; 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., “15(1):2” for volume 15, number 1, page 2.

1992

July 3-5. Symposium on Subglacial Processes, Sediments and Landforms. Northern Ireland. George F. Dardis, Sedimentology and Palaeobiology Laboratory, AHSEC, East Road, Cambridge, CB1 1PT, UK; fax 0223-332793.

July 6-10. 36th Annual Meeting of the Australian Mathematical Society. Perth, Western Australia, Australia. W.S. Perriman, School of Mathematics and Statistics, Curtin University of Technology, Bentley, Western Australia 6102, Australia; e-mail tsiewp@cc.curtin.edu.au.


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

July 13-17. 10th International Conference on Solid State Dosimetry. Washington, DC, USA. Dr. S.W.S. McKeever, 10th SSD Conference, Department of Physics, Oklahoma State University, Stillwater, OK 74075, USA.

Aug. 1-14. Meeting to Focus on Global Change. Washington, DC, USA. ASPRS, Don Hemenway, 210 Little Falls Street, Falls Church, VA 22046, USA.

Aug. 9-14. 15th International Conference on Organometallic Chemistry. Warsaw. Prof. Dr. S. Fasynekiewicz, Warsaw Technical University, Faculty of Chemistry, Koszykowa 75, 00-662 Warsaw, Poland.

Aug. 16-21. 9th International Biotechnology Congress. Arlington, Virginia, USA. Division of Biochemical Technology, American Chemical Society Meetings, 1155 16th Street NW, Washington, DC 20036, USA; tel 202-872-4402.


Aug. 23-28. 3rd International Congress of Human Paleontology. Jerusalem, Israel. Patricia Smith, Organizing Secretary, c/o International Ltd., P.O. Box 25313, 61292 Tel Aviv, Israel.


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 365211 GSGJ.

Aug. 30-Sept. 4. Australian Rock Art Conference; sponsored by Australian Rock Art Research Association and International Federation of Rock Art Organizations. North Queensland, Australia. AURA, P.O. Box 216, Cairnfield South, Victoria 3162, Australia.


* Sept. 6-12. 8th International Palynological Congress. Aix-en-Provence, France. Rob Scaife, Department of Geography, University of Southampton, Southampton SO9 5NH, UK.

* Sept. 7-10. 7th Annual Meeting of Language Origins Society. Cambridge, England. Leonard Rolfe, Department of Psychology, University of Lancaster LA1 4YF, UK.


Sept. 14-18. 20th European Meeting of Statisticians. Bath, R. Sibson, School of Mathematics, University of Bath, Claverton Down, Bath BA2 7AY, UK.

Meetings Calendar


* Sept. 21-25. Paleoceanography and Global Change International Meeting. Kiel, Germany. ICP IV Organizing Committee, c/o GEOMAR Wischhofstrasse 1-3/Building 4, D-2360 Kiel 14, Germany.


* Nov. 1-6. Soil Science Society of America Annual Meeting. Denver, Colorado. SSA, 677 S. Segoe Road, Madison, WI 53711, USA.


* Nov. 12-15. American Society for Ethnohistory. Salt Lake City, Utah, USA. William Fowler, P.O. Box 6307-B, Vanderbilt University, Nashville, TN 37235, USA.

* Nov. 15-20. American Nuclear Society. Washington, DC, USA. Meetings Department, ANS, 555 N. Kensington Avenue, La Grange Park, IL 60525, USA; tel 312-352-6611.

* Nov. 15-20. Optical Society of America Annual Meeting/OPTCON 92. Boston, Massachusetts, USA. OSA, 2010 Massachusetts Avenue NW, Washington, DC 20036, USA.


+ Dec. 27-30. Archaeological Institute of America. New Orleans, Louisiana, USA. AIA, 675 Commonwealth Avenue, Boston, MA 02215, USA.


1993

* Jan. 13-16. Joint Mathematics Meetings; co-sponsored by the American Mathematical Society. San Antonio,
Texas, USA. H. Daly, AMS, P.O. Box 5887, Providence, RI 02940, USA.


April 11-17. 58th Annual Meeting of the Society for American Archaeology. St. Louis, Missouri, USA.


+ July 28-Aug. 5. 13th Congress, International Union of Anthropological and Ethnological Sciences. Mexico, D.F., Mexico. Linda Manzanilla, Instituto de Investigaciones Antropológicas, Universidad Nacional Autonoma de Mexico, Ciudad Universitaria, Coyoacan D.F. 04510, Mexico; tel 525-548-7828; fax 525-554-0467; bitnet: LMANZ@ UNAMVM. Theme: Cultural and biological dimensions of global change.


* Aug. 22-29. 29th International Congress of History of Science. Zaragoza, XIX International Congress of History of Science, Facultad de Ciencias (Matemáticas), Ciudad Universitaria, 50009 Zaragoza, Spain; fax 76-565825; tel 76 38198 EDUCI-E; e-mail iche@cc.unizar.es. Sections include: Astronomy in ancient cultures; Metalurgy in ancient China and India.

Aug. 23-29. 3rd International Conference on Geomorphology. Hamilton. Derek C. Ford, Department of Geography, McMaster University, 1280 Main Street West, CDH-Hamilton, Ontario L8S 4K1, Canada.


1994


April 18-24. 59th Annual Meeting of the Society for American Archaeology. Anaheim, California, USA.


Phytoliths (continued from p. 4)

Archaic Site in Southwestern Chiapas: The Phytolith Evidence" by Cynthia Pope (University of Texas) and John Jones (Smithsonian Tropical Research Institute) presented results from a similar study but focused on results available from quick (4-hour) processing methods. "Phytolith Problems in Transdanubian Archaeology" by Irwin Rovner (North Carolina State University) showed how the difficult question of resolving Festucoid (Pooid) phytolith shapes may be resolved by computer-assisted microscopy.
SAS BULLETIN
Society for Archaeological Sciences

Editorial Staff

Editor: Rob Sternberg
Dept. of Geosciences, Franklin and Marshall College
Lancaster, PA 17604-3003
Office: (717) 291-4134  FAX: (717) 291-4143
INTERNET: R_Sternberg@Acad.FANDM.edu

Archaeometallurgy: Martha Goodway
CAL MSC, Smithsonian Institution
Washington, DC 20560
Office: (301) 238-3733 Dept.: (301) 238-3700
FAX: (301) 238-3709

Meetings Calendar: Sue Mulholland
Archaeometry Lab, University of Minnesota
10 University Drive
Duluth, MN 55812
Office: (218) 726-7957 FAX: (218) 726-6556
BITNET: SMulholland@UMN Dul

Book Reviews: Robert H. Tykot
Department of Anthropology, Harvard University
Cambridge, MA 02138
Office: (617) 496-8991 FAX: (617) 495-8925
INTERNET: Isotope@HarvardA

SAS Executive Officers 1991-1993

President: James Burton
Department of Anthropology
University of Wisconsin-Madison
Madison, WI 53706
Office: (608) 262-4505 BITNET: JHBurton@WiscMACC

Vice President/President-elect: Erv Garrison
National Oceanographic & Atmospheric Administration
OCRM/MEMD
1825 Connecticut Ave., NW
Washington, DC 20235
Office: (202) 606-4126 FAX: (202) 606-2496

Secretary/Treasurer: Chris Prior
Radiocarbon Laboratory
University of California
Riverside, CA 92521
Office: (714) 787-5521 FAX: (714) 787-5409
BITNET: CPrior@UCRVMS

Remote Sensing and GIS: James I. Ebert
Ebert & Associates
3700 Rio Grande Blvd., N.W., Suite 3
Albuquerque, NM 87107
Office: (505) 344-2345 FAX: (505) 344-2444
BITNET: Ebert@UNMB

Bioarchaeology: Delwen Samuel and Mark Nesbitt
McDonald Institute for Archaeological Research
Cambridge University
62 Sidney Street, Cambridge CB2 3JW
England
Office: 44-223-333537 FAX: 44-223-333536

Archaeological Chemistry: Joseph B. Lambert
Dept. of Chemistry, Northwestern University
Evanston, IL 60201
Office: (312) 491-5347 Dept.: (312) 491-5372
INTERNET: Lambert@Casbah.acns.nwu.edu

Geoarchaeology: Robin L. Burgess
Military Airlift Command
DCS - Logistics and Engineering
Scott Air Force Base, IL 62225-5001
Office: (618) 256-5764

SAS Administration

General Secretary: R. E. Taylor
Associate Secretary: Donna Kirner
Radiocarbon Laboratory
University of California
Riverside, CA 92521
Office: (714) 787-5521 FAX: (714) 787-5409
BITNET: RETaylor@UCRVMS

Published quarterly by the Society for Archaeological Sciences.

Deadline for Submissions:
No. 1 November 15  No. 2 February 15
No. 3 May 15        No. 4 August 15

Distributed to subscribers: $55.00/year individual (with Journal of Archaeological Science), $50.00 student (with JAS), $5.00 student (without JAS), $15.00 institution. Payable with major credit cards: provide card number and expiration date. ISSN 0899-8922.

Printed on recycled paper.