

SAS Bulletin

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From the President

The major discoveries in archaeology in the future will be made in the laboratory, not in the field. For this reason, perhaps more than any other, interest in the variety of studies encompassed in the Society for Archaeological Sciences is blossoming. SAS is likely the fastest growing organization in archaeology. Membership has increased significantly in the last few years as more and more individuals realize both the immediate benefit and the promise of such an organization.

SAS is your representative to government and the public and your conduit for information. SAS speaks for the interests of laboratory scientists in archaeology directly to the government and other funding agencies. Participation in advisory councils on archaeometric technology, consortia on preservation technology, and the like insure that your interests are represented by your colleagues. SAS is also a clearinghouse for new information in laboratory archaeology. The Bulletin has evolved from an earlier newsletter and is now an important source of information, reports, laboratory profiles, and reviews.

These important activities of SAS will continue to grow in the coming years as the organization expands. As current President, I will work toward that expansion. Growth of SAS means we have more power and possibility to pursue and develop the field. Growth of SAS means that we can move toward the larger publications and more symposia at meetings. I believe that SAS should be an international organization in every sense. The world is shrinking rapidly but many of our current organizations have retained a local or national purview. It seems essential to me that SAS take a wider perspective, incorporating archaeological scientists from around the world. In such a fashion we enhance the both the size and stature of the organization, but more importantly we gain access to the latest discoveries and techniques from a larger pool of individuals. Please let me know if you have ideas, directions, or needs that would be useful for the Society to pursue.

T. Douglas Price, Department of Anthropology, 5240 Social Sciences Building, University of Wisconsin, Madison WI 53706 USA

From the Editor

This issue of the *SAS Bulletin* contains both news and new information. Clark's review of the three volumes on the Central Negev represents a significant contribution for readers interested in that region or those topical areas. The Laboratory Profile of the Archaeometric Lab at Missouri is a welcome overview of that facility's recent activities. As usual, Rob Sternberg has given us a comprehensive list of upcoming meetings, and Martha Goodway has reviewed all the news in the archaeometallurgy community.

Our next issue will include a Work in Progress report by Michael Deal of Memorial University, describing his recent work with organic residues in prehistoric pottery from North America. We'll have a description of the British Academy Group Research Project entitled "Science and Archaeology: Bronze Age Trade Patterns in the Aegean and Adjacent Areas." We'll also have a report on a four-year pilot project to develop specialized instruction in the conservation of ethnographic and archaeological artifacts at NYU.

Jim Burton's E-Mail listing of archaeometrists is growing! Contact him at JHBURTON@WISCMACC.

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Laboratory Profile

Archaeometric Research Laboratory Research Reactor Facility University of Missouri

The Archaeometric Research Laboratory located at the University of Missouri Research Reactor (MURR) in Columbia, Missouri, is dedicated to providing archaeologists with affordable elemental characterizations of artifactual materials by Neutron Activation Analysis (NAA). Organized for collaboration with archaeologists, the Laboratory has assisted a number of investigators with elemental characterizations useful in compositional studies, authentication, provenience analysis and dietary reconstruction. The recent award of an NSF grant has allowed the expansion of its technical capabilities as well as its collaborative efforts and has enabled a great reduction in the cost of elemental characterizations. The Laboratory is directed by Michael D. Glascock with advice and project evaluation provided by an advisory committee of experienced archaeologists. Key personnel involved in work at the Laboratory are pictured in Figure 1.



Figure 1. Key laboratory personnel, left to right: David Provance (Research Assistant), Michael Glascock (Director), Michael Elam (Research Assistant).

NAA is a technique by which extremely small amounts of elements may be measured with great accuracy. In NAA, a small sample of an object is bombarded with neutrons which induce the nuclei of the atoms of the matrix to emit characteristic gamma rays. These gamma rays are measured with sensitive synthetic crystals (Ge detectors) which identify the gamma rays as to energy and frequency of

occurrence. Specific elements emit gamma rays of discrete energies which allow the identification and quantification of the elements in a matrix. NAA is an extremely accurate technique capable of measuring elemental concentrations as small as parts per billion. Its sensitivities are far superior to any other instrumental method and its ability to measure more elements simultaneously represents a greater efficiency over other instrumental techniques.

The source of neutrons used by the Laboratory is the 10MW Reactor housed at the MURR Facility. The MURR is the most powerful reactor on a university campus in the United States. A variety of neutron fluxes are available for use by researchers including a peak thermal flux of $4E14$ used for many activation analysis irradiations. Additionally, the MURR has one of the few Prompt Gamma Neutron Activation Analysis (PGNAA) facilities available in the United States. In addition to Archaeology, MURR is involved in projects from many diverse disciplines such as Physics, Medicine, Geology, Materials Science, Biology, Health Physics and Agriculture. The reactor facility is currently under consideration for upgrade to a power level of 30MW as well as for expanded laboratory facilities.

NAA of archaeological specimens usually involves three experiments: one to measure elements with long halfives (> 1 day), one to measure short halfife elements (< 1 day), and a prompt gamma analysis (PGNAA). These three experiments allow for the accurate identification and quantification of up to 30-40 elements depending upon the material tested. Once the elemental data has been obtained, it is uploaded to the MURR MicroVAX network for statistical characterization and analysis. The Laboratory supports both the Brookhaven and SAS programs for this purpose.

The Laboratory has been long involved in a number of significant archaeological problems requiring trace element analyses. Foremost among these has been the characterization and compilation of all of the major obsidian sources in Mesoamerica. After almost ten

years of research, the resultant data base contains elemental characterizations for all of the major obsidian sources in Mexico as well as many of the known sources in Central America. Figure 2 is a bivariate plot of these sources. While this data base represents the largest and most comprehensive set of information of Mesoamerican obsidian anywhere in the world, collaboration with a number of archae-

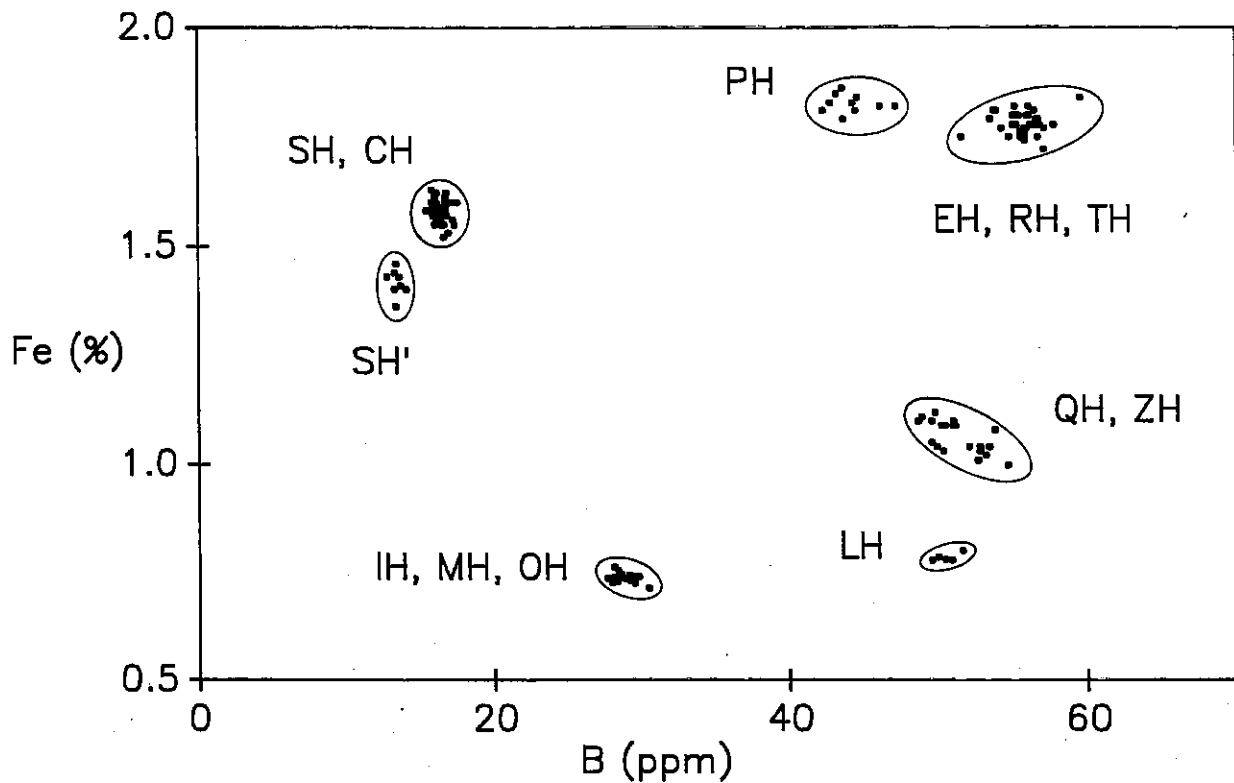


Figure 2. A bivariate plot of iron versus boron for the major obsidian sources in Hidalgo, Mexico.

ologists working in the Mesoamerican region continues to lead to its expansion.

The Laboratory is also working with a number of archaeologists on the problem of elemental characterization of cherts and flints. Diagenetic silicates of this type present special problems for elemental analysis due to the low level of their trace impurities and the fact that the degree of variation within specimens can be exceedingly high. Nonetheless, some potential for success has been noted especially when the focus is on sets of particular elements such as iron, uranium and boron.

Pottery is another material with which the laboratory has had some good results. Recent work on Hellenistic pottery of the Eastern Sigillata A (ESA) signature has led to a reassessment of the pottery's provenience. Data acquired by the lab has indicated that the earlier postulated Cypriote origin is probably incorrect and that a more likely provenience is the northern Levantine region, particularly Syria.

Other projects in which the Laboratory has been involved include authentication of Roman era surgical instruments, attempts at using NAA as a dating technique for metals based on comparison of elemental concentrations relative to known ranges of metallic alloys for a given era, dietary reconstruction of prehistoric peoples in Peru via trace element analysis of osteological remains, the effect of diagenetic processes on osteological remains during burial,

and an assessment of the sourcing capabilities of Thermoluminescence Glow Curve Characterization (TLGCC) relative to NAA.

The Laboratory also hopes to improve the quality of NAA for archaeological specimens by implementation of the K_0 method for determining absolute concentrations of elements in an unknown matrix. The K_0 method involves constant measurement and monitoring of the neutron flux during irradiation so that the accuracy of elemental measurements is greatly enhanced. Since the K_0 method eliminates the need for standard comparators, the resultant determination of elemental concentrations may be deemed absolute rather than relative to a known standard. Initial research in this area has proved promising and has worked well in NAA of human tissues for epidemiological purposes.

The Archaeometric Research Laboratory welcomes the submission of collaborative research projects in which elemental characterizations would be beneficial to the goals of the project. Support for relevant projects is available and interested researchers should write or call the lab for full information regarding submission.

Dr. Michael D. Glascock, Archaeometric Research Laboratory, Research Reactor Facility, Research Park, University of Missouri, Columbia, MO 65211, (314) 882-5270.

News of Archaeometallurgy

The Council for British Archaeology and the British Museum are sponsoring a Conference on Archaeological Dating on November 13, 1989 at the British Museum. For information, write Henry Cleere, Council of British Archaeology, 112 Kennington Road, London SE11 6RE, England.

The 11th International Corrosion Congress of the International Corrosion Council, "Innovation and Technology Transfer for Corrosion Control", will be held in Florence, Italy, April 2-6, 1990. It is being organized by the Associazione Italiana di Metallurgia under the auspices of the Consiglio Nazionale delle Ricerche. The congress chairman is Professor Francesco Mazza. For information, write the Secretariat, 11th International Corrosion Congress, Associazione Italiana di Metallurgia, Piazzale Rodolfo Morandi 2, I-20121 Milano, Italy; cable ASSOMETAL Milano I, telex 323831 FEDAS I, fax 02/784236.

The International Corrosion Congress will be preceded by a conference on "Microscopy of Oxidation" at Selwyn College, Cambridge on March 26-28, 1990. It is being organized by the Institute of Metals, 1 Carlton House Terrace, London SW1Y 5DB, England.

The Society of Jewellery Historians have announced the 5th International Symposium on Jewellery Studies, "Decorative Techniques in Jewellery", at The Society of Antiquaries, Burlington House, London W1, for June 11-13, 1990. For information, write Jack Ogden, Independent Art Research Ltd., 2 D'Arblay Street, London W1V 3DF, England. This symposium will precede the international colloquium on "Surface Colouring and Plating of Metals" at the British Museum June 14-16, 1990. For information write Mrs. S. La Niece, Research Laboratory, British Museum, Great Russell Street, London WC1B 3DG England, telephone 01-636-1555.

The International Committee for the Conservation of the Industrial Heritage (ICCIH) will hold the 7th International Conference for the Conservation of the Industrial Heritage, "Technology, Organization of Labor, and the Shaping of the Industrial Landscape", in Brussels, Belgium, September 2-8, 1990. For information write TICCIH Belgium, c/o La Fonderies, rue Ransfort 27, B-1080 Brussels, Belgium, telephone 0032/522.30.80.

The Comité pour la Siderurgie Ancienne of the UISPP have scheduled conferences for France in 1990 and Oslo in 1992. For information write Dr. Radomir Pleiner, Archaeological Institute of the Czechoslovak Academy of Sciences, Letenska 4, 118 01 Praha 1 - Mala Strana, Czechoslovakia.

The 12th Congress of the International Union of Prehistoric and Protohistoric Sciences, "Archaeology: Present —

Future", will be held September 1-7, 1991 in Bratislava, Czechoslovakia. For information write Archeologicky ustav Slovenskej akademie vied, Sekretariat XII, Kongresu UISPP, 949 21 Nitra-brad, Czechoslovakia.

In Belgium, the group "Arts et Techniques metallurgiques du Moyen Age et des Temps Modernes/Kunst en Metaal-technieken van de Middeleeuwen en de Moderne Tijden" is one of the "groupes de contact" funded by the Fonds National de la Recherche Scientifique (FNRS). Its establishment was brought about at the request of Professor Vandevivere of the Catholic University of Louvain in Louvain-le-Neuve, Mme. L. Masschelein, Director of the Institut Royal du Patrimoine Artistique in Brussels, Professor Van Molle of the Catholic University of Louvain in Leuven, and Professor Colman of the State University of Liege. The FNRS funding allows for two meetings a year with invited speakers. The membership represents broad interests in archaeological and historical metallurgy, and welcomes foreign researchers to Belgium. For information, write Monique de Ruelle, Schermersstraat 31, B-2000 Antwerp, Belgium.

In Great Britain, an Early Mines Research Group has been established to identify sites and sponsor excavations. For information write Paul Craddock, Research Laboratory, British Museum, Great Russell Street, London WC1B 3DG, England. The British Museum is amassing an important collection of ingots, as well as early mining equipment such as stone hammers and the like.

In Sweden, a center for research in archeometry has been founded by a group of archaeologists and scientists and is located in the Physics Department of the Chambers University of Technology and the University of Gothenburg. It is called the Scandinavian Archaeometry Center/Skandinaviskt Arkeometricentrum. The interests represented by the Center are very broad, ranging from conservation to archaeoastronomy, and include ancient metals, metallurgy and numismatics. The group's newsletter, *SAC-News*, was first issued in May 1989 and is written in a mixture of English and the Scandinavian languages, with the center-page spread reserved for a short contribution. A new journal, *Archaeology and Natural Sciences* (ANS), will be published by the center in English. The provisional board of SAC is headed by Peter Fischer. For information write him at Sims-Laboratoriet, Chalmers Techniska, Hogskola, 412 96 Goteborg, Sweden, telephone 031-81 01 00-1247.

In France, the "Institut pour l'histoire d'aluminium" was founded in 1986 with the support of the French association of aluminum producers and fabricators. The Institute has set up a Documentation Center, offers study grants for work in the history of aluminum, and publishes a journal, the *Cahiers d'histoire de l'aluminium*. The annual subscrip-

tion for two issues is 80 francs outside France. For information, write the Secretary General, Ivan Grinberg, 203 rue du Faubourg Saint-Honore, 75008 Paris, France, telephone (1) 45 61 61 93.

The Asian Institute of Gemological Sciences have recently begun publication of a lavishly illustrated quarterly, the *Gemological Digest*. A one-year subscription by surface mail is US\$29, 3 year \$79; by air \$39 or \$106. They also offer courses and mine tours. For a catalogue, write the Asian Institute of Gemological Sciences, 987 Silom Road, Rama Jewelry Building 4th floor, Bangkok, 10500, Thailand, telephone 233-8388-9, 236-0257, 236-8870, 235-1254-5, cable GEMMART, telex 22518 HOGROUP TH, fax 236-7803.

Volume 12, in the series "Bibliographies of the History of Science and Technology" edited by Robert Maulthauf and Ellen Wells and volume 446 in the Garland reference library of the humanities is *The History of Metal Mining and Metallurgy: an Annotated Bibliography* by Peter M. Molloy (New York 1986). It is available for \$57 (ISBN 0-8240-9065-9) from Garland Publishing Inc., 136 Madison Avenue, New York, New York 10016 telephone (212) 686-7492.

Also published in 1986 Volume 13 in the same series is *Bronze Age, Greek and Roman Technology: A Select, Annotated Bibliography* by John Peter Oleson, volume 646 in the Garland reference library of the humanities (\$73, ISBN 0-8240-8677-5), which has items on prospecting and mining (pp. 55-63), metallurgy (pp. 76-99) and metalworking (pp. 253-273).

The Royal Numismatic Society has published the second volume of *Metallurgy in Numismatics*, edited by W. A. Oddy, as Special Publication No. 19 (London 1988). In addition to papers on analysis and striking, it includes the "Code of Practice for the Technical Examination of Numismatic Material" (pp. 129-132). The Code was developed by the Scientific Research Committee of the Royal Numismatic Society and is presented in the form of a check list.

The Archaeometallurgy column in the *Journal of Metals* being conducted by Vincent Pigott presented "A modern reincarnation of ancient slags" by William Rostoker in April (pp. 70-71) and a two-part series on "Replicating America's earliest bloomery process" by David Harvey in June (pp. 46-47) and July (pp. 44-46).

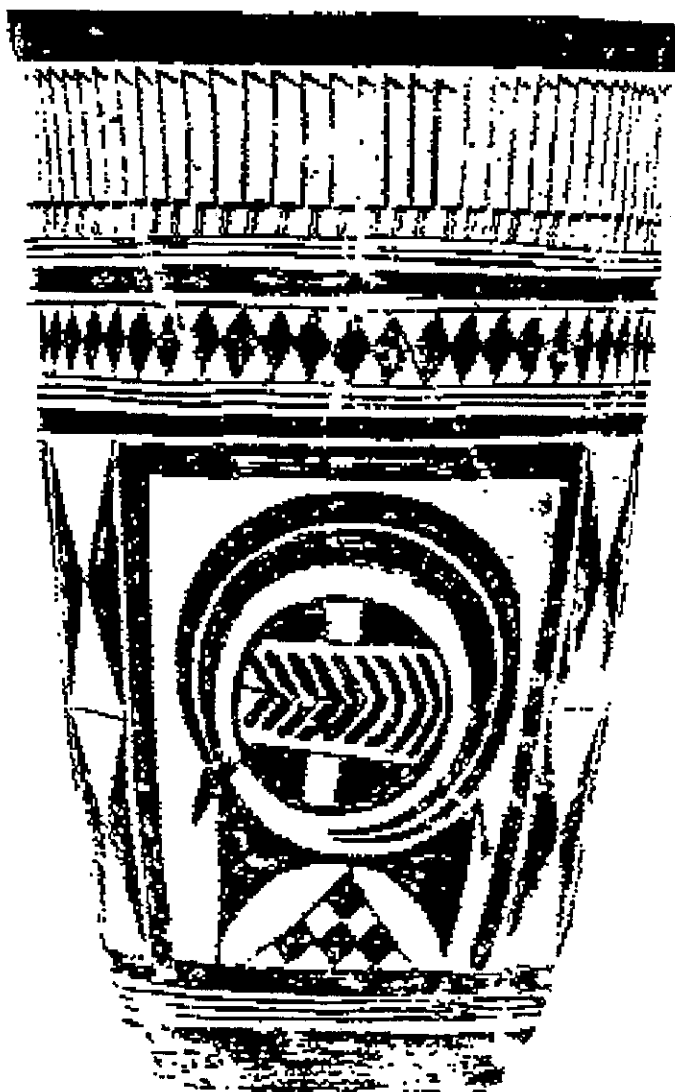
The book *Heartland Blacksmiths: Conversations at the Forge* by Richard Reichelt (Southern Illinois University Press, Carbondale and Edwardsville 1988) contains an interview with Daryl Meier (pp. 61-76) on modern pattern welding.

Ned Heite reports from Iceland that some smithy slags have appeared in fill on a 1226-1550 priory site excavated this summer.

Professor Birgit Arrhenius of the University of Stockholm has been appointed a Research Collaborator at the Smithsonian's Conservation Analytical Laboratory where she will continue her study of the techniques of Merovingian jewelry. Her monograph *Merovingian Garnet Jewellery: Emergence and Social Implications* was published in 1985 by Almquist and Wiksell International, Stockholm (ISBN 91-7402-160-5).

Professor Robert Maddin has been awarded a Senior Humboldt Fellowship to spend a half year in Andreas Hauptmann's laboratory at the German Mining Museum in Bochum. He will examine Roman mining tools in German collections for evidence of carburization.

A 2nd Symposium of Archaeological Sciences was held October 21-26 at the University of Science and Technology in China in Hefei. If you have any news of this meeting or any other archaeometallurgical news to contribute, please call Martha Goodway at (301) 238-3733 or write her at CAL MSC, Smithsonian Institution, Washington, DC 20560, fax 301-238-3667.



Book Review

Prehistory and Paleoenvironments in the Central Negev, Israel. ANTHONY MARKS, EDITOR

Volume I: the Avdat/Aqev Area, Part 1. 1976 viii + 383 pages. Dallas: Southern Methodist University Press.

Volume II: the Avdat/Aqev Area, Part 2, and the Har Harif. 1977. x + 356 pages. Dallas: Institute for the Study of Earth and Man.

Volume III: the Avdat/Aqev Area, Part 3. 1983 xv + 349 pages. Dallas: Institute for the Study of Earth and Man.

Reviewed by G.A. Clark, Arizona State University

The Marks-edited trilogy on the work in the central Negev Desert of Israel represents some 15 years of more or less sustained fieldwork and laboratory analysis, supported by a number of NSF grants. The Central Negev Project (CNP) began in 1969, and the original intent was to investigate possible relationships between the deserts of the southern Levant (Sinai, Negev) and northern Egypt, where Wendorf had been working since the mid-1960s. The consensus then was that the prehistoric occupation of the deserts was likely to have been ephemeral since these arid areas were thought to have always been the harsh, inhospitable places they are today. That this was not the case was confirmed by a brief visit to the central Negev in 1968, whereupon Marks abandoned the search for African connections as he came to the realization that the Negev had its own unique research questions, questions specific to Levantine research traditions and for which Levantine data were more pertinent than those of Egypt.

Two areas were targeted for systematic surveys: (1) the region north of the Byzantine city of Avdat (the Avdat/Aqev area; 55 km²), where most of the work was concentrated, and (2) a smaller zone (15 km²), on the western edge of the Har Harif, on the international border at the eastern margin of the Sinai Desert. The two survey areas are environmentally contrastive. The Avdat/Aqev region is one of rugged, heavily dissected terrain at elevations of 320-620 m, and with a number of strong, perennial springs; the Har Harif is an arid, highland plateau (900-1100 m) with relatively little relief and few present-day water sources. In the years following the 1967 war, the western edge of the Har Harif was a military zone, and Marks and his team could not remain there overnight, nor did they have direct access to the survey area. In consequence, only about one-half of one volume deals with the Har Harif sites.

The surveys located 21 prehistoric sites on the Har Harif, and 37 in the area around Ein Aqev. A wide range of site types was recorded, varying in size from a few square meters to enormous, deflated, depositional composites

comprising remains from a number of different episodes of occupation. Field methodology was adjusted to take into account these obvious differences in site contextual integrity, Marks reasoning that something could be learned even from cultural deposits where the relational aspects of objects could no longer be reconstructed in detail. The extent and depth of midden deposits, the presence or absence of features and bone, the size and diversity of lithic assemblages, and aspects of the local topography were all recorded in what has become a model for subsequent workers (e.g., Bar-Yosef, Phillips, Henry, me) in a region where caves and rockshelters are extremely rare.

The format of the books was established with Volume I (1976) and they closely resemble one another structurally. Although, in terms of numbers of pages, most of the text is given over to site descriptions, a regional perspective is maintained throughout, the objective being to put the sites into a broader temporal/spatial context. The present-day geographical setting is characterized in terms of soils, sediments, vegetation, and fauna (by Munday for Avdat/Aqev, Scott for the Har Harif) and there are extended discussions of Upper Pleistocene geology, landforms, and geomorphic processes (Goldberg), late Quaternary paleoenvironments (Horowitz), and their associated faunal communities (Tchernov). An effort is made to locate sites in relation to significant features of the landscape (esp. localized water sources - extant and fossil springs; cuesta ridges that afford unobstructed views of the Divshon Plain, flint outcrops etc.). For the site descriptions, reporting is standardized with sections on technology, typology (using a modified version of the Bordesian method); blank, core and platform metrics, reduction sequences, core reconstructions (when possible), and systematic relationships between blank selection and various categories of retouched tools. There is usually a summary discussion of the salient features of each collection, and how it might be related to those from other sites. The numerous, splendid illustrations of Lucille Addington grace each volume, and supplement the rather dry, technical prose.

Since these books have been reviewed elsewhere, I will identify what I think are the enduring contributions of each, and then assess the impact of the project as a whole. Volume I (1976) is important mainly because of the extended discussion of Upper Pleistocene paleoenvironmental change, which previously had been seen almost exclusively from a north central Levantine coastal perspective. The chapters by Munday, Goldberg, Horowitz, and Tchernov show that the present environment is perhaps the least favorable of a long series of paleoenvironments extending back more than 120 kyr, most of which were characterized by greater annual rainfall and/or cooler temperatures than those of today. Twelve sites are described ranging from the early Middle Paleolithic (Rosh Ein Mor), through the various Epipaleolithic phases (20-10 kyr BP) and Prepottery Neolithic (Nahal Divshon). Collections from eight Upper

Paleolithic sites express the range and technotypological diversity present during this previously neglected interval (ca. 45-20 kyr BP). Many are dated. What have subsequently been identified as Ahmarian and Levantine Aurignacian sites are represented, although this work predated the consensus revision of Levantine Upper Paleolithic systematics first proposed (apparently independently) by Marks and Gilead in 1981. A glossary of terms is a useful feature.

Volume I (1977) accounts for an additional 20 sites, with a temporal spread equivalent to that of Volume I. This is the 'Har Harif volume'; all the Har Harif sites are described here, along with an introduction to the unique Middle/Upper Paleolithic transitional site of Boker Tachtit (the subject of Volume III), and extended discussion discussions of the Middle Paleolithic site of Nahal Aqev, the Upper Paleolithic sites of Boker and Ein Aqev East, and a Geometric Kebaran A campsite (D101C). These last are all in the Avdat/Aqev area.

Two essays on Epipaleolithic systematics, and a general, region-wide settlement pattern model are salient contributions. Motivated by problems with accommodating Har Harif Kebaran sites into Bar-Yosef's (1975) schema, Marks and Simmons defined a 'Negev Kebaran', divided into sequent Harif and Helwan phases using technotypological criteria and settlement pattern differences. Six of the eight Negev Kebaran sites can be assigned to these phases. The other systematics essay is by Scott, who creates an analytical unit called the Harifian, a post-Natufian final Epipaleolithic adaptation with distinctive chipped and large and varied ground stone industries, architecture, and other evidence for sedentism. There are extensive faunal, floral, molluscan, and other 'exotic' remains preserved at the best of the Harifian sites, Abu Salem, radiocarbon dated to the late 9th millennium B.C. Long distance exchange is indicated by shell of Indian Ocean origin. Harifian-like adaptations are thought to be represented at Gebel Meghara (NC Sinai), the Halutza Dunes, and Nahal Lavan sites (NW Negev).

Probably the paper best known outside Levantine archaeological circles is the settlement pattern essay by Marks and Freidel, known colloquially as the 'circulating/radiating dichotomy' or the 'Negev Model' (Clark 1984). The Negev model links settlement pattern changes to zonal changes in the moisture regimen, and argues that radiating patterns organized around semi-permanent base camps supported by non-residential exploitation sites of various kinds would have typified mesic intervals (the early Mousterian, early Natufian), and that circulating patterns with little intersite differentiation, in which movements of prehistoric groups were conditioned primarily by seasonal resource variability, would have been characteristic of xeric intervals (the late Mousterian, Upper Paleolithic, and most of the Epipaleolithic) (cf. Binford 1980). The model appears

to work reasonably well for the Negev, but runs into problems elsewhere (Henry 1982, Clark et al. 1987). Since it relies upon an articulation of archaeological evidence with a paleoclimatic reconstruction (mostly the work of Goldberg, Horowitz), it can be criticized from either perspective. The palynology in particular is often regarded as overinterpreted due to small samples, statistical naïveté, and the use of an anthropogenic environment as a baseline for assessments of the direction and intensity of Pleistocene paleoclimatic changes. Depending upon their predictions about the course of human biological evolution, many archaeologists have trouble accepting the existence of modern-like, logistical collecting behaviors on the part of early Middle Paleolithic, 'pre-modern' hominids.

The unanticipated Volume III (1983) was made necessary by and is largely confined to Boker Tachtit, so far a unique site because it documents an *in situ* technological transition (firmly grounded in almost 200 core reconstructions) in the absence of a corresponding typological transition between the Middle and the Upper Paleolithic. The change is thought to have taken place relatively rapidly (ca. 7 kyr) and involved a shift from a specialized Levallois-based core reduction strategy oriented toward the production of Levallois points to a single-platform pyramidal core reduction strategy used to make blades. Over the span represented by the three main occupation floors (Levs. 1, 2, 4), however, typologically identical Levallois points continued to be produced. In default of the core reconstructions, it would have been impossible to distinguish points made from a 'typical' Middle Paleolithic reduction strategy from those produced by an equally 'typical' Upper Paleolithic one. Whether or not the Boker Tachtit transition has any generalizable properties is not known. It is a cautionary tale with many implications, however, since most prehistorians have tended to think that technology and typology are, or should be, all of a piece (i.e., highly correlated with one another). The extensive refitting experiments at Boker Tachtit, which were widely and rapidly published, resulted in a loss of faith (or at least a de-emphasis) on the analytical utility of typological classifications, and had a marked (although delayed) effect on European systematics, which have traditionally emphasized typological comparisons of tool forms to the near exclusion of anything else. The impact of Boker Tachtit is still being felt, particularly in France where typological systematics originated and where they are most deeply entrenched.

The Central Negev Project was an extremely productive enterprise, involving the collaboration of about 25 individuals, many of them Marks' current or former graduate students. Because of rapid and comprehensive publication, the CNP almost single-handedly brought about a shift in emphasis, and in momentum, toward what I would call 'desert archaeology', and away from the site-centered cave and rockshelter excavations that had dominated Levantine research in the north. A regional, loosely 'ecological'

approach based on environmental reconstructions, faunal analysis, the acquisition of absolute dates (there are > 30), settlement pattern studies and intrasite spatial analyses are the enduring legacies of the CNP. Marks also was among the first workers to develop methods for coping with numerically large lithic collections, and for describing the technological, typological, and metrical characteristics of the always-overwhelming debitage component, traditionally de-emphasized or ignored altogether by many Old World prehistorians. A specific methodological innovation was the refitting experiments, which, in addition to providing the only reliable means for identifying core reduction strategies, also produced an index of the integrity and resolution of the archaeological context and allowed for more meaningful intrasite comparisons. Marks did a lot of this himself. Most workers, including this one, would not have thought large-scale core reconstruction and other aspects of refitting to have been practical.

REFERENCES

- Bar-Yosef, O.
1975 The Epi-Paleolithic in Palestine and Sinai. In *Problems in Prehistory: North Africa and the Levant*. F. Wendorf & A. Marks, eds. Pp. 363-378. SMU Press, Dallas.
- Birford, L.
1980 Willow smoke and dogs' tails: hunter-gatherer settlement systems and archaeological site formation. *American Antiquity* 45 (1): 4-20.
- Clark, G.
1984 The Negev model for paleoclimatic change and human adaptation in the Levant. *Annual of the Department of Antiquities of Jordan* 28: 225-248.
- Clark, G. et al.
1987 A diachronic study of paleolithic and aceramic neolithic settlement patterns in the Wadi Hasa, west-central Jordan. In *Studies in the History and Archaeology of Jordan, Volume III*. A. Hadidi, ed. pp. 215-223. Routledge & Kegan Paul, London.
- Gilead, I.
1981 Upper Paleolithic tool assemblages from the Negev and Sinai. In *Préhistoire du Levant (Colloques Internationaux du CNRS No. 598)*. P. Sanlaville & J. Cauvin, eds. Pp. 331-342. Éditions du CNRS, Paris.
- Henry D.
1982 Paleolithic adaptive strategies in southern Jordan. In *Studies in the History and Archaeology of Jordan, Volume II*. A. Hadidi, ed. Pp. 41-47. Routledge & Kegan, London.
- Marks, A.
1981 The Upper Paleolithic of the Levant. in *Préhistoire du Levant (Colloques Internationaux du CNRS No. 598)*. P. Sanlaville & J. Cauvin, eds. pp. 369-374. Éditions du CNRS, Paris.

JOURNAL OF MEDITERRANEAN ARCHAEOLOGY

Edited by A. Bernard Knapp
(Cambridge University)

The archaeological significance of the Mediterranean Sea as facilitator or barrier of culture and material culture has long been recognized. Yet no regularly-published professional journal considers the region delimited by the Mediterranean as an archaeological and geographic entity. The *Journal of Mediterranean Archaeology*, published biannually since 1988 by the Sheffield Academic Press, provides a medium for synthetic studies that deal with the broader archaeological and interdisciplinary issues of the circum-Mediterranean region.

Aimed at the international archaeological community, the *Journal of Mediterranean Archaeology* invites authors to submit material that deals with local or regional production, development, interaction, and change in the Mediterranean world, and with the assumptions that can be extrapolated from relevant archaeological data. Preference will be given to problem-oriented studies that demonstrate a sound methodological and theoretical framework. Purely descriptive excavation reports or survey results should be submitted to the appropriate regional journals. No constraints are placed on the period of focus, from Palaeolithic through Mediaeval. The area investigated is limited to the islands within, and the lands and regions that border on the Mediterranean Sea.

Subscriptions: Individuals \$25.00 / £15.00, Institutions \$72.00 / £45.00, Students \$18.75 / £11.25. Manuscript guidelines available from the Press or from the Editor.

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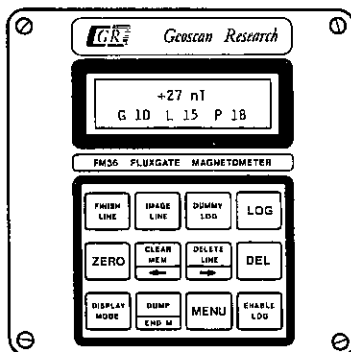
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Meeting Announcements

Fifth Nordic Conference on the Application of Scientific Methods in Archaeology Stockholm, Sweden September 20-24, 1990

The Fifth Nordic Conference on Scientific Methods in Archaeology will be held in Stockholm, at the Arrenius Laboratory of the University of Stockholm. A central theme for the conference will be "Transition and Change" as illustrated in the scientific and archaeological source material.

Persons interested in participating in the conference should contact the organizers at: Arkeologiska Forskningslaboratoriet, Greens Villa, Stockholms Universitet, 106 91 Stockholm, Sweden. Telephone: 08/16 21 77; BITNET: P39622@QZCOM.BITNET.

50th Anniversary Celebration Lubbock Lake, October, 1990

A week-long series of events will recognize the half-century of discovery, exploration, and community involvement at the Lubbock Lake State and National Landmark, a 300 acre archaeological preserve located on the outskirts of Lubbock, Texas, USA. The Landmark is a complex of activity areas with an extensive depositional, cultural, and natural history record spanning at least 36,000 years.

The celebration is intended to point up the continuing contributions that work at Lubbock Lake has made to the understanding of Quaternary archaeology and environment. Besides dedication of new facilities, a public lecture series, and a regional field trip, the celebration will emphasize the international importance of the site with a Symposium. Thirty nine scholars representing 11 countries will participate. The sessions will focus on the integration of the geological and biological sciences in archaeology as a driving force within the current era of Quaternary research.

For more detailed information, contact:
50th Anniversary Celebration
Lubbock Lake Landmark
Museum of Texas Tech University
Lubbock, TX 79409-3191 USA
(806) 742-2479

***Time and Environment* A PACT Seminar Helsinki, Finland September 25-28, 1990**

The Department of Archaeology and the Dating Laboratory of the University of Helsinki, in association with the Group PACT of the Parliamentary Assembly of the Council of Europe, will organize a symposium entitled "Time and Environment". It will be held in Helsinki September 25-28, 1990, within the framework of the 350 year Anniversary Celebrations of the University of Helsinki.

The themes of the symposium are dating and time itself, as well as the environment of ancient man: how do archaeologists and natural scientists explain and understand time and space, the very concepts behind the temporal and spatial framework they have created for antiquity?

In the first place the symposium will provide a forum for invited lectures. Posters on interdisciplinary studies and scientific applications in archaeology are welcome, as well. A critical approach is encouraged. Ample time will be reserved for discussion, possible as round table sessions with informal papers on fixed themes. The organizers are striving for a balanced discussion between archaeologists and scientists, "consumers" and "producers" of archaeometric interpretations.

Interested persons should contact the local organizers at: *The Dating Laboratory, University of Helsinki, Snellmaninkatu 5, SF-00170 Helsinki, Finland.*

14th International Radiocarbon Conference May 20-24, 1991 Tucson, Arizona, USA

Plans are underway for the 14th International Radiocarbon Conference to be held in Tucson, AZ. This meeting will concern research in radiocarbon dating, accelerator mass spectrometry, and related fields. Contact:

*Dr. Austin Long
Department of Geosciences
The University of Arizona
Tucson, AZ 85721 USA
Fax: 602-621-2672
BITNET: C14@ARIZVAX*

*Communication and Archaeology:
a Global View of the Impact of
Information Technology*

World Archaeological Congress 2,
Cartagena, Colombia, September 4-8, 1990

CALL FOR PAPERS

The Second World Archaeological Congress will be held in Cartagena, Colombia, South America, from the 4th to the 8th of September, 1990. The Congress will include a series of symposia devoted to a discussion of the impact of information technology on archaeology. Computers have been with us since the 1950s—what benefits have they contributed to the subject? What can we expect in the future? These sessions will provide a radical and clear statement about what we have achieved, what we want to gain, and the directions we must take.

Contributions are sought relating to three major topics:

• **Visualisation:** Archaeologists are now in a position to use their recorded data more fully than ever before, thanks to improved techniques for examining data from multiple viewpoints. Will this have an impact on primary archaeological recording?

• **Information Dissemination:** Traditional methods of making archaeological data available are inadequate, but the growing availability of computer networks and other technologies is likely to mean that communication will be increasingly available to archaeologists in all parts of the world. Can we hope that this will result in the democratisation of archaeological knowledge on a global basis?

• **Archaeological Argument:** How far can we justify the claims that the use of Artificial Intelligence techniques will enhance archaeological reasoning processes by forcing practitioners to think more deeply about the underlying nature of their assertions?

The chairman of the organising committee for these sessions is Dr. Paul Reilly (IBM UK Scientific Centre), assisted by scholars from the UK, Japan, USA, France, Poland, Australia and Kenya. Abstracts should be received (indicating a firm intention to participate) by the end of December 1989. The full text of discussion papers will be required by February 2nd 1990.

Enquiries and proposals for papers or posters should be sent to: *Dr Paul Reilly, IBM UK Scientific Centre, St. Clement Street, Winchester SO23 9DR, United Kingdom.*

E-Mail Addresses: WAC2@ECS.SOTON.AC.UK;
REILLY%VNET.EARN@AC.UK.EARN-RELAY;
SPQR@ECS.SOTON.AC.UK; FAX:44 962 840099.

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.

November

Nov. 2-3. Diseases and Demographics of Pre-Columbian Peoples of America. Washington, DC. Thomas Harney, Public Information Officer, National Museum of Natural History, Smithsonian Institution, 10th & Constitutional Avenue NW, Washington, DC 20560 (202) 357-2458.

Nov. 6-9. Geological Society of America, Annual Meeting. St. Louis. GSA, 3300 Penrose Place, Boulder, CO 80301 (303) 447-8851. Includes pre-meeting field trip on Archaeological Geology and Geomorphology in the Central-Mississippi-Lower Illinois Valley Region, Illinois and Missouri. See *SAS Bulletin*, 12(1), for details.

Nov. 8-11. Tampa. 51st Annual Meeting for the Southeastern Archaeological Congress. Nancy White, Department of Anthropology, University of South Florida, Tampa, FL 33620 (813) 974-2209. Abstract deadline: 8/31/89.

Nov. 12-15. National Computer Graphics Association Mapping and Geographic Information Systems. Los Angeles. National Computer Graphics Association, 2722 Merrilee Drive, Suite 200, Fairfax, VA 22031 (703) 698-9600. Conference and exposition for users and vendors of products and services for automated mapping and GIS.

Nov. 15-19. American Anthropological Association, Annual Meeting. Washington, DC. AAA, 1703 New Hampshire Ave. NW, Washington, DC, 20009 (202) 232-8800. Abstract deadline: 4/1/89.

Nov. 17-19. Southeast Friends of the Pleistocene, 3rd Annual Conference. Art Schultz, U.S. Geological Survey, 926 National Center, Reston, VA 22092.

Nov. 19-23. Conference in Honor of Professor Thurston Shaw. Ibadan, Nigeria. Kit Wesler, Wickliffe Mounds Research Center, PO Box 155, Wickliffe, KY 42087 (502) 335-3681. Theme: Fifty Years of Archeology in Africa. Visits to sites.

Nov. 22-24. 1st European Conference on Materials Science and Technology; sponsored by the Federation of European Materials Societies. Aachen, FRG. Deutsche Gesellschaft für Metallkunde eV, Adenaueralee 21, D-6370 Oberursel, Federal Republic of Germany (06171). Abstract deadline: 2/28/89.

Nov. 27-Dec. 2. Materials Research Society Fall

Meeting. Boston. Gary L. McVay, Pacific Northwest Laboratories, PO Box 999, Richland, WA 99352 (509) 375-3762. Abstract deadline: 7/1/89. Symposia include: Frontiers of materials research; Fractal aspects of materials. Short courses include: SEM and X-ray microanalysis; Modern materials analysis techniques; Fractals - Concepts and applications in materials science and engineering; Electron microscopy and specimen preparation. For short course information: Materials Research Society, 9800 McKnight Road, Suite 327, Pittsburgh, PA 15237 (412) 367-3003.

December

* Dec. 3-6. **Winter Simulation Conference**; sponsored by the Society for Computer Simulation. Washington, DC. Sallie Sheppard, Office of Associate Provost, 103 Academic Building, Texas A&M University, College Station, TX 77843 (512) 845-3210. Topics in discrete event and combined discrete/continuous simulation.

* Dec. 4-6. **10th Annual International Conference on Information Systems**. Boston. Lewis E. Leeberg, UCLA AGSM, 405 Hilgard Ave., Los Angeles, CA 90024-1481 (213) 825-1428.

Dec. 4-8. **American Geophysical Union Fall Meeting**. San Francisco. A. Fred Spilhaus, Jr., Executive Director, AGU, 2000 Florida Avenue NW, Washington, DC 20009 (202) 462-6903.

* Dec. 10-17. **1st Latin American Congress on Ecology**; sponsored by the International Association for Ecology. Montevideo. Eduardo Gudynas, Coordinator, 1er CLAE, Grupo Ambiente y Desarrollo, CIPFE, Casilla de Correo 13125, Montevideo, Uruguay.

Dec. 17-22. **International Chemical Congress of Pacific Basin Societies**. Honolulu. Pacificchem '89 Secretariat, American Chemical Society, 1155 16th St. NW, Washington, DC 20036 (202) 872-8069. Abstract deadline: 4/28/89.

* Dec. 18-20. **Theoretical Archaeology Group, Annual Meeting**. Newcastle upon Tyne, UK. TAG Organizing Committee, Department of Archaeology, University of Newcastle upon Tyne, Newcastle upon Tyne, NE1 7RU, United Kingdom. Sessions include: Landscape archaeology; Geoarchaeology - Theory and practice in European prehistory; Taphonomy - Implications for hypothesis testing; Ethnoarchaeological analogy. See *SAS Bulletin* 12(2).

Dec. 27-30. **Archaeological Institute of America, Annual Meeting**. Boston. Joan Bowen, Director, AIA, 675 Commonwealth Avenue, Boston, MA 02215 (617) 353-9361.

January 1990

* Jan. 8-13, 1990. **Winter Conference on Plasma Spectrochemistry**. St. Petersburg, Florida. Dr. Ramon Barnes, ICP Information Newsletter, GRC Towers, University of Massachusetts, Amherst, MA 01003-0035 (413) 545-2294.

Jan. 11-13. **Society for Historical Archaeology Conference on Historical and Underwater Archaeology**. Tucson. Edward Staski, SHA Program Chair, Department of Sociology/Anthropology, Box 3BV, New Mexico State University, Las Cruces, NM 88003. Abstract deadline: 8/15/89.

February

Feb. 5-9. **Topical Meeting on Laser Applications to Chemical Analysis**. Incline Village, NV. Optical Society of America, Meetings Department, 1816 Jefferson Place NW, Washington, DC 20036 (202) 223-0920.

* Feb. 11-16. **SPIE (International Society for Optical Engineering)/SPSE (Society for Imaging Science and Technology) Symposium on Electronic Imaging**. Santa Clara, California. SPIE/SPSE Technical Program Committee: E190, PO Box 10, Bellingham, WA 98227-0010 (206) 676-3290. Abstract deadline: 7/31/89. Twenty-six conferences include: Image storage and retrieval technologies; Stereoscopic displays and applications; Image workstations systems integration issues; Extracting meaning from complex data - processing, display, interaction; Sensing and reconstruction of 3D objects and scenes.

* Feb. 15-20. **American Association for the Advancement of Science, Annual Meeting**. New Orleans. AAAS, 1333 H Street NW, Washington, DC 20005.

* Feb. 19-22. **Annual Meeting of the Minerals, Metals, and Materials (TMS) Society**. Anaheim, California. TMS Society, 420 Commonwealth Drive, Warrendale, PA 15086. 150 sessions will update metallurgists and materials scientists with the latest scientific and technical developments.

March

March 5-7. **SIAM (Society for Industrial and Applied Mathematics) Conference on Applied Probability in Science and Engineering**. New Orleans. SIAM Conference Coordinator, Suite 1400, Architects Building, 117 S. 17th St., Philadelphia. PA 19103-5052 (215) 564-2929. Abstract deadline: 9/27/89.

* March 5-9. **41st Pittsburgh Conference and Exposition on Analytical Chemistry and Applied Spectroscopy**. New York. Mrs. Alma Johnson, Program

Secretary, The Pittsburgh Conference, 300 Penn Center Boulevard, Suite 332, Pittsburgh, PA 15235. Abstract deadline: 8/4/89. Symposia include: Data tools for solving analytical chemistry problems; Laboratory management - International perspectives on quality; New frontiers in mass spectrometry; Catastrophic environmental problems.

* **March 19-22. 11th Annual National Graphics Association Conference and Exposition.** Anaheim, California. National Computer Graphics Association, 2722 Merrilee Drive, Suite 200, Fairfax, VA 22031 (703) 698-9600.

* **March 28-31. Society of Human Genetics, 2nd Annual Meeting.** Bonn. Prof. Peter Propping, Institut für Humangenetik der Universität, Wilhelmstrasse 31, D-5300 Bonn 1, Federal Republic of Germany.

March 29-April 1. Northeastern Anthropological Association Annual Meeting. Burlington. Stephen Pastner, Program Chair, Department of Anthropology, University of Vermont, Burlington, VT 05405-0168 (802) 656-3884. Proposal deadline: 12/15/89.

April

* **April 2-4. 9th ACM (Association for Computing Machinery) Symposium on Principles of Database Systems.** Nashville. Daniel Rosenkrantz, General Chair, PODS, Department of Computer Science, State University of New York, Albany, NY 12222 (E-mail: djr@albanycs.albany.edu).

April 2-6. International Symposium on Archaeometry. Heidelberg. Archaeometrie, E. Pernicka, Max-Planck-Institut für Kernphysik., Postfach 10 39 80, D-6900 Heidelberg, Federal Republic of Germany. Abstract deadline: 11/1/89. Symposia include: dating of organic and inorganic materials; prospecting; provenance studies; technology; mathematical and statistical methods; one-day thematic session on Chronology and Environment of Early Man - The Archaeometric Approach.

* **April 3-5. 5th International Conference on Statistical and Scientific Database Management;** sponsors include International Association for Statistical Computing. Charlotte, North Carolina. Zbigniew Michalewicz, General Chair, Department of Computer Science, University of North Carolina, Charlotte, NC 28223 (E-mail: zbyczck@comp.VUW.AC.NZ).

* **April 4-6. 2nd International Meeting of ASSESS.** Glasgow, UK. Evelyn Benett, ASESS, Department of Statistics, Huddersfield Polytechnic, Huddersfield HD1 3DH, UK.

April 16-20. Materials Research Society Spring Meeting: Material Issues in Art and Archaeology. San Francisco. Pamela Vandiver, Research Physical Scientist, Smithsonian Institution Conservation Ana-

lytical Lab, Museum Support Center, Washington, DC 20560 (301) 238-3700. Topics: Ancient technology - Processing evidence from workshops and industrial debris; Analysis of properties to interpret function; Materials degradation; Characterization through compositional and structural analysis.

April 18-22. Society for American Archaeology, 55th Annual Meeting. Las Vegas. James Moore, Program Chair, Department of Anthropology, Queens College, 65-30 Kissena Boulevard, Flushing, NY 11367. Abstract deadline: 10/1/89. (Also SAS Annual Meeting)

April 23-27. European Geophysical Society, 15th General Assembly. Copenhagen. EGS Office, Postfach 49, D-3411 Katlenburg-Lindau, Federal Republic of Germany. Abstract deadline: 1/31/90.

May

* **May 16-18. Geological Association of Canada, Annual Meeting.** Vancouver. GAC-MAC '90, 801-750 Jervis Street, Vancouver, BC, Canada V6E2A9.

* **May 20-25. Society for Imaging Society and Technology (SPSE), 43rd Annual Conference.** Rochester. Prof. Rodney Shaw, Rochester Institute of Technology, Center for Imaging Science, One Lomb Memorial Drive, Rochester, NY 14623. Abstract deadline: 12/1/89. Sessions will include: Computer imaging and digital graphics; Advances in image processing techniques; electro-optical imaging systems.

May 21-25. 6th International Conference on Archaeozoology. Washington, DC. The International Council for Archaeozoology, c/o Department of Anthropology, National Museum of Natural History, Smithsonian Institution, Washington, DC 20560. See *SAS Bulletin*, 12(1), for details.

* **May 24-27. Geological Society of Greece, 5th Congress.** Thessaloniki. Prof. D. Mountrakis, Aristotle University of Thessaloniki, Department of Geology, Thessaloniki 54006, Greece.

* **May 28-June 1. 6th International Conference on Hunting and Gathering Societies.** Fairbanks. Linda Ellanna, CHAGS 6, Anthropology Department, University of Alaska, Fairbanks, AK 99775. Abstract deadline: 7/30/89. Sessions include: Past and present health and nutrition patterns; Ethnoarchaeology.

May 29-June 1. American Geophysical Union Spring Meeting. Baltimore. AGU Meetings, 2000 Florida Avenue NW, Washington, DC, 20009 (202) 462-6900.

* **May 29-June 1. European Association of Exploration Geophysics, 52nd Annual Meeting.** Copenhagen. J. Tychsen, Miljøministeriet, Amaliegade 13, DK-1265, Copenhagen K, Denmark.

June

* June 4-6. **Canadian Quaternary Association and American Quaternary Association, 1st Joint Meeting.** Waterloo. A.V. Morgan, Quaternary Sciences Institute, Department of Earth Sciences, University of Waterloo, Waterloo, Ontario, N2L 3G1 Canada (519) 885-1211, ext. 3231; FAX (519) 746-2543; BITNET: FOSSIL@WATDCS). Theme: Rapid change in the Quaternary record. Field trips and short courses before and after meeting.

* June 13-15. **Hydrologic Aspects of Global Climatic Change;** Chapman Conference sponsored by the American Geophysical Union. Lake Chelan, Washington. Meetings, AGU, 2000 Florida Ave NW, Washington, DC 20009 (202) 462-6900.

* June 14-16. **International Colloquium on Surface Colouring and Plating of Metals.** London. Mrs. S. La Niece, Research Laboratory, British Museum, Great Russell Street, London WC1B 3DG U.K. (01-636-1555).

* June 21-22. **International Symposium on Mapping and Geographic Information Systems;** sponsored by American Society for Testing and Materials. San Francisco. Dorothy Savivi, ASTM, 1916 Race Street, Philadelphia, PA 19103 (215) 299-5413. Abstract deadline: 11/15/89. Main topics: mapping, remote sensing, and geographic information systems, especially in relation to the general state-of-the-art and development of standards.

* June 24-29. **4th International Conference on Geoscience Information;** Co-sponsored by: Geological Society of Canada; International Union of Geological Sciences; Geoscience Information Society. Ottawa, Canada. David Reade, GeoInfo IV Secretary-Treasurer, GEOSCAN Centre, 601 Booth Street, Ottawa, K1A 0E8 Canada (613) 992-9550. Themes include: Geographic and expert systems; Constructing and managing databases; Managing collections and archives. Abstract deadline: 9/1/89.

July

July 1-7. **Society for the Study of Evolution Annual Meeting.** Dr. Barbara A. Schaal, SSE Executive Vice-President, Department of Biology Washington University, St. Louis, MO 63130 (314) 889-6822.

* July 23-27. **4th International Symposium on Spatial Data Handling;** sponsored by International Geographic Union Commission on Geographic Information Systems. Zurich. Symposium Secretariat, Department of Geography, University of Zurich (Irchel), Winterthurer Strasse 190, CH-8057 Zurich, Switzerland (E-mail: K505820@CZHRZU1A.bitnet; FAX: 0041-1-257 4004).

August

Aug. 6-9. **Annual Joint Statistical Meetings;** co-sponsored by the American Statistical Association, the Biometric Society, and the Institute of Mathematical Statistics. Washington, DC. ASA, 1429 Duke St., Alexandria, VA 22314-3402 (703) 684-1221.

* Aug. 6-10. **17th Annual ACM Conference on Computer Graphics and Interactive Techniques (SIGGRAPH 90).** Dallas. Lois Blankenstein, SIGGRAPH Conference Liaison, Association for Computing Machinery, 11 West 42nd Street, New York, NY (212) 869-7440; E-mail: lois.blankenstein@um.cc.umich.edu).

Aug. 19-25. **20th Meeting of the Federation of European Biochemical Societies.** Budapest. 20th FEBS Meeting Secretariat, Hungarian Biochemical Society, MTESZ, Budapest 1368, PO Box 240, Hungary.

* Aug. 26-31. **Euroanalysis VII - European Conference on Analytical Chemistry.** Vienna. Prof. Dr. M. Grasserbauer, c/o Interconvention, A-1450, Vienna, Austria (43-222-2369-2647).

* Aug. 26-Sept. 1. **13th International Association of Sedimentology Congress.** Nottingham, UK. I.N. McCave, Department of Earth Sciences, Cambridge University, Downing Street, Cambridge CB2 3EQ, U.K.

* Aug. 27-Sept. 1. **International Association of Hydrology, 22nd Congress; Symposium on Water Resources in Mountainous Regions.** Lausanne. Dr. A. Parriaux, Laboratory of Geology EPFL (GEOLEP), CH-1015 Lausanne, Switzerland.

Aug. 28-30. **IMACS European Simulation Meeting on Problem Solving by Simulation.** Esztergom, Hungary. A. Javor, Central Research Institute for Physics of the Hungarian Academy of Sciences, H-1525 Budapest 114, PO Box 49, Hungary. Abstract deadline: 9/30/89.

September

* Sept. 3-8. **International Congress on Volcanology.** Mainz. G. Brey, Max Planck Institut fur Chemie, Abtl. Kosmochemie, Saarstrasse 23, 6500 Mainz, Federal Republic of Germany.

Sept. 4-8. **8th General Conference of the European Physical Society.** Amsterdam. L. Roos, FOM-Institute for Atomic and Molecular Physics, PO Box 41883, NL-1009 DB Amsterdam, The Netherlands.

* Sept. 9-13. **Large Lakes and Their Stratigraphic Record; Geological Society of America Penrose Conference.** Lake Tahoe, California. Andrew S. Cohen, Department of Geosciences, University of Arizona, Tucson, AZ 85721 (602) 621-4691.

* Sept. 10-13. **African Geology, 15th Colloquium;** co-

sponsored by CIFEG. Nancy, France. Marc Deschamps, Universite de Nancy 1, Laboratoire de Petrologie, BP 239, F-545006 Vandoeuvre-les-Nancy Cedex, France.

* Sept. 23-27. Society of Exploration Geophysicists, 60th International Meeting. San Francisco. Convention Assistant, SEG, PO Box 3098, Tulsa, OK 74101.

Sept. 24-29. 7th International Conference on Geochronology, Cosmochronology, and Isotope Geology. Canberra. Organizing Committee IGOC7, Research School of Earth Sciences, Australian National University, Box 4, Canberra, ACT 2601, Australia. Sessions include: Dating of the Quaternary period; Low-temperature geochemistry; Paleoenvironmental studies; Innovative techniques in isotope geochemistry.

* Sept. 29-Oct. 7. 6th Meeting of the European Geological Societies. Lisbon. MEGS 6, Sociedade Geologica de Portugal, Apartado 2361, P 1109 Lisbon Codex, Portugal. Abstract deadline: 3/31/90.

Fall/Winter 1990

Oct. 8-12. 5th Australasian Remote Sensing Conference. Perth. Dr. Norman Campbell, Technical Paper Coordinator, 5th Australian Remote Sensing Conference, PO Box 411, West Perth, Western Australia 6005. Abstract deadline: 10/89.

Oct. 21-26. Soil Science Society of America Annual Meeting. San Antonio, Texas. SSA, 677 S. Segoe Road, Madison, WI 53711 (608) 273-8080.

Oct. 29-Nov. 1. Geological Society of America Annual Meeting. Dallas. GSA Meeting Department, PO Box 9140, Boulder, CO 80301 (303) 447-2020.

Nov. 14-18. American Anthropological Association Annual Meeting. New Orleans. AAA, 1703 New Hampshire Ave. NW, Washington, DC 20009 (202) 232-8800.

Dec. 2-9. 20th International Ornithological Congress. Christchurch, New Zealand. Ben D. Bell, Secretary-General, XX International Ornithological Congress, Zoology Department, Victoria University, Private Bag, Wellington, New Zealand. Symposia themes include: Systematics, evolution and ornithogeography; Ecology. Abstract deadline: 3/31/90.

1991

* May 20-24. 14th International Radiocarbon Conference. Tucson. Dr. Austin Long, Department of Geosciences, University of Arizona, Tucson, AZ 85721 (FAX: (602) 621-2672; BITNET: C14@ARIZRVAX).

* Aug. 2-9. 13th INQUA International Congress on Quaternary Research. Beijing. Secretariat, 13th IN-

QUA Conference, Chinese Academy of Sciences, 52 Sanlihe, Beijing 100864, People's Republic of China.

* Aug. 18-23. International Symposium on Engineering Geology in a Desert Environment, Rock-Water Interaction. Jerusalem. The Secretariat, International Symposium on Engineering Geology in a Desert Environment, Rock-Water Interaction, PO Box 50006, Tel Aviv 61500, Israel. Theme is based on engineering geological problems in semi-arid to arid regions where water is not obviously abundant in the environment, and yet remains a major factor affecting geotechnical properties of rocks.

* Aug. 26-30. 12th International Mass Spectrometry Conference. Amsterdam. RAI Organisatie Bureau Amsterdam, Europaplein 12, NL-1078 GZ Amsterdam, The Netherlands.

* Sept. 6-11. Paleocology, 2nd International Congress. Nanjing. Ma Yu-Ying, Nanjing Institute of Geology and Palaeontology, Academia Sinica, Chi-Ming-Ssu, Nanjing 210008, People's Republic of China.

* Oct. 6-11. 8th International Congress on Human Genetics. Washington, DC. John J. Mulvihill, M.D., Secretary-General ICHG, 9650 Rockville Pike, Bethesda, MD 20814.

Rob Sternberg, Department of Geology, Franklin and Marshall College, PO Box 3003, Lancaster, PA 17604-3003. BITNET: R_STERNBERG@FANDM. Phone: (717) 291-4134 (on sabbatical 1989-90: Jacob Burckhardt Strasse 20, D-7750 Konstanz, Federal Republic of Germany, 011-49-7531-54687, E-mail PHSTERN@DKNKURZ1)



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