

SAS Bulletin

Society for Archaeological Sciences

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SAS Nominations Open

Nominations for officers of the Society for Archaeological Sciences for 1989/90 are open. Please submit the names of candidates for the offices of Vice-President/President-elect and Assistant Secretary-Treasurer Treasurer Elect on or before 1 March 1989. The Nominating Committee will nominate at least one individual for the the office of Assistant Secretary-Treasurer/Treasurer Elect and at least two, no more than three, candidates for the office of Vice-President/President-elect. Society By-Laws indicate that any individual receiving a minimum of ten (10) nominations from the membership by 1 March will automatically be placed on the ballot along with the candidates suggested by the Nominating Committee. Nominees must be willing to serve. Nominations should be sent to the Chair of the Nominating Committee, T. Douglas Price, Department of Anthropology, University of Wisconsin, Madison, Wisconsin 53706. Other members of the Committee are Prudence Rice, Department of Anthropology, University of Florida, Gainesville FL, 32611, and Jeff Eighmy, Department of Anthropology, Colorado State University, Ft. Collins, CO 80526.



Graduate Program Directory Updated

Rip Rapp has released the Sixth Edition of the *Directory of Graduate Programs in Archaeological Geology and Geoarchaeology*. This guide to programs is updated each Fall, and is available free to any student or faculty advisor who requests a copy from: George (Rip) Rapp, Archaeometry Laboratory, Research Laboratory Building, University of Minnesota, Duluth, MN 55812-2496

RADIOCARBON Is Moving

Editor Austin Long and Managing Editor Renee Kra have announced that the editorial offices of **RADIOCARBON** have moved to the University of Arizona. As of January 1, 1989, the new address will be: **RADIOCARBON**, Department of Geosciences, University of Arizona, Tucson, AZ 85721

SAA Distinguished Service Award

Nominations are requested for the Distinguished Service Award to be given by the Society for American Archaeology in 1990. This award is intended to recognize individuals who have provided extraordinary service to the Society and the field. Previous winners include Carl Chapman, Charles McGimsey III, Gordon Willey, Albert Spaulding, Jesse Jennings, Hannah Marie Wormington, James Griffin, Emil Haury, Waldo Wedel, William Ritchie, and Richard and Natalie Woodbury. Nominations should contain a two-page statement of the service, activities, and qualifications of the nominee as well as a curriculum vitae. Letters of recommendation from at least two individuals other than the primary nominator should be provided in the nomination package. The deadline for nominations is March 15, 1989. The award, a framed, inscribed citation, will be presented at the 1990 Annual Meeting of the Society for American Archaeology. Complete nomination packages [three letters, two-page statement, and curriculum vitae] should be sent to T. Douglas Price, Chair, SAA Distinguished Service Award Committee, Department of Anthropology, University of Wisconsin, Madison WI 53706.

Publishing Opportunity

In 1982 Linda Ellis published a very useful compendium entitled "Laboratory Techniques in Archaeology. A Guide to the Literature, 1920-1980" (Garland Publishing Inc, New York & London). Several years ago, with the intention of updating and expanding the scope of the Ellis bibliography, 3755 entries, I wrote letters to many archaeologists and physical scientists world-wide to gather lists of publications, references, titles of PhD theses, etc. I am afraid I bit off more than I could chew up, and today am the owner of a vast stack of titles and references which need to be organized into a bibliography on the subject of the physical sciences and archaeology. Unfortunately, I have no time for this project and no students and/or grants that could be applied.

If there is anyone out there who is interested, I would be happy to make these materials available to them. It looks to me as though the final tally might be over 10,000 entries. Ownership of a good PC is imperative. Please contact: Gar Harbottle, Chemistry Department, Building 555, Brookhaven National Laboratory, Upton, N.Y. 11973.

EDWARD SMITH DEEVEY, JR. 1914-1988

Edward S. Deevey, Jr., Graduate Research Professor in the Department of Natural Sciences, Florida Museum of Natural History, passed away in Gainesville on November 29, 1988. He was 73 years of age. An eminent paleoecologist of international renown, Deevey's accomplishments transcended those of narrow disciplinary categories, and he held appointments in four academic departments at the University of Florida—zoology, geology, botany, and Latin American studies. He was a Renaissance scholar who made a mark on many fields, among them archaeology.

Deevey was born December 3, 1914, in Albany, New York. He was educated at Yale University, receiving the Ph.D. degree in Zoology in 1938. He taught at Yale from 1946 to 1968, then served as Killam Professor of Biology at Dalhousie University in Nova Scotia from 1968 to 1971. In 1971 he moved to Gainesville to join the University of Florida and what was then called the Florida State Museum.

During his long and distinguished career he held office in numerous national and international organizations, including the presidencies of the Ecological Society of America and the American Society of Limnology and Oceanography. He was NSF Program Director for Environmental Biology, and he served as editor or editorial board member of seven journals. His research was supported by numerous NSF grants as well as Fulbright and Guggenheim awards, and he was selected as Eminent Ecologist in 1982 by the Ecological Society of America. He was elected to the National Academy of Sciences in 1981.

Deevey published his first scientific article in 1937 [1] (on pollen analysis and climatic interpretation) and in the succeeding half century produced more than 100 publications. Much of his work is considered by ecologists to be innovative and truly pioneering. For example, in 1947 he published a now-classic article [2] borrowing actuarial procedures for applying life tables to animal populations in order to quantify fluctuations over time; in so doing he set forth some of the questions to be addressed in population ecology for several decades. Besides pollen studies and biogeography, his scholarly writings span topics as diverse as the chemistry of lake waters, stable isotope geochemistry, theoretical systems ecology, tropical limnology, sea level change, taxonomy, and extinction of moas.

Deevey's contributions to archaeology reflect his commitment to studying ecology as a series of long-term dynamic processes operating within a historical context. One of his early fields of interest was dating techniques. In 1957 he received a grant from the Rockefeller Foundation to establish the Geochronometric Laboratory at Yale University, and he served as its director from 1951 to 1962. He also served on the editorial board of *Radiocarbon* (1959-1971),

and published numerous articles on radiocarbon dating and its relation to pollen sequences and lake sediment stratigraphies. Another related area of research and publication is Pleistocene chronology. Deevey found the first Pleistocene-age pollen deposits in the New World and established the standard pollen stratigraphy for eastern North America.

His interest in the long-term aspects of ecological change led him to the unique research perspective identified in the title of a 1969 article, [3] "coaxing history to conduct experiments." Since ecological, geological, and archaeological researchers cannot manipulate variables in past settings to conduct active scientific experiments, then they must learn to select diverse sites for study so that the variables themselves have already effectively been manipulated: i.e., the experiments are "coaxed" out of history. Such was the research perspective that inspired an historical ecology project in the tropical lakes area of northern Guatemala, a combined archaeological and ecological study that attempted to correlate the effects of Maya settlement locations and densities with environmental changes over a period of 4000 years.[4]

The astonishing depth and breadth of his knowledge, his unerring ability to recall the most obscure citations, his stature in so many fields—all of these might have conspired to make Ed Deevey not a little intimidating to the many students and colleagues who worked with him. Yet that was never the case, for what all of us will remember is how humane Ed was—gentle and soft-spoken—and his wonderful wit. How many evenings in the field were enlivened by his marvelous anecdotes and endless supply of limericks, all delivered with that reflective pulling at his pipe, that twinkle in his eye, and that shy grin. For those of us who were privileged to work with him, Ed Deevey was mentor, father-figure, wise man. He will be sorely missed.

1. Deevey, E.S. 1947 Pollen from interglacial beds in the Panggong Valley and its climatic interpretation. *American Journal of Science* 235:44-56.
2. Deevey, E.S. 1947 Life tables for natural populations of animals. *Quarterly Review of Biology* 22:283-314.
3. Deevey, E.S. 1969 Coaxing history to conduct experiments. *Biological Science* 19(1):40-43.
4. Deevey, E.S., D.S. Rice, P.M. Rice, H.H. Vaughan, M. Brenner, and M.S. Flannery. 1979 Mayan urbanism: impact on a tropical karst environment. *Science* 206:298-306.

Prudence M. Rice, Department of Anthropology, University of Florida

Mark Brenner, Department of Natural Sciences, Florida Museum of Natural History, University of Florida

Research Report

Obsidian and Basaltic Glass Dating Require Significant Revision of High Temperature Rate Development Methods

Christopher M. Stevenson, John K. Bates, Teofilo A. Abrajano, and Barry E. Scheetz

Over a decade ago Friedman and Long (1976) published the results of their accelerated hydration rate experiments. In this analysis, rates of glass hydration for twelve obsidians were developed in a high temperature vapor environment that did not exceed 250°C. Five years ago, Michels, et al. (1983) published their methodology for the development of glass hydration rates under conditions of elevated temperature and pressure in a hydrothermal solution. Using this approach freshly fractured obsidian or basaltic glass is hydrated in 500 ml of distilled deionized water at temperatures of 150°C to 250°C for durations of up to 6 days in a pressure reactor. The induced rims are used to calculate the activation energy and preexponential. The rates developed at elevated temperature are extrapolated to ambient conditions for archaeological sites using the Arrhenius equation.

Recent independent replications of the experimental design (Stevenson et al. 1988; Tremaine and Frederickson 1988) and studies of glass-water interaction (Bates et al. 1987,

1988) have produced results that are contrary to those reported by Michels et al. (1983). These reports show that obsidian hydration rims developed at 225°C may not be measurable using standard optical procedures (Michels and Bebrich, 1971; Ericson, 1971 and 1981a), or may not even be present. It has been documented by these researchers that the hydrothermal reaction of obsidians at elevated temperatures in distilled deionized water results in the loss of diffusion front definition, and the dissolution of the hydration rim by the aqueous media (Table 1, Table 2, Figure 1).

In response to these replications of the experimental design, one of the authors (Stevenson et al. 1988) added powdered silica to the reaction solution in order to suppress or prevent surface dissolution of the obsidian during the reaction process and reduced the maximum reaction temperature to 180°C. These changes resulted in the development of readily identifiable, low birefringent rims, that can be used to develop hydration rate constants.

Table 1: Replication of the Induced Hydration Rate Experiment Conducted in Distilled Water

Rim Width (μm) and Standard Deviations					Obsidian Type				
Temp.	Duration	Government(1)		Government(2)		RGG II(1)		RGG II(2)	
200°C	0.5 day	1.78	0.04	2.34	0.06	2.13	0.07	2.07	0.05
200°C	1.0 day	2.36	0.03	3.24	0.06	2.34	0.04	3.17	0.04
200°C	2.0 day	5.44	0.09	4.65	0.10	3.73	0.04	4.25	0.08
200°C	4.0 day	3.44	0.04	6.64	0.06	5.18	0.04	5.92	0.07
200°C	6.0 day	NP	NP	8.52	0.05	NP	NP	7.37	0.07
150°C	4.0 day	1.82	0.04	1.80	0.05	1.86	0.05	1.59	0.07
175°C	4.0 day	4.08	0.06	3.26	0.07	3.26	0.05	3.04	0.04
225°C	4.0 day	NP	NP	10.71	0.10	NP	NP	10.11	0.11
250°C	4.0 day	NP	NP	18.02	0.09	NP	NP	17.17	0.13

(1) measurements by Stevenson; (2) measurement by Michels (1983, 1984) NP=no hydration present

Table 2: Replication of the Induced Hydration Rate Experiment Conducted in Distilled Water

Rim Width (μm) and Standard Deviations					Obsidian Type				
Temp.	Duration	Napa (1)		Napa (2)		Annadel(1)		Annadel(2)	
200°C	1 day	2.77	0.13	2.66	0.06	2.36	0.04	1.38	0.06
200°C	2 day	3.12	0.07	3.80	0.05	2.52	0.08	2.65	0.08
200°C	4 day	4.68	0.01	5.33	0.10	3.74	0.03	5.01	0.10
200°C	6 day	5.11	0.06	6.62	0.13	3.85	0.17	6.21	0.14
150°C	4 day	1.59	0.12	1.51	0.07	1.34	0.04	1.38	0.06
175°C	4 day	2.94	0.10	2.86	0.14	2.26	0.02	2.65	0.04
225°C	4 day	6.20	0.14	8.76	0.07	3.80	0.56	9.25	0.14
250°C	4 day	DH	—	14.37	0.07	DH	—	14.25	0.07

(1) Tremaine and Frederickson (1988) ; (2) Michels (1982, 1986) DH=diffuse and unmeasurable hydration

Recent accelerated hydration runs by Abrajano et al. (1986) and Bates et al. (1987) on a simulated nuclear waste glass (SRL 131) and an alkali basaltic glass have shown that the rate of hydration in vapor, under the condition reported, can be significantly less than that observed for samples exposed to aqueous solutions (Figure 2). This observation, where the extent of reaction (vapor vs. hydrothermal solution) is reversed compared to obsidian, highlights the importance of identifying the rate limiting process, e.g., water diffusion, ion exchange, or etching of the glass surface that governs the hydration layer growth. The relative importance of each process can change with glass composition or with reaction conditions, and the interplay between processes will control the thickness of the observed hydrated layer. These data suggest that care must be taken in choosing the experimental method used to accelerate glass reaction, and that current experimental methods used by archaeologists to estimate hydration

rates for archaeological sites are probably not the best methods that could be used to determine the ages of occupation. This observation is supported in the archaeological community (Ericson, 1981b), who initially called into question the use of rates developed at elevated temperatures. In the vast majority of settings obsidian debitage is deposited in soil horizons saturated with water vapor. It would appear that a high temperature vapor environment, as initially simulated by Friedman and Long (1976), and more recently extended by Bates et al. (1981), under certain circumstances, may be the best accelerated reaction method to simulate long-term natural conditions. Research along those experimental designs must pay specific attention to experimental details and must address the initial work of Ericson (1983) that suggests no difference between a vapor/liquid and saturated vapor experiments which is in opposition to work replicated by Bates (1987).

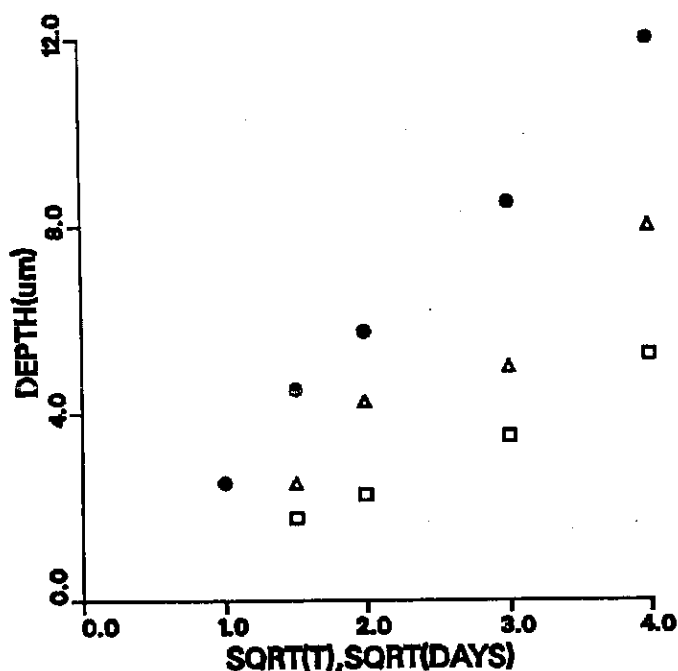


Figure 1: Layer Thickness of Vapor and Hydrothermally Reacted Obsidian (200°C), from Bates et al. (1988). open squares = Hydrothermal disk; open triangles = hydrothermal chip; closed circles = vapor disk

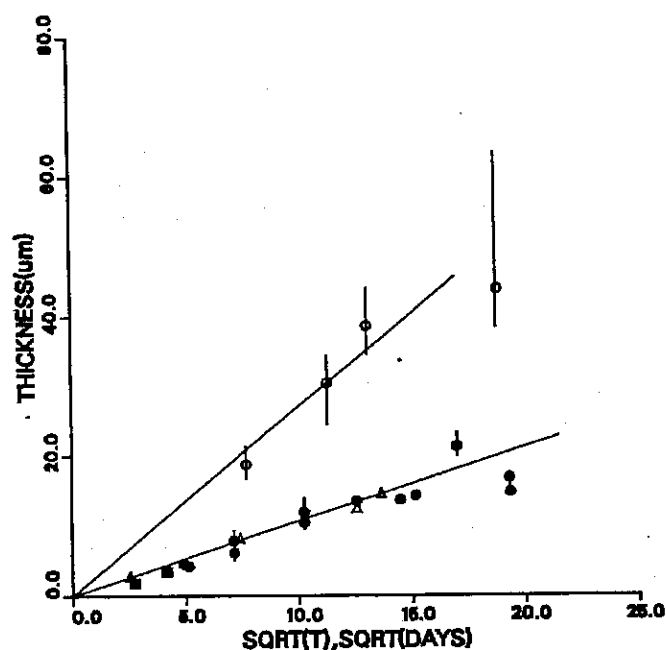


Figure 2: Thickness of hydration layer on SRL 131 glass as a function of the square root of time. Open circles represent liquid hydrated samples with bar indicating observed range of rim thickness. Other symbols represent vapor hydrated glass. All hydrated samples run at 202°C (After Bates et al. 1987).

References

Abrajano, T.A., J.K. Bates., and C.D. Byers
1986 Aqueous corrosion of natural and nuclearwaste glasses, *Journal of Non-Crystalline Solids* 84:251-257.

Bates, J.K., T.A. Abrajano, W.L. Ebert, J.J. Mazer, and T.J. Gerding
1988 Experimental hydration studies of natural and synthetic glasses. Paper presented at the Spring Meeting of the Materials Research Society, Reno, Nevada.

Bates, J.K., T.J. Gerding, T.A. Abrajano, and W.C. Ebert.
1987 NNWSI waste form testing at Argonne National Laboratory. Semi-annual Report, January-June 1986.

Ericson, J.E.
1981a Exchange and Production Systems in California Prehistory, *British Archaeological Reports*, International Series 110:240.
1981b Durability of Rhyolitic Obsidian Glass Inferred

- from Hydration Dating Research. *Scientific Basis for Nuclear Waste Management*, Vol. 3 (J.G. Moore, Ed.) Plenum Press, Inc. New York, 283-291.
- 1983 Some Environmental Variables of the Obsidian Hydration Process. Paper presented at the International Archaeometry Conference, Naples, Italy.
- Friedman, I., and W. Long
1976 Hydration rate of obsidian. *Science* 191: 347
- Lee, R., D.A. Leich, T.A. Tombrello, I.I. Friedman, and J.E. Ericson
1974 Obsidian Hydration Profile Measurements Using a Nuclear Reaction Technique. *Nature* 250: 44-47.
- Michels, J.W.
1982 Hydration rate constants for Annadel Farms obsidian, Sonoma County, California. *MOHLAB Technical Report No. 12*, State College, Pennsylvania.
1983 Hydration rate constants for Rio Grande Gravels Group 2, Dona Ana County, New Mexico. *MOHLAB Technical Report No. 27*. State College, Pennsylvania.
1984 Hydration rate constants for Government Mountain obsidian, Flagstaff, Arizona. *MOHLAB Technical Report No. 29*. State College, Pennsylvania.
1986 Hydration rate constants for Napa Glass Mountain obsidian, Napa County, California. *MOHLAB Technical Report No. 14 (Revised)*, State College, Pennsylvania.
- Michels, J.W., and C. Bebrich.
1971 Obsidian hydration dating. In *Dating Techniques for the Archaeologist*, H.N. Michael and E.K. Ralph, eds. MIT Press, Cambridge. pp:164-221.
- Michels, J., I.S.T. Tsong., and C. Nelson
1983 Obsidian dating and East African archaeology. *Science* 219:361-366.
- Nasedkin, V.K.
1964 Volatile Components of Volcanic Glasses. *Geochemistry International* 2: 317-335.
- Stevenson, C., J. Carpenter, and B. Scheetz
1988 Recent advances in the experimental determination and application of obsidian hydration rates. *Archaeometry*. (In press).
- Tremaine, K., and Frederickson, D.
1988 Induced obsidian hydration experiments: an investigation in relative dating. Paper presented at the Spring Meeting of the Materials Research Society, Reno, Nevada.
- Christopher M Stevenson, *Archaeological and Historical Consultants, Inc., Centre Hall, Pennsylvania 16828*
John K. Bates, *Argonne National Laboratory, Argonne, Illinois 60439*
Teofilo A. Abrajano, *Argonne National Laboratory, Argonne, Illinois 60439*
Barry E. Scheetz, *Materials Research Laboratory, The Pennsylvania State University, University Park, Pennsylvania 16802*

Meeting Announcement

Sixth International Conference on Archaeozoology (ICAZ)

The Sixth International Conference on Archaeozoology will be held May 21 to May 25, 1990, at the Smithsonian Institution in Washington D.C. The central theme of the conference will be the "nature and implications of man/animal interactions over time." A number of sessions are planned for the conference, including: Biological Mechanisms Behind Osteological Distinctions; Bone as a Secondary Product; Reading Patterns in Faunal Assemblages; Man/Animal Relationships in Marginal or Closed Environments; Hunters, Past and Present; Understanding Maritime Adaptations; Domestication: Process and Implications; Man/Animal Relationships in Emerging Complex Societies; Animal Utilization in Historic Periods; and Future Directions in Domestication.

In addition to these regular sessions, a special panel discussion is planned on "Approaches to Faunal Analysis: Past, Present, and Future." This discussion will be devoted to "a general consideration of the role of faunal remains in the study of biological and cultural questions in different global contexts," including "the strength and weakness of

different approaches to faunal remains, and the value of communication between faunal analysts from different traditions in archaeozoology."

A series of workshops will also be held throughout the meeting, including Experimental Taphonomy, Computerization of Archaeozoological Data, Preparation of Comparative Collections, SEM Examination of Bones, Stable Isotopes in Archaeozoology, and The Use of Incremental Structures in the Determination of Age and Seasonality. In addition, there will be a special day-long workshop on May 20th on Curation of Archaeozoological Collections.

Preregistration fees (before late 1988) are US \$125 (\$60 for students). Some financial assistance may be available to early registrants. For further information on the meetings and local arrangements, contact:

The International Council for Archaeozoology
c/o Department of Anthropology
National Museum of Natural History
Smithsonian Institution
Washington D.C. 20560

Book Review

The Wadi Kubbania Skeleton: A Late Paleolithic Burial From Southern Egypt. Fred Wendorf and Romuald Schild. Southern Methodist University Press, 1986. ix + 85pp., references. \$12.50 (paper).

Reviewed by David W. Frayer, University of Kansas

This monograph reviews a portion of the research accomplished by Fred Wendorf and Romuald Schild in the Wadi Kubbania of Southern Egypt. Divided into five chapters plus an appendix, the bulk of the work concerns a reconstruction of the geomorphology of the Wadi Kubbania, a discussion of the Middle and Late Paleolithic sites, and a review of the sedimentology of the region. Despite the title, less than half of the monograph is devoted to a description and analysis of the human skeleton which was found in 1982 eroding out of the sediments near the mouth of the wadi.

For most subscribers of this newsletter, I suspect the analysis of the skeletal remains (done by Angel and Kelley) would be of little interest. The approach is mainly descriptive and utilizes no new techniques nor any innovative twists in skeletal analysis. Even for those working with human skeletal material the description is not particularly informative. Although the inclusion of morphological details and some standard measurements of the skull and postcranial skeleton will be useful for compiling data on anatomically modern *Homo sapiens* from Africa, the description of the human remains is incomplete and lacks a systematic comparison to other North (or East) African Late Pleistocene specimens. Ironically, the relationship of the Wadi Kubbania skeleton to other North African specimens is better presented by Wendorf and Schild in the concluding chapter than by the physical anthropologists. There is also little discussion of dental size or specifics of wear and no radiographic analysis of the skeletal elements. The absence of X-ray analysis is surprising since, besides the "reduced" stature of the individual which Angel and Kelley speculate may be due to adolescent stress, there is an indication of a healed distal ulna fracture and other signs of traumatic injury and stress in the skeletal remains. Presentation of X-ray information would have been useful in providing more details of these skeletal pathologies and in checking for signs of arrested growth in the metaphyses of long bones. In many ways, this final contribution of J. Lawrence Angel is not a fitting conclusion to his long, distinguished career in human osteology and forensics.

Regardless of the shortcomings of the skeletal analysis, the remaining chapters on the geological setting, archaeological sites and sedimentological research give a detailed, comprehensive review of the Wadi Kubbania. Besides providing a background of site formation processes, a major focus of the geological research was concerned with

tracing the sequence of dune and fluvial deposits and how these relate to local environmental factors and fluctuations in the Nile. Geological maps, cross-section profiles, results of geochemical/sedimentological analyses and a series of absolute dates fully document the sedimentary sequence at Wadi Kubbania.

Description of the archaeological material concentrates on five sites found at the mouth of the wadi. Two are Mousterian scatters devoid of faunal remains and another two are richer, Late Paleolithic camps containing hearths, pits and an abundance of fish bones. Characteristics of the Late Paleolithic sites indicate the area was occupied by groups exploiting fish seasonally trapped in backwater embayments of the Nile. The fifth site is the human burial which was initially thought to be associated with Middle Paleolithic artifacts, but later, when bladelets were found in association with the skeleton, proved to belong in the Late Upper Paleolithic. Although brief, the text gives a good account of the archaeological materials and combined with the geological evidence should provide interesting reading and useful information for those interested in the Middle and Late Paleolithic of North and East Africa.

News of Archaeometallurgy

As part of the Natal Museum's research into precolonial metalworking in Natal/KwaZulu, the Department of Archaeology is compiling an annually updated bibliography: "Precolonial Metalworking in Africa- particularly Southern Africa." The bibliography concentrates on, but is not limited to, Namibia, Zimbabwe, Mozambique and areas further south; it presently has more than 1200 entries. A computer printout will be available by June 1989 at a cost of US\$15 from the Department of Archaeology, Natal Museum, Post Bag 9070, Pietermaritzburg 3200, Republic of South Africa, telephone 51404/5.

The dates for the "International Symposium on Archaeometallurgy '89: From Bloom to Knife" have been announced. It will be held September 19-22 1989 at Kielce-Ameliówka, an area of early iron making in the Holy Cross Mountains. Experimental smelting in bloomery furnaces and demonstrations of forging are part of the program. To receive future announcements, write the Secretary of the Organizing Committee, Dr. Elzbieta Nosek, Archaeological Museum of Kraków, Senacka 3 Str, 31-002 Kraków, Poland, telephone 22 71 00.

Another session on materials issues in art and archaeology will be held at the next meeting of the Materials Research Society to be held in San Francisco April 16-20 1989. To receive announcements of this session, write Dr. Pamela B. Vandiver, Conservation Analytical Laboratory, Smithsonian Institution, Washington D.C. 20560.

The proceedings of the previous session on "Materials Issues in Art and Archaeology", Edward V. Sayre, Pamela Vandiver, James Druzik, and Christopher Stevenson, eds., Pittsburgh 1988 (ISBN:0-931837-93-6) has been published by the Materials Research Society as Volume 123 in

the MRS Symposium Proceedings Series. A section on "Technology of Ancient Metals" includes papers by Robert Maddin on the early use of metals, Michael R. Notis et al. on microanalysis, G. Demortier on soldering gold, J. Peter Northover and Sabina Gerloff on Bronze Age cauldrons, Michael N. Geselowitz on Harvard's Mecklenburg collection, and also a reevaluation of lead isotope data in the Aegean by Chandra L. Reedy and Terry J. Reedy. The proceedings are available for \$53 including mailing (\$60 overseas) from the Publications Department, Materials Research Society, 9800 McKnight Road, Suite 327, Pittsburgh, PA 15237, telephone (412) 367-3003, FAX (412) 367-4373.

Occasional Paper 3 of the Fitch Laboratory, *New Aspects of Archaeological Science in Greece*, A Meeting held at the British School of Athens, January 1987, edited by R.E. Jones and H.W. Catling, Athens 1988 (ISBN: 0-904887-03-0) contains a paper by Y. Bassiakos on "Ancient iron metallurgy in Laconia". This paper includes a table of compositions of slags and ores of the Neapolis iron district. Another contribution, an extended abstract by G. J. Varoufakis on the "Metallurgical examination of forty-five Minoan figurines" reports tin contents of 5% or less for figurines dating from Early Minoan I to Late Minoan I but contents of 10-12% in those dating to Late Minoan II and III, along with declining quality in casting and development of working. The proceedings are available for £8.50 postage included from the Publications Department, British School of Athens, Souedias 52, Athens 106 76, Greece.

The former chief engineer at the Royal Mint in London, Denis R. Cooper, has written a book on *The Art and Craft of Coinmaking, A History of Minting Technology*. It is available for £29.50 plus £2.50 postage and packing from Denis R. and Peggy F. Cooper, 86 Reigate Road, Ewell, Epsom, Surrey KT17 3DZ England.

The Archaeometallurgy column in the *Journal of Metals* being conducted by Vincent Pigott continues with articles on iron production in prehistoric Europe by Michael Geselowitz in June, the innovation of steel in Transjordan by Patrick E. McGovern in July, forging iron at Valley Forge by Helen Schenk in August, the early use of iron in Arctic North America by Michael L. Wayman in September, and King Solomon's mines: a twentieth century myth by James D. Muhly in October.

The Center for Canal History and Technology has acquired a number of prewar documentary films on steel making and steel structures from Bethlehem Steel for its film collection. The Center is also involved in recording on 3/4" video the operation of a 1908 steam-powered Grey Mill in rolling wide-flange steel beams before its replacement by more modern equipment. For information contact Lance Metz, Program Director/Historian of the Canal Museum, P.O. Box 877, Easton PA 18044.

A new chapter of the Artist-Blacksmith's Association of North America (ABANA) has been formed in Pittsburgh. For information contact John W. Steel, 263 Lovi Road, Freedom PA 15042, telephone (412) 774-6757

The most interesting information to come out of the International Colloquium on Archaeometallurgy held in Bologna in October was Professor Gerhard Sperl's analysis of the lead necklace excavated by Mellaart at Çatal Hüyük as galena, lead ore rather than smelted metal. Confirmation is being attempted, sample size permitting, by Dr. K. Aslihan Yener at the Conservation Analytical Laboratory of the Smithsonian.

If you have any archaeometallurgical news to contribute, please call Martha Goodway at (301) 238-3733, or write her at CAL MSC, Smithsonian Institution, Washington D. C. 20560, FAX (301) 238-3667.



**Papers Presented
Northeastern Faunal
Analysis Conference**

Princeton University, April 9, 1988

- Kathryn Cruz-Urbe: "Distinguishing carnivore and hominid bone accumulations"
- Mary Ann Larson: "A reconsideration of the faunal remains from the site of Prolonged Drift, Kenya"
- Nicholas Conard: "Faunal remains from the Middle Palaeolithic site of Tonchesberg in the central Rhine Valley"
- Sandra L. Olsen: "The use of modern equid ethology in reconstructing Palaeolithic hunting strategies at So lutre, France"
- Anne Pike-Tay: "Seasonal exploitation of red deer in the Upper Palaeolithic of SW France"
- Paul Rissman: "Herd splitting in Bronze Age India: explorations in the use of cemental annulations"
- Allan S. Gilbert: "The cattle of Meketre: an exercise in boneless zooarchaeology"
- Melinda Zeder: "Livestock and urban economy at Tell Halaf, northern Negev, 3200-700 B.C."
- Darlene Balkwill: "Down the garden path [Faunal analysis on urban sites in New York City]"
- Nicholas Bellantoni, Jeffrey Bendremer, and Marc Banks: "A comparison of white-tailed deer processing at two coastal Contact Period sites in Connecticut"
- Catherine Carlson: "Problems in the study of prehistoric Atlantic salmon utilization in New England"
- Ruth L. Greenspan: "Freshwater fish remains from Stillwater Marsh, Nevada"
- Tonya Largy: "Bird, fish, and amphibian remains from a Middle Woodland oyster midden, Statue of Liberty, New York"
- Thomas H. McGovern: "Some spreadsheet applications; Using QUATTRO for quantifying faunal data"

S A A - Phoenix, Arizona - April 27 to May, 1988

A symposium titled "Soils, Landscape Evolution, and Human Occupation" was presented at the 53rd annual meeting of SAA in Phoenix. This was the first annual SAA-sponsored Fryxell Symposium on interdisciplinary studies in archaeology. A review of the symposium was published in the journal *Geoarchaeology*, 3(4):303.

The SAA Fryxell Award was given to David M. Hopkins, for his work in Quaternary studies in Alaska and adjacent Siberia. Dr. Hopkins received his Ph.D. from Harvard University in 1955, after which he has worked for the U.S. Geological Survey in Menlo Park. A description of his work is given in *American Antiquity*, 53(3).

S A A - Atlanta, Georgia - April 5-9, 1989

At least one symposium has been proposed which may be of interest to members of SAS: "Paleoshorelines and Prehistoric Settlement", proposed and organized by Lucy Lewis Johnson (Vassar College). The symposium, if accepted, will include papers by M.A. Winslow, L.L. Johnson, W. Fitzhugh and P. Clark, J. Dunber, E. G. Garrison, W. F. Keegan, J. Donahue and D.R. Watters, E. J. McDougle, M. Moseley, D. Wagner, and J. B. Richardson. All of these papers deal with changes in shorelines and the effects of those changes on prehistoric settlement.

GSA - Denver, Colorado, Oct 31- Nov. 3, 1988 Centennial Celebration

In honor of the 100 year anniversary of the GSA a symposium focusing on "History of the Establishment of a Geologic Framework for Human Evolution" was organized by Leo F. Laporte. Speakers included Donald K. Grayson, William R. Farrand, Michael O Woodburne, G. H. Curtis, R. L. Hay, and C. Vance Haynes. Their papers are being considered for publication in the *GSA Special Contribution Series*.

The Archaeological Geology Division sponsored two symposia: "New World Geoarchaeology", including reconstructions of Holocene landscapes of Central Great Plains, Southern Plains, Northwestern Plains, and the Southwest (New Mexico, Utah, and Arizona), and "Archaeological Geology: Geophysical, Geochemical, and Geological Studies." The papers covered a wide range of topics, including remote sensing, oxygen-isotope fingerprints of quartzite, the altithermal in the central plains, landscape reconstruction in Greece, age of pans in South Africa, paleosols in Hadar Ethiopia, and water conservation in Pakistan.

At the business meeting of the Archaeological Geology Division, the division award was given to Glenn Evans and Claude Albritten for their contributions to archaeology and geology in deciphering the age and stratigraphy of Paleo Indian sites in the southern and central plains of the United States. Presentation of the award by Vance Holliday and Reid Ferring and the acceptance speeches of the recipients will be published in the *GSA Bulletin* in 1989.

A student award was given to Tina Nieme, Department of Geology, Stanford University, for her paper "Late Holocene Landscape Reconstruction of the Submerged Ruins of Thronion, Northern Euboean Gulf Coastal Plain, Central Greece". She will receive a check for the cost of meeting registration and membership dues for the Archaeological Division. Students are encouraged to submit abstracts to GSA. Any student presenting a paper in either of the Archaeological Division-sponsored symposia are eligible to receive the award. Winners are announced at the business meeting, following the presentation of the papers.

Nominations for the Archaeological Geology Division Award are being solicited now. Please forward the names of individuals, who have contributed significantly to archaeological geology, to William R. Farrand, Department of Geology, University of Michigan, Ann Arbor, 48109 (Chair of the Awards Committee). Nominations can be made by mail or phone, only the name is needed, by February 15, 1989.

Nominations for a member of the management board (the 2nd vice-chair) are also being solicited. People interested in becoming involved in the Archaeological Geology Division of the GSA should contact John Gifford (chair of nominations committee), Department of Anthropology, University of Miami P.O. Box 248106, Coral Gables, Florida, 33124. Nominations requested by March 1, 1989. The management board of 1988-89 consists of chair-Fekri Hassan, 1st vice chair-Robert Thorson, 2nd vice chair-Julie Stein, secretary/treasurer-Vance Holliday. These individuals will move up as a new 2nd vice chair is elected.

Norm Lasca and Jack Donahue, editors of the Archaeological Geology Division's contribution to the *Decade in North America Geology*, announced that the volume will be ready for publication by the first of the year. The volume will contain 33 articles concerning archaeological geology of Canada, Mexico, and the United States.

GSA - St. Louis - November 6 - November 9, 1989

Next year the GSA will be held in St. Louis, with the theme "Frontiers in Geoscience". The Archaeological Geology Division will be organizing a symposium, an awards presentation, and a field trip.

The symposium for the 1989 GSA is being organized by Robert Thorson; the topic is now being decided. For more information contact him at Department of Geology and Geophysics U-45, University of Connecticut, Storrs, CT, 06268.

A pre-meeting field trip is planned for Nov. 5, 1989, "Archaeological Geology and Geomorphology in the Central Mississippi-Lower Illinois Valley Region, Illinois and Missouri", organized by Edwin Hajic, Russell W. Graham, and Michael D. Wiant. The group will visit the Modoc Rock Shelter, Barnhart mastodon sites, Cahokia Mounds Mississippian ceremonial center, and the Koster site (among other places). The focus of the trip will be to examine contextual relations between late Quaternary geology, interpreted paleoenvironments, and the extensive archaeological record in the American Bottom, central Mississippi Valley, and lower Illinois Valley. The trip will begin early Sunday morning and will cost an estimated \$40. For further information write to Edwin R. Hajic, Dept. of Geology, University of Illinois, Urbana, Illinois, 61801.

GSA meeting in 1990 will be in Dallas, Texas. Ideas for field trips associated with this meeting are now being solicited by Julie Stein, Department of Anthropology, University of Washington, Seattle, WA, 98195.

GSA meeting in 1991 will be in San Diego, California. Ideas for field trips associated with this meeting are now being solicited. Contact either Vance Holliday, Dept. of Geography, University of Wisconsin, Madison, WI, 53706, or Reid Ferring, Institute of Applied Sciences, Box 13078, North Texas State University, Denton, Texas 76203, if you have suggestions.

New publications in Geoarchaeology

Archaeostratigraphic Classification and Terminology Workshop

1987 *Stratigraphica Archaeologica* Volume 2, The University of Ghent, Sint-Pietersplein 6, B-9000 Ghent, Belgium.

Bailey, Geoff and John Parkington, (editors)

1988 *The Archaeology of Prehistoric Coastlines*, Cambridge University Press, New York.

Bousman, C. Britt, Michael B. Collins, and Timothy K. Pertulla

1988 *Quaternary Geomorphology at Cooper Basin: A Framework for Archaeological Inquiry, Delta and Hopkins Counties, Texas.* Prewitt and Associates, Inc. Austin, Reports of Investigations 55.

Bruins, Hendrik J

1986 *Desert environment and agriculture in the Central Negev and Kadesh-Barnea during historical times.* Midbar Foundation, P.O. Box 78, Nijkerk, the Netherlands.

Johnson, Eileen (editor)

1987 *Lubbock Lake: Late Quaternary Studies on the Southern High Plains.* Texas A&M University Press, College Station.

Nash, D.T. and M. D. Petraglia (editors)

1987 *Natural Formation Processes and the Archaeological Record* British Archaeological Record, International Series 352.

McKinnon, Neil A. and G.S.L. Stuart (editors)

1987 *Man and the Mid-Holocene Climatic Optimum.* Archaeological Association, University of Calgary.

Ruddiman, W.F. and H.E. Wright, Jr (editors)

1987 *North America and Adjacent Oceans During the Last Deglaciation.* Geological Society of America, the Geology of North America Vol. K-3.

Schiffer, Michael B.

1987 *Formation Processes of the Archaeological Record.* University of New Mexico Press, Albuquerque.

Geoarchaeology: An International Journal (editor Jack Donahue, Department of Anthropology, University of Pittsburgh, Pittsburgh, PA 15260) is now beginning volume 4. Subscriptions to the journal are \$52.00 for members of SAS.

Julie K. Stein, Department of Anthropology, University of Washington, Seattle, WA 98195



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Faculty Positions Available

Washington State University is seeking a 1-year assistant professor in archaeology, with primary research specialty in geoarchaeology required.

This is a replacement position for Dr. Fekri Hassan, who has taken a 2-year leave of absence to serve as Advisor for Archaeological Affairs to the Minister of Culture in Cairo, Egypt.

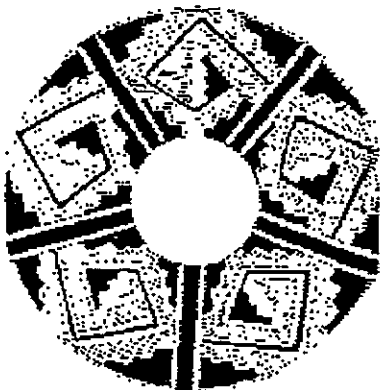
The Institute for Quaternary Studies of the University of Maine invites nominations and applications for a new tenure-line, academic-year faculty position at the Assistant or Associate Professor level in Quaternary Studies. We are particularly interested in candidates who will complement our established groups in archeology, paleoecology, glaciology, and glacial geology. Examples of complementary fields are: geoarchaeology, geomorphology, paleoclimatology, stable isotopes, geochemistry, and vertebrate paleontology.

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Please send applications along with a resume and names of three references to:

Search Committee
Institute for Quaternary Studies
304 Boardman Hall
University of Maine
Orono, ME 04469

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Meetings Calendar

New listings are marked by a *. The Meetings Calendar editor receives additional information for many of the listed meetings. You may contact him, preferably by BITNET, for further details.

January 1989

Jan. 14-19. American Association for the Advancement of Science, Annual Meeting. San Francisco. AAAS, 1333 H Street NW, Washington, DC 20005 (202-326-6640). Abstract deadline: 11/1/88. Program published in the 28 Oct. issue of Science. Symposia include: Statistical description and modelling of spatial variability; Frontiers in chemistry; Resilience of arid lands to natural and man-caused perturbations. Expressions of world view and cosmology in the ancient Americas; Plenary lectures include: The search for Eve.

*Jan. 15-20. Optics, Electro-optics, and Laser Applications in Science and Engineering; sponsored by The Society for Imaging Science and Technology and The International Society for Optical Engineering. Los Angeles. The International Society for Optical Engineering, PO Box 10, Bellingham, WA 98277-0010 (206-676-3290). Programs include: Reconnaissance, astronomy, remote sensing, and photogrammetry; Image processing; Three-dimensional visualization of scientific data.

Jan. 19-21. Colloquium on The Discovery of Metal Before the End of the 3rd Millennium B.C. Saint-Germain-en-Laye, France. La Musee des Antiquites Nationales, Chateau National, 78103 Saint-Germain-en-Laye, France (1-34.51.53.65)

*Jan. 25-27. Western Spectroscopy Association Meeting. Pacific Grove, CA. Heather W. Lafferty, 4720-F Boston Way, Lanham, MD 20706.

March 1989

*March. International Symposium on Natural Catastrophes and Their Impact. Ankara, Turkey. Tevfik Erkal, Turkiye Jeomorfologlar Dernegi, P.K. 652 Kizilay, 06425 Ankara, Turkey. Abstract deadline: 12/1/88.

* March 6-10. 40th Pittsburgh Conference and Exposition on Analytical Chemistry and Applied Spectroscopy. Atlanta. Pittsburgh Conference, 12 Federal Drive, Suite 322, Pittsburgh, PA 15235 (412-795-7110). Symposia include: Computers in the laboratory; Mass spectrometry; New applications of Raman spectroscopy; Expert systems in chromatography; The art of chemical measurements - where will it be 40 years from now; Parts per trillion and femtograms - elemental analysis at the limits;

Reference materials - their development and use in a modern analytical laboratory Short courses include: Basic statistics for the analytical chemist; Choices in mass spectrometers; Computer-aided experimental design; ICP/MS; Off-the-shelf software in the laboratory; PC-based laboratory information management systems.

- March 10-12. Central States Anthropological Society, Annual Meeting. Notre Dame, Indiana. Program Chair Oswald Werner, Department of Anthropology, Northwestern University, Evanston, IL 60208. Abstract deadline: 12/1/88.
- *March 13-17. European Geophysical Society, 14th General Assembly. Barcelona. EGS Office, c/o MPI fur Aeronomie, D-3411 Katlenburg-Lindau, Federal Republic of Germany. Abstract deadline: 12/15/88.
- March 15-18. 4th Annual Landscape Ecology Symposium - Linking Landscape Structure to Ecosystem Processes. Fort Collins, Colorado. Dr. M. G. Turner, US-IALE Program Chair, Environmental Sciences Division, Oak Ridge National Laboratory, Oak Ridge, TN 37831-6038. Abstract deadline: 11/15/88.
- March 16-19. Northeast Anthropological Association, Annual Meeting. Sherbrook St. Montreal, Quebec. Kenneth Jacobs, Department of Anthropology, University of Montreal, CP6128 Succursale A Montreal PQ H3C 3J7, Quebec, Canada. Abstract deadline: 1/15/89. Special sessions include: Archaeology of the St. Lawrence Iroquoians; Old World Lower Palaeolithic archaeology; European human evolution, 40-20 Ky. B.P.
- March 19-22. American Association of American Geographers, Annual Meeting. Baltimore. Association of American Geographers, 1710 16th Street NW, Washington, DC 20009 (202-234-1450).
- *March 19-24. 73rd Annual Meeting of the Federation of American Societies for Experimental Biology. New Orleans. FASEB Office of Scientific Meetings, 9650 Rockville Pike, Bethesda, MD 20814. March 29-31. Remote Sensing, short course. Madison, Wisconsin. Department of Engineering Professional Development, University of Wisconsin, 432 N. Lake St., Madison, WI 53791-9943 (800-262-6243). Fee: \$395.
- *March 31-April 1. 6th Southeast Mathematical Ecology Conference. Wakulla Springs, Florida. M. Mesterton-Gibbons, Department of Mathematics, Florida State University, Tallahassee, Florida 32306-3027 (904-644-2580).

April 1989

- *April 2-6. 5th Conference on the Scientific Use of Statistical Software (SoftStat '89). Heidelberg. Hans-Martin Uehlinger, Conference Director, SoftStat

'89, ZUMA, Postfach 5969, D-6800 Mannheim 1, Federal Republic of Germany.

- *April 2-6. 30th Experimental Nuclear Magnetic Resonance Conference. Pacific Grove, CA. Judith Watson, ENC Conference Office, 750 Audubon Rd., East Lansing, MI 48823 (517-332-3667).
- *April 4-7. Annual Chemical Congress of the Royal Society of Chemistry. Hull, U.K. Royal Society of Chemistry, Burlington House, London W1V 0BN, United Kingdom.

April 5-9. 54th Annual Meeting of the Society for American Archaeology. Atlanta. Kenneth L. Kvarnme, Arizona State Museum, University of Arizona, Tucson, AZ 85721. Also SAS Annual Meeting

- *April 7-9. Species Mapping and the Biology of Plant Distribution. Exeter, UK. British Ecological Society, Burlington House, Piccadilly, London W1V 0LQ, United Kingdom.
- *April 9-12. 6th Symposium on Ion Chromatography; organized by International Association of Environment Analytical Chemistry. Sils Maria, Switzerland. Dr. R.W. Frei, Free University, Department of Analytical Chemistry, De Boelelaan 1083, 1081 HV Amsterdam, Netherlands. Abstract deadline: 3/1/89. Topics include: new application areas for organic and inorganic ion analysis in biological and environmental samples.
- *April 9-14. 197th National Meeting of the American Chemical Society. Dallas. B. Ulyot, American Chemical Society, 1155 16th St. NW, Washington, DC 20036.
- *April 10-12. Symposium on Multi-Element Analytical Techniques. Chicago. Robert Zutkis, Infoscience Services Inc., 3000 Dundee Rd., Suite 313, Northbrook, IL 60062 (312-291-9161).
- April 11-14. Joint Mathematics Meetings. Phoenix. H. Daly, American Mathematical Society, Meetings Department, PO Box 6248, Providence, RI 02940.
- *April 13-14. Workshop on Ion Chromatography (state-of-art and new developments). Freiburg, Federal Republic of Germany. Workshop Office, IAEAC, M. Frei-Hausler, Postfach 46, CH-4123 Allschwil 2, Switzerland. Topics include: sample handling, ion separations, detection, applications. Registration deadline: 3/1/89. Fee: DM 690.
- *April 17-20. Snowbird, Utah. Chapman Conference on Causes and Consequences of Long-Term Sea Level Change. B. Weaver, American Geophysical Union, 2000 Florida Ave. NW, Washington, DC 20009. Abstract deadline: 12/19/88.
- *April 17-21. Nuclear Analytical Methods in the Life Sciences. Gaithersburg, MD. Rolf Zeisler, B108 Reactor Building, National Institute for Standards and Technology, Gaithersburg, MD 20899 (301-

975-6290).

- April 24-29. Materials Research Society, Spring Meeting. San Diego. Robin F. C. Farrow, IBM Almaden Research Center, 650 Harry Road, MS K32/801D, San Jose, CA 95120-6099 (408-927-2389). Abstract deadline: 10/17/88. Short courses include: Scanning electron microscopy and X-ray microanalysis; Surface and thin film analysis.
- April 26-28. 50 Years with Nuclear Fission; co-sponsored by the National Bureau of Standards, American Physical Society, American Nuclear Society, American Chemical Society. Gaithersburg, Maryland. J. W. Behrens, B109 Radiation Physics Building, National Institute for Standards and Technology, Gaithersburg, MD 20899 (301-975-5572).
- April 28-May 3. 5th Scientific Conference of the Iraqi Scientific Research Council. Baghdad. Organizing Committee, 5th Scientific Conference, Scientific Research Council, Jadiriya, PO Box 255, Baghdad, Iraq (77668931). Abstract deadline: 6/1/88.

May 1989

- May 1-4. American Physical Society, Spring Meeting. Baltimore. W. W. Havens Jr., APS, 335 E. 45th St., New York, NY 10017.
- May 4-5. 20th Annual Pittsburgh Conference on Modeling and Simulation. Pittsburgh. W. G. Vogt, Modeling and Simulation Conference, 348 Benedum Engineering Hall, University of Pittsburgh, Pittsburgh, PA 15261. Abstract deadline: 1/31/89. Emphases include: personal computer applications; social, economic, geography, regional science, global modeling and simulation.
- *May 8-10. 6th International Symposium on Preparative Chromatography. Washington, DC. Janet Cunningham, Barr Enterprises, PO Box 279, Walkersville, MD 21793 (301-898-3772). Abstract deadline: 11/30/89.
- May 8-12. American Geophysical Union, Spring Meeting. Baltimore. AGU, Convention Director, 2000 Florida Avenue NW, Washington, DC 20009 (202-462-6903).
- May 10-13. 21st Annual Meeting of the Canadian Archaeological Association. Fredericton, New Brunswick. Christopher Turnbull, Conference Coordinator, Tourism, Recreation, and Heritage Archaeological Services, Old Soldiers Barracks, PO Box 6000, Fredericton, New Brunswick E3B 5H1, Canada (506-453-2792). Titles due: 12/2/88; abstract deadline: 1/6/89. All aspects of prehistoric and historic archaeology.
- May 14-19. Society for Imaging Science and Technology, Annual Meeting. Boston. SPSE, 7003 Kilworth Lane, Springfield, VA 22151 (703-642-9090). Abstract deadline: 11/25/88. Topics include:

- remote sensing; image processing; microscopy; imaging in three dimensions; underwater imaging.
- May 15-17. Geological Society of Canada, Annual Meeting. Montreal. Colin Stearn, Local Organizing Committee for Montreal 89, Room 238, 3450 University Street, Montreal, Quebec H3A 2A7, Canada (514-398-4082). See SAS Newsletter, 11(3). Short courses include: Methodological advances in X-ray fluorescence; Image analysis. Field trips include: Pleistocene stratigraphy of SW Quebec; Classic volcanic localities of southern Italy.
- *May 22-25. 10th International Symposium on Capillary Chromatography. Riva del Garda, Italy. P. Sandra, Laboratory for Organic Chemistry, University of Ghent, Krijgslaan 281 (S4), B-9000 Ghent, Belgium. Abstract deadline: 12/15/88. Basic and practical aspects of microseparation techniques.
- May 24-28. World Summit Conference on the Peopling of the Americas. Orono, Maine. Robeson Bonnichsen, Center for the Study of Early Man, 495 College Avenue, Orono, ME 04473 (207-581-2197).

June 1989

- June 4-8. American Nuclear Society, Annual Meeting. Atlanta. ANS Headquarters, 555 N. Kensington Ave., La Grange Park, IL 60525 (312-352-6611).
- June 5-9. 2nd Karlsruhe International Conference on Analytical Chemistry in Nuclear Technology. Karlsruhe, Federal Republic of Germany. Hans J. Ache, Kernforschungszentrum, Karlsruhe, Institut für Radiochemie, Postfach 3640, D-7500 Karlsruhe 1, Federal Republic of Germany. Abstract deadline: 2/15/89. Topics include new developments in analytical methods; trace analysis of radionuclides in the environment.
- June 11-15. 174th Meeting of the American Astronomical Society. Ann Arbor, Michigan. AAS, 2000 Florida Ave. NW, Suite 300, Washington, DC 20009.
- *June 19-23. 7th International Conference on Fourier Transform Spectroscopy. Fairfax, VA. Robert F. Cozzens, George Mason Institute, 4400 University Dr., Fairfax, VA 22030.
- *June 21-23. Centennial Scientific Meeting of the Astronomical Society of the Pacific. Berkeley Meeting Information, ASP, 390 Ashton Ave., San Francisco, CA 94112 (415-337-1100).
- *June 27-30. 2nd Conference of the International Federation of Classification Societies. Charlottesville, VA. IFCS-89, Department of Mathematics, University of Virginia, Charlottesville, VA 22903 (804-924-4919); BITNET: SJT/Virginia. Abstract deadline: 1/15/89. Presentation of theoretical, methodological, and applied papers on classification, pattern recognition, and related methods of statistics and data analysis.

July 1989

- *July 2-9. 26th Colloquium Spectroscopicum Internationale. Sofia, Bulgaria. CSI '89, Sofia University, Faculty of Physics, Department of Optics and Spectroscopy, 5, A. Ivanov Boulevard, 1126-30 Sofia, Bulgaria.
- July 9-19. 28th International Geological Congress. Washington, D.C. Dr. Bruce R. Hanshaw, Secretary General, 28th IGC, PO Box 1001, Herndon, VA 22070-1001 (703-648-6053). Abstract deadline: 10/1/88. Symposia include: Geologic phenomena and archaeology; Archaeological geology - geologic controls on human habitation; Global change - impact on the earth, natural hazards, and human activities; Clovis origins and the Bering Land Bridge. Short courses include: Quaternary dating methods; Digital geologic and geographic information systems; Paleoenvironmental interpretation of paleosols. Field trips include: Quaternary geology of the Great Basin; Geology of the Colorado Plateau.
- *July 23-29. 13th International Congress for Caribbean Archaeology. Willemstad, Curacao, Netherlands Antilles.
- July 24-Aug. 4. International Association of Geomagnetism and Aeronomy, 6th Scientific Assembly. Exeter, United Kingdom. Roy Jady, IAGA 1989 Organizing Secretary, Department of Mathematics, University of Exeter, Exeter EX4 4QE, United Kingdom.
- *July 30-Aug. 5. SAC '89 - International Conference on Analytical Chemistry. Cambridge, U.K. Royal Society of Chemistry, Analytical Division, Burlington House, London W1V 0BN, United Kingdom.
- July 31-Aug. 4. Computer Graphics and Interactive Techniques, 16th Annual Conference (SigGraph '89). Boston. C. Herot, Javelin Software Corporation. 1 Kendall Square, Building 200, Cambridge, MA 02139.
- *July 31-Aug. 4. 39th Gordon Research Conference on Statistics in Chemistry and Chemical Engineering. New Hampton, New Hampshire. L. Sheiner, University of California, C255, San Francisco, CA 94143.

August 1989

- Aug. 1-9. 18th International Conference of the History of Science. Hamburg (Aug. 1-5) and Munich (Aug. 6-9). C.J. Scriba, Institut für Geschichte der Naturwissenschaften der Universität Hamburg, Bundesstr. 55, D-2000 Hamburg 13, Federal Republic of Germany. Abstract deadline: 1/31/89. Sessions include: Science and technology of Native Americans; Science, medicine, and technology in antiquity. Held in conjunction with 9th Interna-

tional Scientific Instrument Symposium, Aug. 4-6, Kassel.

- Aug. 6-10. Joint Statistical Meetings; cosponsored by American Statistical Association, Biometric Society, Institute of Mathematical Statistics. Washington, DC. American Statistical Association, 1429 Duke Street, Alexandria, VA 22314-3402 (703-684-1221).
- Aug. 7-11. 12th Caribbean Geological Conference. Christiansted, St. Croix, Virgin Islands. Frederick Nagle, 12th Caribbean Geological Conference, c/o Department of Geological Sciences, PO Box 249176, University of Miami, Coral Gables, FL 33124.
- Aug. 17-24. 14th International Cartographic Conference. Budapest. Conference Secretary, Institute of Geodesy, Cartography, and Remote Sensing, PO Box 546, H-1373 Budapest, Hungary. Abstract deadline: 12/15/88. Topics include: automation in cartography; geographical information systems; remote sensing.
- *Aug. 22-29. 5th International Theriological Congress. Rome. Secretariat, ITC-5, Department of Animal and Human Biology, Viale dell'Università 32, 00185 Rome, Italy (39-6-491135); BITNET: Boltani@IRMUNISA. Abstract deadline: 3/31/89. Symposia include: Late Cenozoic mammals - dispersal between Americas; Domestication and wildlife utilization; Multiple factors and population dynamics of mammals.
- *Aug. 20-25. 14th International Congress of Nutrition. Seoul. Secretariat Prof. Sook He kim, XIV International Congress of Nutrition, The Korean Nutrition Society, EWHA Womans University, Seoul 120, Korea.
- *Aug. 21-24. International Conference on Recent Developments in Statistical Data Analysis and Inference, in Honor of C.R. Rao. Neuchatel, Switzerland. Y. Dodge, Conference Organizer, Université de Neuchatel, Groupe d'Informatique et de Statistique, Pierre-a-Mazel 7, CH-2000 Neuchatel, Switzerland (038-257205). Abstract deadline: 1/31/89.
- Aug. 22-29. 5th International Theriological Congress. Rome. Secretariat, 5th International Theriological Congress, c/o Dipartimento di Biologia Animale e dell'Uomo, Università di Roma "La Sapienza", Viale dell'Università 32, I-00185 Roma, Italy.
- *Aug. 27-31. 2nd International Symposium on Mass Spectrometry in the Health and Life Sciences. San Francisco. M.F. Schwartz, Department of Pharmaceutical Chemistry, University of California, San Francisco, CA 94143 (415-476-2582).
- *Aug. 27-Sept. 1. 11th International Symposium on Microchemical Techniques. Wiesbaden, Federal Republic of Germany. Gesellschaft Deutscher Chemiker, Abteilung Tagungen, Varrentrappstrasse 40-42, PO Box 90 04 40, D-6000 Frankfurt am Main 90,

Federal Republic of Germany. Abstract deadline: 1/10/89. Topics include: Inorganic and organic trace, micro, and surface analysis.

Aug. 28-Sept. 1. IFIP '89, 11th World Computer Conference. San Francisco. IFIP Secretariat, 3 Rue de Marche, CH-1204, Geneva, Switzerland. Abstract deadline: 11/1/88. Includes a major exhibition of computer products, systems, and services.

Aug. 28-Sept. 2. 9th International Clay Conference. Strasbourg. Helene Paquet, Institut de Geologie, 1 rue Blessis, 67084 Strasbourg, France. Abstract deadline: 12/31/88. Topics include: Geochemistry and isotope chemistry; ceramics; analytical techniques. Field trips include: famous clay deposits.

Aug. 29-Sept. 6. 47th Session of the International Statistical Institute. Paris. International Statistical Institute, 428 Prinses Beatrixlaan, Voorburg, Netherlands. Abstract deadline: 2/28/89. Topics include: Statistical methodology in ecology and environment; Methods for analysis of complex socio-economic data; Dynamic presentations of multivariate data; Software environment for statistical computing; Statistics and data-base management; Cluster analysis and distance based methods in data analysis.

September 1989

*Sept. 3-9. 2nd International Conference on Geomorphology. Frankfurt am Main. Dr. Dietrich Barsch, Geographisches Institut, Imoversitat Heidelberg, Im Neuenheimer Feld 348, D-6900 Heidelberg, Federal Republic of Germany.

*Sept. 8-14. COSMEX '89: International Conference on Stochastic Methods in Experimental Sciences. Wroclaw, Poland. A. Weron, Institute of Mathematics, Politechnika, 50-370 Wroclaw, Poland. Abstract deadline: 3/1/89. Topics include: Stochastic analysis in physical sciences; Chaos and order; Synergetics; Stochastic dynamical systems; Regression analysis; Time series; Design of experiments; Computer-oriented and robust methods in data analysis.

*Sept. 10-15. American Chemical Society. Miami Beach. ACS Meetings department, 1155 16th St. NW, Washington, DC 20036.

*Sept. 10-16. 3rd International Conference on Palaeoceanography. Cambridge. I.N. McCave, Department of Earth Sciences, University of Cambridge, Downing Street, Cambridge CB2 3EQ, England (223-333422).

*Sept. 11-12. 150th Anniversary Commemorative Meeting of the Royal Microscopical Society. London. The Royal Microscopical Society, 37/38 St. Clements, Oxford OX4 1AJ, United Kingdom.

Sept. 11-19. 1st World Congress of Herpetology. Canterbury, United Kingdom. Dr. Ian R. Swingland, World Congress of Herpetology, Rutherford College, University of Kent, Canterbury, Kent CT2 7NX, United Kingdom. Abstract deadline: 2/1/89. Includes roundtable: Herpetobiogeographic review of the continents.

Sept. 18-22. 14th International Congress of Organic Geochemistry. Paris. Yolande Rondot, Institut Francais du Petrole, BP 311, 92506 Rueil-Malmaison cedex, France (33-1-47.49.02.14). Abstract deadline: 11/15/88. Topics include: Chemistry and biochemistry of biomarkers. Nov. 6-9. Geological Society of America, Annual Meeting. St. Louis. GSA, 3300 Penrose Place, Boulder, CO 80301 (303-447-8851).

November 1989

*Nov. 11-15. 40th Annual Meeting of the American Society of Human Genetics. Baltimore. Ms. Peggy Gardiner, ASHG Administrative Office, 9650 Rockville Pike, Bethesda, MD 20814.

Nov. 15-19. American Anthropological Association, Annual Meeting. Washington, DC. AAA, 1703 New Hampshire Ave. NW, Washington, DC, 20009 (202-232-8800).

*Nov. 22-24. 1st European Conference on Materials Science and Technology; sponsored by the Federation of European Materials Societies. Aachen, FRG. Deutsche Gesellschaft fur Metallkunde Ev, Adenauerallee 21, D-6370 Oberursel, Federal Republic of Germany (06171).

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