

CMRAE SUMMER INSTITUTE

Prehistoric Agriculture

The Center for Materials Research in Archaeology and Ethnology (CMRAE) announces its fourth annual Summer Institute course. This one-month intensive investigation of ancient agricultural technology and its reconstruction from archaeological and paleoenvironmental data will be held 10 June - 5 July, 1985 at M.I.T. The course will be taught by Frederick M. Wiseman, Principal Research Scientist, CMRAE, M.I.T. Its purpose is to introduce archaeologists, geographers, and scholars in related disciplines to techniques and methods used to reconstruct past agricultural technologies and crop mixes.

Morning lectures will focus on a variety of agricultural land use types that are to be expected in the archaeological or paleolimnological record, how they related to other portions of past socio-economic systems such as trade and consumption, and how they affected natural biotic and geomorphic systems. Decision making and optimization theory as they pertain to agricultural practice will also be discussed.

Afternoon laboratories will involve examination of materials from archaeological and paleoenvironmental contexts that reflect some form of agricultural activity in the past. We will also investi-

gate larger-scale indicators of past agriculture, both in the laboratory and in the field. Techniques involved will be: pollen analysis (both archaeological and paleolimnological), dendro-chronology, macrobotanical

SAS

VOL. 8 • NO. 2
WINTER 1985

NEWSLETTER

SOCIETY FOR ARCHAEOLOGICAL SCIENCES

MEETING ANNOUNCEMENTS

SAS Annual Meeting in Denver May 1

The SAS Seventh Annual Meeting will take place concurrently with the Society for American Archaeology meeting at the Denver Hilton Hotel in Denver, Colorado. On Wednesday, May 1, the SAS will conduct a symposium entitled: "Near Surface Dating: Obsidian Hydration and Cation Reactions." In the afternoon of the same day from 2-5 p.m., a Poster Session (see form, p. 4) will be held for contributed papers. The Annual Business Meeting will be held from 5-6 p.m. the same day. Further details will be mailed to all members.

Call for SAS Nominations

Those interested in nominating or becoming a candidate for the SAS 1985-1986 Vice President (President-elect) or Assistant Secretary-Treasurer (Secretary-Treasurer elect) should indicate their intention to the chair of the Nominating Committee, Joseph W. Michels (SAS Vice President) at the Department of Anthropology, Pennsylvania State University, State College, PA 16802 not later than March 1.

Society for Pennsylvania Archaeology, Inc.

The Society for Pennsylvania Archaeology, Inc. will hold a meeting April 26-28, 1985 at the Holiday Inn, Brookville, PA. For further information, write Program Chairman Edmund Dlutowski, 105 Woodlawn Rd., Butler, PA 16001.

analysis, vegetation sampling, and study of relic earthworks both on site and by aerial photography.

The course is limited to 15 participants and is open to graduate students, faculty, and post-doctoral staff. Credit must be arranged at the student's home institution. The cost is \$500, which covers registration and course materials. Lodging in the M.I.T. dormitories can be arranged for an additional cost of approximately \$800. Financial assistance is available.

For further information and application forms, write to: Professor Suzanne DeAtley, Director, CMRAE Summer Institute, Massachusetts Institute of Technology, Room 8-138, Cambridge, Massachusetts 02139.

The deadline for receiving applications is 15 February, 1985.

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MEETING ANNOUNCEMENTS

Penrose Conference

The Archaeological Geology Division of the Geological Society of America plans a Penrose Conference on "Archaeological Geology: The mutual impact of research in the two facets of an interdisciplinary science" to be held in Pachuca or Teotihuacan, Mexico in late Spring 1986. More detailed information will appear in later issues of the Newsletter. SAS is an official co-sponsor of this conference. Further information can also be obtained from the Newsletter editor or from Dr. Charles Vitaliano, Dept. of Geology, Indiana University, Bloomington, IN 47405.

RECENT PUBLICATIONS

Archaeological Sediments in Context

Stein, J.K. and W.R. Farrand (eds.), 1985. Archaeological Sediments in Context. Orono, ME: Center for the Study of Early Man, Publication No. 2.

Recent Books by B.S. Ottaway

B.S. Ottaway, Dept. of Archaeology, University of Edinburgh, has recently published two new books:

- Earliest Copper Artifacts of the North-alpine Region: Their Analysis and Evaluation. 1982. Schriften des Seminars für Urgeschichte, Bern, Heft 7.
- Editor of Proceedings of Workshop on Archaeology, Dendrochronology and the Radio-carbon Calibration Curve. 1983. Occasional Paper No. 9, Department of Archaeology, University of Edinburgh.

Rochester Museum and Science Center Publication

Proceedings of the 1982 Glass Trade Bead Conference, general editor: Charles F. Hayes III. This volume is sponsored by the Arthur C. Parker Fund for Iroquois Research, Research Records No. 16, 1983. It is published by the Research Division of the Rochester Museum and Science Center, 657 East Avenue, Rochester, NY 14603. The 284-page volume includes a Kidd and Kidd Classification System Reprint. The publication may be ordered for \$19.95 plus \$2.00 postage and handling.

Institut de Paléontologie Humaine

Two new publications by Marylene Patou:

- Tighennif (Ternifine, Algérie). Premiers résultats concernant l'origine de l'accumulation du matériel osseux de ce gisement Pleistocène. En collaboration avec Christiane Denys et Nasser Djemmali. c.R.; de l'Académie des Sciences, Paris, t.299, Serie II n°8, 1984, pp. 481-86, 1 pl. photos.
- Contribution à l'étude des Mammifères des couches supérieures de la Grotte du Lazaret (Nice, A.M.): Méthodes et Résultats Paleontologiques et Palethnographiques (Gisement Pleistocène Moyen supérieur). THESE DE DOCTORAT DE 3 CYCLE en Géologie du Quaternaire et Préhistoire. I.P.H. Paris VI. 450 P., nombreuses figures et nombreux tableaux, 2. 6 planches photos.

WORKSHOP ON THE STUDY OF ANCIENT METALS AND CERAMICS

A workshop, Analytical Tools in Archaeometry I, will be held at the University of Delaware, Newark, Delaware, October 7-9, 1985. Most archaeologists now recognize that analytical techniques can provide fresh insight into the interpretive problems surrounding an artifact corpus. However, the growth in sophistication of scientific equipment has been so dramatic over the past two decades, that it is often difficult to design a research strategy that will correctly blend those techniques for maximum information recovery. In the face of idealized commercial claims it is important to be aware of the limitations of a technique as well as its merits. The purpose of the proposed workshop is to provide practical guidance on such matters, with an emphasis on inorganic materials; to create a dialogue between laboratory specialists and the potential "users" of technical data, that addresses not only the principles of a particular technique (e.g., PIXE, XRF, NAA, ICP, Pb-isotope analysis, electron microprobe, polarography) but also general aspects such as running costs, turnaround time, accessibility to comparable data bases, etc. Publication of the workshop proceedings would provide a pragmatic overview of the current status of this fast-growing discipline.

Invited Papers and Poster Session

Please complete the slip below as appropriate, and mail it to one of the workshop convenors:

WORKSHOP ON THE STUDY OF ANCIENT METALS AND CERAMICS University of Delaware, October 7-9, 1985

Dr. Charles Swann
Bartol Foundation
University of Delaware
Newark, DE 19716

Dr. Stuart Fleming
MASCA, University Museum
33rd and Spruce Streets
Philadelphia, PA 19104

- I am interested in attending the workshop.
- I would like to receive details of Proceedings.
- I would like to present a paper/poster.

Title of paper/poster _____

Name

Institution

Address

Zip

POSTER SESSION PROPOSAL

SOCIETY FOR ARCHAEOLOGICAL SCIENCES
1985 Meeting-Denver, Colorado
May 1, 1985

NAME: _____

INSTITUTIONAL AFFILIATION: _____

ADDRESS: _____

DAYTIME TELEPHONE: Area Code _____

TITLE OF POSTER PRESENTATION: _____

ABSTRACT: (Please do not exceed indicated space on front of sheet)

Remember that poster session materials must fit into space of about 6' x 5'. Please return to Office of General Secretary, SAS, Department of Anthropology, University of California, Riverside, CA 92521 not later than **April 10, 1985**.

Published quarterly by the Society for Archaeological Sciences. Distributed to members of the Society with membership, \$7.50 per year, \$5.00 per year for students, \$10.00 institutional membership, \$150.00 life membership. ISSN 0739-0637. Editor: George Rapp, Jr.; Associate Editor: Judith D. Holz, 108 Mathematics-Geology Building, University of Minnesota, Duluth, MN 55812 U.S.A.

GRASS SILICA PHYTOLITHS

Susan C. Mulholland and George Rapp, Jr.

Archaeometry Laboratory
University of Minnesota, Duluth

Phytoliths are microscopic mineral deposits which form within and between plant cells. Subsequent deposition in sediments preserves evidence of plants in the archaeological and environmental record. Although any mineral deposit in a plant may be considered to be a phytolith, recent research (and this report) focuses on deposits of opaline silica ($\text{SiO}_2 \cdot n\text{H}_2\text{O}$).

Plant families rich in silica include the Gramineae (grasses), Cyperaceae (sedges), Juncaceae (rushes), and Equisetae (horsetails). All plant parts (leaf, stem, root, and inflorescence) may produce phytoliths, although subterranean structures tend to have less than aerial parts. Function of silica in plants is not well understood at present. Hypotheses include structural support, light "windows," and disease and insect resistance.

Phytoliths are similar in size to pollen grains, botanical microfossils extensively used in paleo-environmental reconstruction. However, the two microfossils differ in other characteristics. Opal phytoliths are most abundant and distinctive in the Gramineae; pollen grains are most distinctive in trees. Therefore, different information is available from the two microfossils. Deposition methods also differ. Pollen grains have mostly wind and water deposition. Phytoliths are normally deposited by in situ decomposition of plant material. However, fire or erosion can expose phytoliths to wind and water transport. Finally, the microfossils have different compositions. Pollen grains preserve under many conditions but decompose in some environments. Silica phytoliths weather both mechanically and in strongly basic sediments.

Although phytoliths may yield detailed information about certain plant groups, many areas must be researched first. Phytolith description and classification is the single most important area. A detailed morphological classification is the basis for accurate interpretation of phytoliths recovered from sediments. The most widely used classification scheme, based on 17 grass species, contains four categories divided into 26 types (Twiss et al., 1969). Research at the Archaeometry Laboratory, UMD, has developed a more detailed classification scheme, based in part on that of Twiss. Forty grass species were examined.

The classification is divided into ten shape categories: dumbbell, cross, saddle, long trapezoid, short trapezoid, trichome, long cell, bulliform cell, stoma, and rectangle/square. The first five categories are grass silica cells and form the bulk of Twiss' classification. The second five categories are structures that have been described by botanists.

Structural elements of plants can be silicified or not. Trichomes include hairs, scales, papillae, and other types of epidermal protrusions. Long cells are thin, rectangular epidermal cells, the most abundant epidermal cell type. Bulliform cells are enlarged, specialized cells, thought to function in leaf rolling. Stomata are epidermal openings that function in gas exchange. The adjoining specialized cells are often silicified, either in a group or singly. Rectangle/squares are large blocky cells from the epidermis or mesophyll. Other types of structural cells may be silicified but have not yet been observed.

Grass silica cells always produce phytoliths; one or more of the following types were observed in every grass specimen. Dumbbells have two distinct lobes separated by a shaft. Crosses have four equal lobes separated by four indentations. Saddles are approximately rectangular with two convex and two concave edges. Long trapezoids are oval to rectangular, usually with sinuous sides. Short trapezoids are oval to circular with a ridge or plateau on top. Both long and short trapezoids have a trapezoidal side view (one face is shorter than the other). Intermediate shapes exist among all five categories. It is still unknown if a complete range of shapes exists between each category. Additional shapes may be discovered as new species are examined (see Metcalfe, 1960).

The five grass silica categories are basically as described by Twiss et al. (1969); however, our data do not show the distribution pattern they observed (see Table below). Dumbbells and crosses were thought to be unique to the subfamily Panicoideae; we found dumbbells and crosses in all subfamilies. Saddles were thought to be unique to the Chloridoideae; we found saddles in the Arundinoideae as well. Trapezoids (long and short) were listed only in the Pooideae. We found short trapezoids in most subfamilies; however, long trapezoids were restricted to the Pooideae. The overall pattern is similar to that observed by Twiss: Panicoideae species all have dumbbells and crosses, Chloridoideae species all have saddles, Pooideae species all have trapezoids. However, the phytolith categories as defined are not restricted to the respective subfamilies. Further research should enable recognition of finer category subdivisions that are restricted to plant groups.

Table. Distribution Pattern of Grass Silica Phytoliths

Phytolith Categories Grass Subfamily*	Long Trapezoid	Short Trapezoid	Saddle	Dumbbell & Cross
Pooideae	X	X		X
Arundinoideae		X	X	X
Chloridoideae		X	X	X
Panicoideae				X

*See Pohl, R.W. 1978. How to Know the Grasses, Wm. C. Brown Co. Pub.

References

- Metcalfe, C.R. 1960. Anatomy of the Monocotyledons. I. Gramineae, Oxford at the Clarendon Press.
- Twiss, P.C., E. Suess, and R.M. Smith. 1969. "Morphological Classification of Grass Phytoliths," Soil Science Society of America, Proceedings, 33:109-15.

NEWS OF ARCHAEOMETALLURGY

● **Professor Heather Lechtman**, Director of the Center for Materials Research in Archaeology and Ethnology (CMRAE) at MIT, has been engaged for several years in research on alloys of copper and arsenic and their production in prehistory. Her work includes an assessment of the comparative mechanical properties of arsenic and tin bronzes as well as an investigation into the extractive metallurgies developed to manufacture copper-arsenic alloys.

During August 1984, **Professor Ronald Tylecote** of the Institute of Archaeology, University of London, joined Professor Lechtman in Sussex, England for a month of experiments designed to produce copper-arsenic alloys by several methods, including the smelting of sulfarsenide ores of copper. The work continued experiments begun in Vermont in 1982.

The investigators designed three experimental approaches to achieve alloys in the compositional ranges desired: 1) addition of arsenic-containing minerals to molten copper; 2) direct smelting of roasted copper sulfarsenide ores; and 3) co-smelting of copper sulfarsenide ores with ores of copper.

All three sets of procedures resulted in the manufacture of copper-arsenic metal. The smelting experiments were particularly successful in producing plano-convex ingots of solid alloy. The investigators are currently studying these alloys and the mattes and slags associated with them. They hope to publish their findings in about a year's time.

● **The International Secretariat for Research on the History of Agricultural Implements** is a new organization that reports on studies undertaken by the Danish National Museum and the Metallurgy Department of the Technical School of Denmark concerning ancient forging techniques. The Department has already worked on Viking knives, prehistoric horseshoes, and 19th-c. stem frames, with metallurgical analysis of an assymetrical 17th-c. plowshare currently underway. Results of these investigations will be published in the Secretariat's journal Tools and Tillage. For information, write Grith Lerche, International Secretariat for Research on the History of Agricultural Implements, National Museum, Brede, DK-2800 Lyngby, Denmark.

● **The National Association of Corrosion Engineers (NACE)** has formed a Public Affairs Subcommittee on Conservation of Historic and Artistic Works to facilitate the exchange of information between corrosion engineers and others with a professional interest in corrosion phenomena. For further information write Dale Miller, Deputy Executive Director for Public Affairs, National Association of Corrosion Engineers, P.O. Box 218340, Houston TX 77218, (telephone 713-492-0535).

● A symposium on the restoration of the **Statue of Liberty** will be held February 28, 1985 at the Metallurgical Society (TMS-AIME) 114th Annual Meeting in New York City. The symposium is sponsored by the American Society for Metals Committee on the History and Archaeology of Materials, which will also sponsor a one-day symposium on Canadian Archaeometallurgy at the Fall Meeting of TMS-AIME in Toronto, October 13-17, 1985. For information write Dr. Michael Wayman, Department of Metallurgy and Material Sciences, University of Toronto, Ontario M5S 1A4, Canada (telephone 416-978-3012).

● An Historic Iron Studies Workshop sponsored by the **Society for Industrial Archaeology (SIA)** is planned for early March in Virginia. For information write Edward S. Rutsch, Box 111, RD 3, Newton NJ 07860 or call 201-383-6355.

- A symposium on Medieval Iron in Society, announced by the **Jernkontoret (Swedish Ironmasters' Association)** and the **National Board of Antiquities**, will be held May 6-9 in the old mining district of Bergslagen, about a hundred miles northwest of Stockholm, at the Hotel Klackbergsgarden in Norberg. The symposium will include site visits. For information write Jernkontoret, attention Kerstin Fernheden, Box 1721, S-111 87 Stockholm, Sweden.
- From June 7-9, the **Historical Metallurgy Society**, the **British Museum**, and the **University of Bristol** will sponsor a conference on 2000 Years of Zinc and Brass. The conference will be held in Bristol at the University and will include site visits to William Champion's factory, the Salford brass battery mill, and the calamine mining areas of Mendip. For details write Dr. J.H. Bettey, Department of Extramural Studies, University of Bristol, Wills Memorial Building, Queen's Road, Bristol BS8 1HR England.
- A week-long course in Methods of Production of Ancient Metallic Artifacts is being offered from July 15 to 19 at the **University of London**. Tutors are Dr. Paul Craddock of the **British Museum** and Professor Ronald Tylecote of the **Institute of Archaeology**. The guest lecturers include Andrew Oddy of the British Museum, Nigel Seeley and David Scott of the Institute of Archaeology, Jack Ogden and other independent experts. The fee is \$125 (L85) and enrollment is limited to twenty-five. Application should be made to James Black, Coordinator, Conservation Summer School, 31-34 Gordon Square, London WC1H 0PY England.
- Recent Research in Jewellery Studies, a symposium organized by the **Society of Jewellery Historians**, will be held in London at the Society of Antiquaries, November 4-6, 1985. For information write the Symposium Secretary, Jack Ogden, 42 Duke Street, St. James's, London SW1Y 6DJ England. This symposium will be followed immediately by a second, **Precious Metals in Art and Archaeology: Conservation and Technology**, on November 7 and 8 at the British Museum. For information, write Mrs. H. Lane, Conservation Division, **British Museum**, Great Russell Street, London WC1B 3SG England.
- Volume I of Kenneth C. Barraclough's Steelmaking Before Bessemer, titled Blister Steel, The Birth of an Industry, is now available from **The Institute of Metals Book Sales Department** (Book 297, ISBN 0 904357 538) for \$39.90, member's price \$31.92. Volume II, Crucible Steel - The Growth of a Technology, will be available soon. Both volumes may be ordered as a set (Book 314) for \$89, members \$71.20.
- The inaugural meeting of a new organization, the **Association for Metals and Archaeology**, is tentatively scheduled for June 1985 in Oxford, England. For further information, write Dr. J. Peter Northover, Dept. of Metallurgy and Science of Materials, Parks Road, Oxford OX1 3PH England.
- **Professor Michael R. Notis** plans a spring workshop for metallurgists and archaeologists. Write to him at the Dept. of Metallurgy and Materials Engineering, Whitaker Laboratory #5, Lehigh Univ., Bethlehem, PA 18015.
- If you have news of archaeometallurgy, please call **Martha Goodway** at 202-287-3733 or write to her at CAL MSC, **Smithsonian Institution**, Washington DC 20560.

CALL FOR PAPERS

Call for Archaeometry Papers

Michael B. Schiffer, editor of Advances in Archaeological Method and Theory, a serial publication that serves as an outlet for synthetic articles pertaining to archaeological method and theory, wishes to increase the archaeometric content of this series. The first 7 volumes of Advances include on average about 1-2 papers (among 6-10) that fall within the province of archaeometry. Contributions so far tend to concern dating techniques and ge archaeology, but articles from a material science perspective are in press. The acceptance rate for archaeometry papers in Advances tends to be quite high, but few articles are published because few are submitted. This is not a desirable situation since advances in archaeometry are taking place along many fronts, and synthetic articles are needed to bring archaeologists and students up-to-date on progress in specific areas. Schiffer is eager to publish readable synthetic articles on any aspect of archaeometry. Readers should contact him directly for information on preparing a submission to Advances in Archaeological Method and Theory. Michael B. Schiffer, Department of Anthropology, University of Arizona, Tucson, AZ 85721.

CURRENT RESEARCH

Northwest Coast Shell Midden

Julie K. Stein, assistant professor, University of Washington, Seattle, has been involved in excavation of a Northwest Coast shell midden at San Juan Island National Historic Park. The prehistoric site is one of at least 200 middens on San Juan Island. The excavation, using new techniques and new methods of analysis, is being conducted together with an island-wide survey to assess the prehistoric utilization of the entire area.

REQUEST FOR COOPERATION

Dave Kohler, president of the Society for Pennsylvania Archaeology, Inc. asks for help in locating information on Dr. Frank Soday, author of several publications on the Quad Site. Kohler also seeks assistance in locating materials collected by Soday from various sites, especially in Pennsylvania. Any information should be sent to Dave Kohler, Box 339, Waverly, PA 18471.

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Volume 8

Number 2

Winter 1985

Published quarterly by the Society for Archaeological Sciences. Distributed to members of the Society with membership, \$7.50 per year, \$5.00 per year for students, \$10.00 institutional membership, \$150.00 life membership. ISSN 0739-0637. Editor: George Rapp, Jr.; Associate Editor: Judith D. Holz, 108 Mathematics-Geology Building, University of Minnesota, Duluth, MN 55812 U.S.A.

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For inquiries concerning change in addresses, information from membership records, and other business affairs, contact: Office of the General Secretary, SAS, Radiocarbon Laboratory, Department of Anthropology, University of California, Riverside, California 92521 U.S.A.

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SPECIAL - SAS Subscription rate JOURNAL OF ARCHAEOLOGICAL SCIENCE

The Journal of Archaeological Science offers a special subscription rate to SAS members. The rate is \$42.00 per year for subscriptions outside England. The regular yearly rate is \$124. Three societies have been given this rate reduction: the Association for Environmental Archaeology, the Prehistoric Society in the United Kingdom, and the Society for Archaeological Sciences in the U.S. Contact Mr. Richard Scott, Journals Marketing Department, Academic Press, Inc. 24-28 Oval Road, London NW1 7DX, England to take advantage of this special rate.

In order to reflect more accurately the actual publication dates of the SAS Newsletter, your editors have called this issue Winter 1985 rather than Fall 1984. We still plan to publish a Newsletter each quarter, and the volume and number designations for subsequent issues will follow consecutively. The only change is that you'll receive the winter Newsletter during winter, the spring issue during spring, and so on -- a more realistic and timely arrangement.

SAS

University of Minnesota, Duluth
SOCIETY FOR ARCHAEOLOGICAL SCIENCES
College of Science and Engineering, 108 MG
10 University Drive
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