

# SAS Bulletin

## Society for Archaeological Sciences

Volume 12

Number 2

April - June 1989

### From the President

At the Atlanta SAA/SAS meeting I turn over the symbolic computer chip to T.D. Price, your incoming President and a distinguished archaeologist, as well. Your Society is moving right along and Doug will keep up the momentum. We have a new format and name for the Newsletter that recognizes our publication's emergence as a true, quality conduit for scientific communication, under Pat Martin's inspired Editorship. Not only does the *Bulletin* still feature the interesting Laboratory Profiles — it now also has Book Reviews, with Pru Rice taking on that important editorial job.

It is also good news that Erv Taylor's untiring efforts have now fully launched a new hard-cover series of publications under the SAS aegis: *Studies in Archaeological and Museum Science*, to be published by Plenum Press. General editors are Erv, Martin Aitken and Ed Sayre, and the first volume ought to come out in 1991. Erv has also worked hard to restructure the SAS Board into a more rational and effective committee system and you will hear more about that as it matures.

During my year as President I have come to appreciate one force in Archaeology/Archaeometry that is revolutionizing our ease of communication with one another, and that is the computer network linkup. BITNET, INTERNET and all the other NETs make it possible for me to exchange letters and data files almost instantly with coworkers in California, Michigan, Germany, England, Israel,...even Philadelphia and the Bronx! The network is very time- and cost-effective and overcomes the multiple barriers of writ-

ing a letter, getting it typed, correcting, mailing, waiting. If you're not on BITNET already, get on it! Badger your Department Chairperson! One example of the creative use of this tool is the lively discussion on computers, proficiency, and the definition of a professional archaeologist carried on lately over the Archaeological Information Exchange, maintained by our British colleagues. In order to increase accessibility, perhaps the Bulletin could publish from time to time a compendium of useful worldwide BITNET/JANET addresses and the exact commands necessary to reach archaeologists abroad (for some reason you invert the British addresses) as well as in the U.S.A.

The one aspect that still gives trouble is membership. We know, and you know, of colleagues out there who would appreciate the benefits of membership— news of meetings, publications, laboratories, new software, new technology in the enormously diverse field of the Archaeological Sciences. And yet they are not all members. It can't be the money, in most cases. Let the officers know who they are and we will recruit them. Or tell the officers where we are falling short of the desired goals, so that we can improve and incorporate all those appropriate colleagues.

In closing, thanks to all who worked hard to make this a good, forward-looking year for the SAS. We will have lots more to come.

*Garman Harbottle, SAS President, Chemistry Department, Building 555, Brookhaven National Laboratory, Upton, NY 11973 BITNET: HARBOTTLE@BNLCHM.*

### International Radiocarbon Database

The IRDB is now affiliated with the Geosciences Department at the University of Arizona. Those wishing to use or contribute to the database should contact:

Renee Kra, IRDB  
4717 East Fort Lowell Road  
Department of Geosciences  
University of Arizona  
Tucson, AZ 85712  
Telephone (602) 881-0554  
BITNET: C14@ARIZRVAX

## Laboratory Profile

Accelerator Mass Spectrometry Laboratory  
Institute of Nuclear Sciences  
Lower Hutt, New Zealand

It is just two years since the accelerator mass spectrometry facility at the Institute of Nuclear Sciences of the New Zealand Department of Scientific and Industrial Research (DSIR) came into operation. It was a logical field to get into, in view of the Institute's years of experience in operating a Van de Graaff accelerator and a radiocarbon dating laboratory. The development was made possible by the opportunity to buy a tandem Van de Graaf from the Australian National University just at the time that the use of accelerators for radiocarbon measurements was being demonstrated.

What makes AMS so important in radiocarbon dating is the very small sample sizes that it requires: a milligram or so of carbon, instead of many grams. But this feature brings with it special problems of how to handle and process such small amounts of material. Various techniques have been developed in different AMS laboratories around the world, but they all come down to converting the carbon in the sample material to graphite in a form suitable for insertion into a cesium beam sputter ion source. Most laboratories prepare the graphite according to a favorite recipe, usually involving catalytic reduction of carbon dioxide gas, then pack it into a small holder that can

be mounted in the ion source. Dave Lowe's contribution to the art was to devise a way so that the graphite deposits itself directly into the holder, thus cutting out an intermediate handling step with its associated dangers of loss of material and sample contamination.

In many cases, particularly with material of archaeological interest, the initial conversion to carbon dioxide can be accomplished by scaling down techniques already devised for conventional carbon

dating, bearing in mind that the smaller the amount of material, the larger the contamination problems become. In other cases, new methods have to be developed. This is especially true for some applications in the environmental sciences, where even collecting the sample can pose enormous problems. Dave Lowe's interest in atmospheric chemistry led him and Greg Drummond to develop a way to extract sufficient methane from the atmosphere (normal concentration about 1.5 ppm) to allow AMS measurements to determine the proportion of radiocarbon in the methane. These measurements were a world first for AMS. Recently Ed Dlugokencky, Carl Brenninkmeijer and Greg Drummond have repeated the trick,

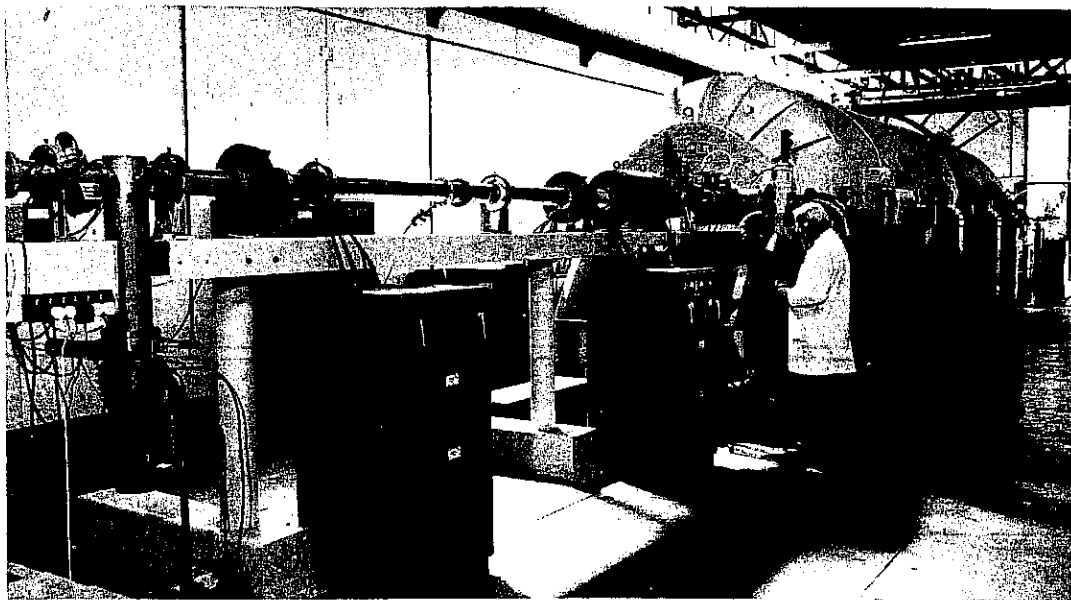


Figure 1. INS Tandem Accelerator. Dr. R. Sparks (left) and Mr. Ray More picture at the high energy end of the tandem accelerator. The cesium sputter ion source is hidden behind the pressure tank.

The facility is operated by a small team of scientists and technicians. Drs. Rodger Sparks and Gavin Wallace look after the accelerator side of things, including the actual sample measurements. The all-important task of converting the samples to graphite for measurement in the accelerator is in the hands of Dr. David Lowe (currently at NCAR in Colorado) and Greg Drummond, and presently Dr. Ed Dlugokencky, a visitor from USA. In addition, Dr. Martin Manning, Hugh Melhuish and Nicola Redver-Higgins of the radiocarbon laboratory also deal with the problems of processing the various sample materials that come into the laboratory.

this time for atmospheric carbon monoxide, which has even greater problems. In the case of measuring the radiocarbon in the oceans, AMS considerably simplifies the problems because it is possible to work with half a milk bottle of seawater instead of the hundred liters or so required by conventional radiocarbon counting.



*Figure 2. AMS Target Wheel.*

This brass wheel has been removed from the cesium sputter ion source. Each target was prepared in place via catalytic reduction of carbon dioxide. At least one of the targets would be made from a modern standard.

This work is making a significant contribution to our understanding of the atmospheric and oceanic environment, but in addition has the effect of 'honing' the skills of everybody involved, and the benefits of this flow through to those who work in collaborative projects with the AMS laboratory, or just submit samples for analysis. Among the projects that the laboratory has been involved in are a study of the age distribution of spicules from *Crown of Thorns* starfish that inhabit the Great Barrier Reef off Queensland; the regeneration of forest cover in the North Island of New Zealand following the great volcanic eruptions 1800 years ago; investigation of the techniques required for making AMS measurements of the rate of soil formation.

One of the reasons that the AMS project has been successful is that, being part of the Institute of Nuclear Sciences, it has been able to call on the facilities and expertise available at the Institute. The prior experience in radiocarbon dating and accelerator operation has proved invaluable, while the presence of a conventional mass spectrometry laboratory on site means that stable isotope measurements, particularly  $^{13}\text{C}$ , can be routinely performed on samples. The ability to measure  $^{13}\text{C}$  provides a check on sample integrity, and allows accurate fractionation corrections to be made to the radiocarbon results. A rather more unexpected benefit stems from the fact that the Institute also operates a small Van

de Graaff accelerator which is used with a nuclear microprobe. A possibility under investigation by Dr. Graeme Coote is that the dating of bones can be facilitated if the bone fluorine content is initially determined with microprobe, giving an indication if significant degradation of the bone material has occurred.

The Institute has provided radiocarbon analyses for many researchers in New Zealand, Australia and the United States, and inquiries about the use of our facilities are always welcome. Such inquiries should be directed to the writer at the address below.

*Rodger Sparks, Institute of Nuclear Sciences, PO Box 31312, Lower Hutt, New Zealand.*

## Rapp Honored by AIA

George (Rip) Rapp, Jr. was awarded the prestigious Pomerance Medal for scientific contributions to archaeology by the American Institute of Archaeology at the Archaeological Congress in Baltimore, Maryland this January. Past president and prominent member of the SAS, Rapp is Professor of Geology and Archaeology, Dean of the College of Sciences and Engineering, and Director of the Archaeometry Laboratory at the University of Minnesota-Duluth, and is only the ninth scientist to be so honored.

The citation read in part: "George (Rip) Rapp, Jr. personifies research at the interface between geology and archaeology, an interdisciplinary field of fundamental importance to our understanding of the archaeological record. Rapp's unique talents center on the ability to sense promising avenues of research, his innate organizational, administrative and fundraising skills, and his exceptional productivity in terms of projects and publications. The archaeological community is indeed fortunate that he has devoted his research interests and energies to addressing, and often resolving, its questions by means of geological methodologies, and seconds the feelings of the geological community in honoring him with this award."

The last line of the citation refers to the fact that Rapp was in 1979 the first recipient of a new award given by the Geological Society of America for significant contributions to archaeological geology. A further measure of his recognition as a contributor to this interdisciplinary area of research was his presentation of one of the six Frontiers in Science lectures, entitled "Provenance Studies in Archaeology," at the recent American Association for the Advancement of Science meeting in San Francisco. We all join in congratulating Rip on these significant honors.

## **An Old Friend in Trouble: Funding Problems Threaten LANDSAT Data**

One of the first space explorers in our planet's history was the little dog, Laika, sent into orbit by the Soviet Union in the late 1960's. Laika did well in orbit, and performed the tasks she was supposed to with heroic aplomb. Apparently, the Soviets didn't have enough funding at that time to include recovery procedures; when the experiment was over, they simply shut down the support systems on that satellite, and Laika expired. She may still be in orbit. Americans registered outrage at such callousness at the time.

Today, the US Government is involved in a space-related episode of callousness which may rival that of the Laika incident, although it's not a dog we are killing. It may, instead, be the future of our entire earth-sensing satellite program which is at stake.

In 1972, the first land-sensing satellite, then called ERTS-1, was launched and put into operation under the auspices of the US Geological Survey. Its name was soon changed to LANDSAT, and when LANDSAT 1 had lived out its usefulness (due to expenditures of attitude correcting fuel and wear and tear), LANDSAT 2 and then 3 were launched. These satellites provided data in four multispectral bands designed to allow the analysis of differences in vegetation, soils, water bodies, and other land cover and use characteristics which would be of use to geologists, mappers, biologists, and — incidentally — archaeologists. Millions of scenes, nominally about 115 x 115 miles in size, were collected at approximately 9-day intervals. They portrayed the surface of our planet in a way that had never been done before.

Until the early 1980's, the LANDSAT program continued to be operated by the US Geological Survey as an "experimental program." During this time, data costs were subsidized by the government, and the cost of a scene on digitally compatible tape or in visual (photographic) form, at various scales, was between about \$15 and \$150. This allowed just about any scientist to order data with which to simply "look at" his or her study area, and scientific (including archaeological) uses of LANDSAT data abounded.

My experience is perhaps typical of such uses. In 1974 I began working with the National Park Service's Remote Sensing Division at the University of New Mexico, in Albuquerque. The mission of this office was to use aerial photographs and LANDSAT satellite data to investigate the landscape characteristics which would have determined where past people in New Mexico, and around the United States, would

have found environmental conditions conducive to settlement. These efforts constituted some of the first "predictive modeling" attempts in this country or, indeed, anywhere.

In 1975, funded by the National Science Foundation, I traveled to Botswana, in southern Africa, to do ethnoarchaeological fieldwork with Bushmen there. Maps of Botswana were minimal, so I used ERTS-1 and -2 prints at a scale of 1:250,000 as maps, instead. When I interviewed Bushman informants, I used these prints, which were about 40 inches on a side, instead of maps. One might imagine that space-age data would be a baffling medium to Bushmen, which have been popularly portrayed in a recent, somewhat racist film as being stymied by a Coke bottle. But that didn't turn out to be the case. When I would take out a LANDSAT image, and spread it on the ground, they immediately gathered around and became engrossed in it.

"Look, there is our village," they would say, "... and there is the pan where we get our water, there is where our women gather Tsin [*Morama sp.*], and there is the woods where we hunt." A LANDSAT picture was better than a map, and they could identify with it easily.

Only in regard to one thing shown on the LANDSAT pictures did I have a problem. Invariably, when I was using the LANDSAT pictures as an informant aid, someone would ask about the clouds. "What are those white things?" Clouds, in a LANDSAT picture taken from 530 miles above the ground, seem to hug the landscape, being relatively very close to the earth. The Bushmen wondered what those white things were. I would tell them, of course, that they were clouds.

When I did so, they would retreat into a little group to discuss that idea, and its implications. After a few minutes, a spokesman would be sent to talk to me. "That cannot be," was the invariable answer. "Think of where you would have to be to take such a picture. Nobody can be there."

If the current policy of our government holds sway, nobody (at least nobody from the USA) will be there much longer.

The LANDSAT program, under a directive endorsed by President Reagan, was declared a non-experimental program in 1983, and its management was taken over on an interim basis by the National Oceanic and Atmospheric Administration (NOAA). The mandate was that they should transfer the LANDSAT program to the private sector, and that it should pay for itself.

NOAA managed the LANDSAT program for two years, at an expenditure of \$35 million per year. Data prices rose to \$4,100 per scene. In 1985, the LANDSAT program was turned over to a private sector contractor, EOSAT Corporation, which cut program costs to \$18 million per year. Data costs are still high: about \$3600 per scene at the present time, which has prompted a network of (quite frankly illegal) "scene trading networks" around the country. Legally purchased, \$3600-per-scene LANDSAT data are no longer something you can "play around with," but it offers a tremendous amount of data about what's going on in our world, data that all spatially-oriented sciences and disciplines would be completely lost without.

The operation of the satellites, currently LANDSAT 4 and 5, however, is still in the hands of NOAA. In February, NOAA announced that they didn't have enough funds to continue the operation of LANDSAT 4 and 5, and decided that the satellite would have to be shut down.

According to an EOSAT source, under this directive, the EOSAT Corporation scheduled March 15 as the last day that orders for data could be taken, and determined that by March 27 the operating satellites, LANDSAT 4 and 5, would be put into a "parking orbit." Since these satellites are already operating past their design schedule, there is a high probability that they cannot be turned on again successfully, if they are shut down.

Talk of such a shutdown, coming after some 17 years of successful operation, prompted Albert Gore [Democrat, Tennessee] to observe that "This is one of the most ridiculous policy decisions I have seen in thirteen years of service in the House and Senate." [Washington Post 3/6/89].

Frederick Henderson, President of EOSAT and a member of the GEOSAT Committee, which represents LANDSAT data users, warns that "Again, the United States is on the brink of losing another US technology to Japan, Russia and others. French and Soviet satellites are competing for LANDSAT business, and Japan will soon enter the market." [Washington Post, 3/6/89].

What he is referring to is the fact that since 1985, the French SPOT satellite, and more recently satellites sent aloft by Russia and Japan, are producing orbital data which, while not of as comprehensive coverage or as high spectral resolution as LANDSAT data, are being marketed today. The French SPOT satellite data, which is EOSAT's major competitor at present,

costs \$2900 per scene, and it takes 9 SPOT scenes to cover the area that one LANDSAT scene covers, at a resolution of 20 meters (60 feet). The LANDSAT data also has much higher spectral resolution, including coverage in the short- and middle-wave IR and thermal IR bands, critical to analysis of soil and surface sediment classifications.

On Monday, March 6, Daniel Quayle, in his first act as the White House "point man" on space issues [Sioux Falls, SD, *Argus Leader*, 3/7/89], stated that he had secured last-minute federal funding which could keep EOSAT's LANDSAT program in operation through the end of the current fiscal year, or October 1, 1989. Quayle is the Chair of the National Space Council. This funding will be derived from government agencies which use the LANDSAT data, including the Department of the Interior, State Department, and the Armed Forces, according to Mr. Mark Albrecht, Executive Secretary of the National Space Council.

This is only an interim measure, however, and the question of funding our earth-sensing space program is going to come up again and again, in the very near future.

LANDSAT 6, the successor to LANDSAT 4 and 5 which are now in orbit, has been funded and is being built for launch in 1991. If LANDSAT 4 and 5 are shut down at any point between now and then, there will be an unmitigatable data gap, not to mention possibly fatal economic effects to the EOSAT Corporation's business. LANDSAT 6 is being designed to carry an enhanced thematic mapper (ETM) sensor which will provide 15m panchromatic resolution, as well as a 7-band multispectral sensor with 30m resolution. The data from these sensors can be merged to provide 15m resolution equivalent in all bands.

The problems with the funding of EOSAT and the LANDSAT program are something that bears serious consideration by archaeologists and anthropologists. I will inject some of my own biases here, for your consideration. While in general I think that most things in this world should be allowed to come to market equilibrium, there are a few things that must be subsidized. These include LANDSAT data and USGS topographic maps (the subject of a future news story).

We, as scientists, depend on the availability of data for our work. LANDSAT data is one source upon which many of us have relied for years, and upon which many of us may rely even more in the near future, which will probably revolve around the use of Geographic Information System-compatible data. Our satellite remote sensing program is one the most

comprehensive sources of such data which we might wish to have, not to mention something that the all of the citizens of this country can be proud of.

The best way we can insure the flow of such data is the continuation of our earth sensing satellite program. And the best way we can insure that this continues is to write to our representatives in the Congress and Senate, detailing how we use these data and why they must not be terminated. You should send letters to your representatives and senators on this matter, and also to the following important people:

Mr. Robert Mosbacher  
Secretary of Commerce  
Herbert Hoover Bldg.  
14th Street and Constitution Ave NW  
Washington, DC 20230

The Honorable Ernest F. Hollings  
US Senate  
Washington, DC 20510-4002

The Honorable Albert Gore Jr.  
US Senate  
Washington, DC 20510-4202

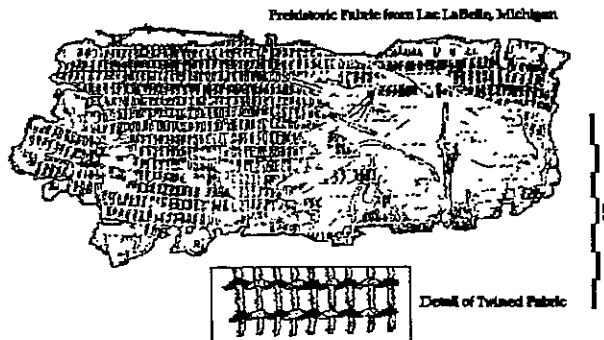
The Honorable Neil Smith  
US House of Representatives  
Washington, DC 20515-1504

The Honorable Robert A. Roe  
US House of Representatives  
Washington, DC 20515-3008

James I Ebert, Ebert & Associates, 3100 Ninth Street  
N.W., Albuquerque, NM 87107

### New Publications

**Archaeological Chemistry IV**, Ralph O. Allen, Editor. Advances in Chemistry Series Number 220. 524 pages, ISBN 0-8412-1449-2. US and Canada \$89.95, Export \$107.95. American Chemical Society, Distribution Office Dept. #304, P.O. Box 57136, West End Station, Washington, DC 20037.



## Meeting Announcements

### Special Session on Archaeology and Geophysics

In December, 1984, the Engineering and Groundwater Committee of the Society of Exploration Geophysicists (SEG) held an all-day "Archaeology and Geology" symposium during the Annual International Meeting of the SEG. This meeting resulted in a Special Issue of the journal **GEOPHYSICS**, published in March of 1986, devoted to archaeological applications of geophysics. Another Special Session on Archaeology and Geophysics is tentatively planned for the SEG meeting in Dallas Texas, October 29 through November 2, 1989. The organizers of this session are soliciting contributions regarding the application of geophysical techniques, including remote sensing, to archaeological problems.

Participants must submit an extended abstract (approximately 2000 words) for inclusion in the Proceedings Volume(s) that will be available for purchase during the meeting. Abstracts are due May 1, 1989. For each submitted paper, the author should write or phone for an Official Abstract Kit, obtainable from the following address:

1989 SEG Annual Meeting  
P.O. Box 702740  
Tulsa, OK 74170-2740  
Telephone: James D. Robertson  
(214) 880-5860

### First CANQUA/AMQUA Joint Meeting (Canadian Quaternary Association/American Quaternary Association)

The theme of this first joint meeting will be "Rapid Change in the Quaternary Record". The conference will be held at the University of Waterloo, Waterloo, Ontario, from June 4 through June 6, 1990. Associated field trips and short courses will take place between June 1-3, and 7-9. For details contact:

A.V. Morgan, Quaternary Sciences Institute  
Department of Earth Sciences  
University of Waterloo  
Waterloo, Ontario  
N2L 3G1 CANADA  
Telephone: (519) 885-1211 (ext. 3231)  
FAX: (519) 746-2543  
E-Mail: FOSSIL@WATDCS on BITNET,  
NETNORTH, or EARN

## Third Australian Archaeometry Conference Adelaide, 1988

The Third Australian Archaeometry Conference was hosted by the Department of Physics and Mathematical Physics of the University of Adelaide and took place from August 29 through September 1, 1988. The conference attracted over fifty delegates, mostly from Australia, but including some distinguished overseas visitors. Notable among the visitors was Professor E.T. Hall from Oxford University, who gave the Keynote Address and public lecture entitled, "From Piltdown skull to Turin shroud - a lifetime in archaeometry," during the conference. The wide variety of topics covered reflected the interdisciplinary appeal of the conference, with geologists, archaeologists, physicists, historians, geographers, and chemists attending.

The first day was devoted entirely to dating techniques, starting with a review talk by Henry Polach on radiocarbon dating. Other talks covered palaeomagnetism, amino acid racemization, uranium-thorium series dating, and on the next day, fluorine diffusion dating of bones and teeth, electron spin resonance analysis, and a review of luminescence dating techniques. The other sessions on the second day were mainly concerned with applications of the different dating techniques to teeth, bones, marine shell deposits, and sediments.

The morning of the last formal day of the conference was devoted to the theme "Early Man in the Southern Hemisphere". The unifying theme was the increasing evidence for the antiquity of human occupation of the three southern continents. Talks ranged from the biological and cultural development of Pleistocene people in South Africa (H.J. Deacon), the age of Solo man and Java man (G.J. Bartstra), the stratigraphy and chronology of early man in Brazil (G. Delibrias, and a review talk on the current perspective on the antiquity of human occupation in Australia (G. Pretty). In the afternoon, papers were presented on "Provenance and Characterization", including the metallography of copper from shipwrecks, *in-situ* pigment analysis, the Lucas Heights external beam PIXE facility and its applications, and oxygen isotope analysis.

For the final day an excursion was arranged to visit some areas of archaeological and historical interest near Adelaide, including the old Baldon homestead, and the Roonka and Devon Downs Pleistocene human fossil sites, both of considerable local importance.

At the close of the conference a preliminary decision was taken to hold the next Australian Archaeometry Conference in three years' time in Canberra.

The Conference organizers gratefully acknowledge the sponsorship of the University of Adelaide Foundation, the Australian Institute of Physics, the Department of Physics and Mathematical Physics, the Research and Publications Committee of the University of Adelaide, the 25th International Geological Congress Fund of the Australian Academy of Science and the **Australian Geographic** magazine.

The Conference Proceedings have been edited by John Prescott and are published in two parts:

**Archaeometry: Australasian Studies  
1988**, vii + 165pp ISBN 0-909782-18-0

**Early Man in the Southern Hemisphere**,  
v + 52pp ISBN 0-909782-19-9

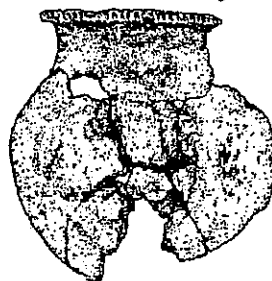
They can be purchased separately at \$20 Australian per volume or \$30 for both volumes, plus postage of \$4.50. Further details of the conference proceedings may be obtained by writing to:

Physics Publications  
Department of Physics and Mathematical Physics  
University of Adelaide  
Adelaide 5001, Australia

*Phillip J. Fox, Department of Physics and Mathematical Physics, University of Adelaide, Adelaide 5001, Australia*

## SAS Election Results

In a closely-contested election, Suzanne P. De Atley was elected as SAS Vice President and President-elect for 1989-1990. Robert S. Sternberg was confirmed as Assistant Secretary Treasurer/Secretary Treasurer-elect extending his tenure as Secretary Treasurer for an additional year. This election saw the largest percentage of members returning ballots of any election held to date, and represents the increasing interest and involvement of SAS members in the affairs of the Society.



Prehistoric Pot,  
McCargoe Cove,  
Isle Royale, Michigan

## Position Available

The Center for Materials Research in Archaeology and Ethnology at Massachusetts Institute of Technology invites applications for a single position, either as Lecturer or as Technical Instructor, to supervise the CMRAE Graduate Laboratory. The Graduate Laboratory is the facility in which all CMRAE graduate instruction in the materials science of archaeological materials takes place and where graduate students carry out Ph.D. research. Supervisory responsibilities include:

**Instruction:** one-to-one laboratory supervision and instruction in the materials analysis of archaeological and ethnographic materials; work with faculty in the design and teaching of year-long graduate subjects in materials and archaeology; preparation of laboratory instruction manuals;

**Equipment maintenance and design:**

**Research and documentation:** work with faculty/staff on research projects, including the opportunity to conduct independent, ongoing research; develop, maintain, and document reference collections of archaeological materials; computer-aided documentation of all procedures.

Applicants must be skilled microscopists, with considerable experience in metallography and in work with the polarizing microscope. Expert darkroom skills are required. Teaching experience is essential; ability to operate personal or minicomputers is highly desirable (CMRAE has a sophisticated Hewlett-Packard computation facility).

Applicants for the Lecturer position must have the Ph.D.; for the Technical Instructor position, an MA/MS or equivalent experience. Please send a detailed letter outlining technical and research training and experience, a c.v., and the names and addresses of 3 references before 15 May to:

Professor Heather Lechtman  
MIT  
Room 16-401  
Cambridge, MA 02139

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## TAG Comes to Newcastle

In December 1989, the Theoretical Archaeology Group will be eleven years old and the birthday celebrations - in the form of its annual conference - will be hosted by the Department of Archaeology of the University of Newcastle upon Tyne. The TAG conference is now the largest annual meeting in British archaeology - over 500 delegates attended TAG 88 in Sheffield. Its aim is to provide a forum for discussion of vital topics of theoretical and methodological debate within archaeology and allied disciplines.

Everyone with an interest in theoretical archaeology is welcome to attend this meeting; and, since being "atheoretical" about archaeology is in itself a theoretical position, that means everyone in archaeology! We are especially keen that field archaeologists and professionals in museums, units and the heritage world should attend and make clear their views; this is not a conference for university staff and students alone.

The meeting will take place from Monday 18 to Wednesday 20 December and we envisage four parallel sessions over five half-day periods. Since it is a democratic organization, TAG welcomes the offer of symposia or workshops from anyone with a good idea and the energy to organize a session. Offers of posters and individual papers are also encouraged: 'vox pop' sets the pace and is responsible for the potential shape of the conference. The TAG organizing committee at Newcastle will do its utmost to provide the facilities and atmosphere for stimulating discussion, in the ambience of the Geordie hospitality famous to all who know the North East.

**The deadline for proposals for contributions is 14 May 1989.** Please send a one-page abstract defining the theme of the session and its significance, plus 100-word abstracts, names and addresses for each contributor, before the deadline to :

TAG Organizing Committee  
Department of Archaeology  
NewCastle Upon Tyne NE1 7RU  
Telephone: 091-232-8511 x7843  
E-MAIL: ara5@uk.ac.ncl.mts



## News of Archaeometallurgy

A symposium, "Dialogue/89: The Conservation of Bronze Sculpture in the Outdoor Environment: A Dialogue Among Conservators, Curators, Environmental Scientists and Corrosion Engineers", will be held 11-13 July 1989 at Johns Hopkins University in Baltimore. It is sponsored by the University, the National Association of Corrosion Engineers, the Getty Conservation Institute, the US Committee of the International Council on Monuments and Sites and the American Institute for Conservation, and is intended to be a sequel to the meeting on Corrosion and Metal Artifacts held at the National Bureau of Standards in 1976. The advance registration fee is \$270, which includes meals, or \$395, which includes lodging as well. For a program, write NACE Education and Training Department, P O Box 218340, Houston, TX 77218, phone 713-492-0535, or fax 713-492-8254.

The Historical Metallurgy Society has announced several meetings. The Annual General Meeting will be held on Saturday, 6 May 1989 at the College of Technology in Dudley, West Midlands, and will include a visit to the Black Country Museum for demonstrations of chain making, brass working and the rolling of iron and steel billets. The fee is £10, and includes lunch and admissions. Reserve with Ian J. Standing, Rock House, Coleford, Glos. GL16 8DH England, telephone Dean (0594) 33778, evenings.

A day conference at the Royal School of Mines in London on the subject of John Percy (1817-1889), his collection and its industrial background, is to be held on Saturday, 17 June 1989. The cost is £9.50 including lunch. Application should be made to Miss Sue J. Cackett, Science Museum, South Kensington, London SW7 2DD, telephone 01 938 8047.

The 1989 Annual Conference of the Historical Metallurgy Society will be held 22-24 September at the Peak District Mining Museum in Matlock Bath, Derbyshire. The main theme will be the mining and smelting of lead and will include field visits. The nonreturnable booking fee is £10, to be sent to Lynn Willes (HMS Conference), Peak District Mining Museum, Matlock Bath, Derbyshire DE4 3PS England, telephone (0629) 583834. Note that the dates are a week later than announced earlier, and follow directly upon the International Symposium on Archaeometallurgy "From Bloom to Knife" being held in Poland 19-22 September.

An international colloquium on "Surface Colouring

and Plating of Metals" is to be held 14-16 June 1990 at the British Museum. For further information, write Mrs. S. La Niece, Research Laboratory, British Museum, Great Russell Street, London WC1B 3DG England, telephone 01-636-1555.

Cyril Stanley Smith's *A History of Metallography: The Development of Ideas on the Structure of Metals Before 1890*, first published in 1960 and long out of print, was reprinted in paperback by the MIT Press in September 1988. It can be ordered for \$15 plus \$1.50 shipping from the MIT Press, 55 Heywood Street, Cambridge MA 02142, telephone toll-free 800-356-0343, fax 617-253-3515.

The book by Eugenia W. Herbert, *Red Gold of Africa: Copper in Precolonial History and Culture*, published in 1984 is being offered at \$6.50 by the University of Wisconsin Press until 30 June 1989. The handling charge is \$3, \$3.50 outside the US and Canada; however, the minimum order prepaid by check is \$10. The order code for this book is REGO-15 (80) and the address of the Press is 114 North Murray Street, Madison, WI 53715.

A monograph entitled *Romanesque Metalwork: Copper Alloys and Their Decoration* by W.A. Oddy, Susan La Niece, and Neil Stratford with additional contributions by P.T. Craddock and M.J. Hughes was published in 1986 by British Museums Publications Ltd., 46 Bloomsbury Street, London, WC1B 3QQ England. It contains analyses of 102 objects, all of which are illustrated, and a discussion of the relation of these compositions to gilding and enamelling.

The Archaeometallurgy Column in the *Journal of Metals* being conducted by Vincent Pigott presented part 2 of "King Solomon's Mines, A 20th Century Myth" by James D. Muhly in December (pp. 36-37).

A new publication has been introduced in the United Kingdom. The *Science-Based Archaeology Newsletter* began publication in December 1988 and includes news from the Science-Based Archaeology Committee of the Science and Engineering Council, the Ancient Monuments Laboratory of English Heritage and the British Academy, notices of forthcoming meetings and positions available. The Coordinator is Dr. Mark Pollard, School of Chemistry and Applied Chemistry, University of Wales, College of Cardiff, PO Box 912, Cardiff CF1 3TB Wales, telephone (0222) 874210.

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, DC 20560, FAX 301-238-3667.

## Book Review

***Trace Elements in Environmental History.* Gisela Grupe and Bernd Herrmann (Editors). Springer-Verlag, Göttingen, 1988.**

*Reviewed by* Joseph Lambert, Northwestern University.

Trace and minor elements present in human and animal bone have provided a new method for learning about ancient diet. This and related topics provided the subject for a symposium held in Göttingen, June 24-26, 1987. This volume contains the papers from this symposium, published in a remarkably fast time. The homogeneous and high-quality format is also very commendable for what is presumably a book produced from copy provided by the contributors. The editors have done an outstanding job in bringing this book to the public so rapidly and in such good order. All of the chapters are in English, though some suffer from problems associated with writing in a second language.

The organizers of the symposium took a wide view of the subject and have managed to include almost every aspect of the use of trace elements in the analysis of dietary and related matters. J. Newsley provides an introductory chapter on hydroxyapatite from the mineralogical point of view. Four papers are concerned with problems of diagenesis. C.T. Williams found that almost all elements studied, including Sc, La, Th and U, are surface enriched by interaction with soil and ground water for samples from East Africa. A very fine study by P. Francalacci and S. Borgognini Tarli on Neolithic and earlier samples from Liguria and Sicily used faunal remains as a baseline for trophic levels. They found contamination for Sr, V and Mn but not Mg and Ba. G. Grupe and H. Piepenbrink performed laboratory experiments on modern pig femurs by inoculation with microorganisms (fungi) and burial for four months. Elements enriched artificially in the soil were found also to be enriched in the bone, including Sr, Ba, Zn and (less) Mg. The authors suggest that soil analysis is mandatory in dietary studies. T. Waldron studied Pb at a Romano-British cemetery in Dorset and found little contamination except for individuals buried in lead coffins. He found that males usually had higher Pb levels than females, and that the Pb burden increased with age up to 55 years or so. The Pb burden also increased from Neolithic times through the Roman and Medieval periods, but has decreased in more recent times.

L. Runia presented a paper on the fundamental problem of dietary discrimination: how raw compo-

nents in food translate into elemental levels in bone. Several papers address difficulties associated with nontraditional mortuary remains. M. Hedrich et al. discuss the difficulties in analyzing Pb and Cd in fetal bone. Two papers are concerned with trace levels in teeth. T. Molleson discusses the effects of diagenesis, particularly for fluorine. V. Vernois et al. studied teeth from individuals found in the south of France from the period A.D. 0-1000. They found no adverse effects from diagenesis, and they discuss the effects of physiological differences. B. Herrmann and G. Grupe report one of the first studies of cremated human remains. They found little loss of elements, except for Pb, and the diagenetic changes were similar to those for noncremated bone. K. Dörner used human hair to study the disease state, toxicology, and nutrition, but few studies on archaeological samples are described.

Several authors examine the role of trace elements in health and disease. I. Thornton focuses on the effects of trace elements in the soil on health. H. Zunkley and C. Spieker examine the effects of intake (such as Se deficiency in soil) and excretion (such as through lactation). O. Oster discusses the use of trace levels in diagnosis and therapy.

This book provides a rich source of material on trace element analysis of dietary, health, and environmental factors. Most papers are of a review nature, although some report original data. As a result, it provides an excellent survey of the field.

## Taos Workshop on Ethnobotany

Southern Methodist University announces a workshop in Ethnobotany to be held at its Fort Burgwin Research Center near Taos, New Mexico, from July 30 - August 5, 1989. The course may be taken for two hours credit, or as a non-credit course. It will provide intensive instruction in modern techniques of ethnobotany, using the Taos area as a laboratory and Fort Burgwin campus as a base. It will focus on mutual interactions between man and plants, and will examine beliefs about plants, as specific expressions of more generalized native views of the world.

Participants will receive lectures on ethnobotanical theory, plant ecology and systematics, and Southwestern plant history. Laboratory and lecture sessions will provide information on Pueblo, Hispanic, and Anglo ethnobotany. There will be field trips to Picuris Pueblo, one of two Tiwa-speaking Indian pueblos in the area.

Dr. Richard I. Ford, Dean of Research and Professor of Anthropology at the University of Michigan, will conduct the workshop. Dr. Ford is an internationally-recognized scholar with years of experience in the Southwest.

The ethnobotany workshop is limited to fifteen participants: graduate or undergraduate students, faculty, and post-doctoral staff. Participants are housed at the Fort Burgwin Research Center. Cost for credit or non-credit participants, including room, board, and tuition or fees is \$560.00. For information and applications contact:

Dr. Patricia Crown  
 Director of Archaeological Workshops  
 Department of Anthropology  
 Southern Methodist University  
 Dallas, TX 75275  
 (505) 983-5342

## 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.

### April 1989

- \* April 7-9. South-Central Friends of the Pleistocene. Central Texas. Stephen A. Hall, Department of Geography, University of Texas, Austin, TX 78712 (512-471-5116).
- \* April 10-12. Computer-Aided Laboratories. Chicago. Robert Zutkis, Infoscience Services, 3000 Dundee Road, Suite 313, Northbrook, IL 60062 (312-291-9161).
- \* April 18-19. New Perspectives on Evolution. Philadelphia. External Affairs Office, The Wistar Institute, 3601 Spruce Street, Philadelphia, PA 19104. A multidisciplinary symposium designed to provide a forum for interrelating recent discoveries and new insights in evolution. Session topics: Historical overview of facts and trends; Interplay of organism and environment; Impact of recent advances in molecular biology, biochemistry, and developmental biology.
- \* April 19-21. First Hellenic Geophysical Congress; sponsored by Hellenic Geophysical Union. Athens. Congress Center-Organization Idea, c/o Ms. Mania Bessieri, 24 Voulis Str., 10563 Athens, Greece (324-2045). Topics include archaeometry, paleomagnetism, remote sensing.
- \* April 23-27. American Ceramic Society, 91st Annual Meeting. Indianapolis. Mark Glasper, The American Ceramic Society, Inc., 757 Brookside Plaza

Drive, Westerville, OH 43081 (614-890-4700).

- \* April 27-30. Solving Environmental Problems: The Past as Prologue to the Present. Olympia. John H. Perkins, The Evergreen State College, Olympia, WA 98505.
- \* April 28-29. Conference on New Directions in Archaeology: The Processual/Post-Processual Debate. Carbondale. Robert W. Preucel, Center for Archaeological Investigations, Southern Illinois University, Carbondale, IL 62901 (618-536-6651).

### May 1989

- \* May 9-11. Sea-level Changes at Active Plate Margins; sponsored by Geological Society Joint Association for Geophysics. London. D.I.M. Macdonald, British Antarctic Survey, High Cross, Madingley Road, Cambridge, CB3 0ET (022361188).
- \* May 13. 12th Annual Spring Systematics Symposium. Chicago. Kristine L. Bradof, Symposium Coordinator, Department of Geology, Field Museum of Natural History, Roosevelt Road at Lake Shore drive, Chicago, IL 60605-2496 (312-922-9410, x298).
- \* May 17-19. Canadian Geophysical Union, 16th Annual Agency, College Station Road, Athens, GA 30613-7799 (404-546-3145).
- \* May 22-26. V Coloquio de Antropologia Fisica Juan Comas; biannual meeting of physical anthropologists working in Latin America, Spain and Portugal. Coloquio Comas, c/o Instituto de Investigaciones Antropologicas, Universidad Nacional Autonoma de Mexico, Coyoacan, DF 04510, Mexico.

### June 1989

- \* June 2-4. Association for the Study of Food and Society, 3rd International Conference. College Station, TX. William Whit, President ASFS, Department of Sociology, Aquinas College, Grand Rapids, MI 49506. Theme: Changing Food Habits.
- \* June 5-8. International Symposium on Vertebrate Biogeography and Systematics in the Tropics. Bonn. Dr. Gustav Peters. Vertebrate Symposium '89, Zoologisches Forschungsinstitut und Museum Alexander Koenig, Adenaueralle 150-164, D-5300 Bonn 1, Federal Republic of Germany.
- \* June 11-15. American Society of Mammologists, 69th Annual Meeting, Fairbanks. Conferences and Institutes, ASM Meeting, 117 Eielson Building, University of Alaska Fairbanks, Fairbanks, AK 99775-0540. Abstract deadline: 3/1/89.
- \* June 15-18. Society for the Study of Evolution Annual Meeting. University Park, PA. Dr. Barbara A. Schaal, Department of Biology, Washington University, St. Louis, MO 63130 (314-889-6822).
- \* June 19-23. Beijing '89 International Symposium on Exploration Geophysics; co-sponsored by Society of Exploration Geophysicists and Union of Chinese

Exploration Geophysics. Beijing. SEG, PO Box 702740, Tulsa, OK 74170-2740.

- \* Summer. Gordon Research Conferences. New Hampshire. Dr. Alexander M. Cruikshank, Director, Gordon Research Conferences, Gordon Research Center, University of Rhode Island, Kingston, RI 02881-0801 (401-783-4011). See Science, 3/3/89 for program, which includes: Analytical Chemistry, Aug. 7-11; Applied and Environmental Microbiology, July 24-28; Bones and Teeth, July 10-14; Calcium Phosphates, July 24-28; Solid State Studies in Ceramics, Aug. 14-18; Fiber Science, July 3-7; Inorganic Chemistry, July 31-Aug. 4; Inorganic Geochemistry, Aug. 14-18; Chemistry at Interfaces, July 17-21; Physical Metallurgy, Aug. 7-11; Statistics in Chemistry and Chemical Engineering, July 31-Aug. 4; Three Dimensional Electron Microscopy of Macromolecules, June 19-23; X-ray Physics, Aug. 7-11.
- \* June 26-28. Annual Congress of the Canadian Association of Physicists. Guelph. Mona L. Jento, Canadian Association of Physicists, 151 Slater Street, Suite 903, Ottawa, Ontario K1P 5H3, Canada (613-237-3392).
- \* June 27-29. Canadian Astronomical Society, Annual Meeting. Montreal. Serge Demers, Department of Physics, University of Montreal, C.p. 6128, Succursale A, Montreal PQ H3C 3J7, Canada (514-343-6718).

#### July 1989

- July 9-19. 28th International Geological Congress. Washington, DC. 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 10-14. 12th Canadian Symposium on Remote Sensing. Vancouver. Venue West Conference Management Services, Ltd., Suite 801, 750 Jervis Street, Vancouver, British Columbia V6E 2A9, Canada (604-681-5226).
  - \* July 10-14. Biological Approaches and Evolutionary Trends in Plants; sponsored by the International Organization of Plant Biosystematists. Kyoto. Dr. Shoichi Kawano, Department of Biology, Faculty of

Science, Kyoto University, Kyoto 606, Japan. Topics include: Molecular approaches in Biosystematics; Population Biology and Life-History Evolution.

- \* July 23-28. Society for the Preservation of Natural History Collections, Annual Meeting. Alberta. SPNHC Conference Secretary, Tyrrell Museum of Palaeontology, Box 7500, Drumheller, Alberta T0J 0Y0, Canada (403-294-1992).
- \* July 23-29. 13th International Congress for Caribbean Archaeology. Willemstad, Curacao, Netherlands Antilles. Jay B. Haviser Jr., Chair, Institute for Archaeology and Anthropology, Johan van Walbeeckplein 6-B, Willemstad, Curacao, Netherlands Antilles (599-9-613304). Sessions include: Prehistoric technologies; Human remains and underwater archaeology; Historical archaeology.
- \* July 24-27. Summer Computer Simulation Conference. Austin. Laurel Costello, Executive Director, The Society for Computer Simulation International, PO Box 17900, San Diego, CA 92117-7900 (619-277-3888).
- 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. 3. Elastic Wave Propagation and Ultrasonic Nondestructive Evaluation; sponsored by International Union of Theoretical and Applied Mechanics. Boulder. S.K. Datta, Department of Mechanical Engineering, University of Colorado, Campus Box 427, Boulder, CO 80309-0427 (303-492-7750).
- \* July 30-Aug. 4. 31st Rocky Mountain Conference; includes 12th International Electron Paramagnetic Resonance Symposium, 38th Denver X-ray Conference. Denver. Carol Gies, Rockwell International, General Lab, Building 881, PO Box 464, Golden, CO 80401 (303-966-7380).
- \* July 30-Aug. 5. Workshop on Ethnobotany. Fort Burgwin Research Center, Taos, NM. Patricia Crown, Director of Archaeological Workshops, Department of Anthropology, Southern Methodist University, Dallas, TX 75275 (505-983-5342). Cost: \$560. (See Meeting Announcement this issue *SAS Bulletin*.)
- 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. Registration deadline: 6/9/89.

#### 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 International Scientific Instrument Symposium, Aug. 4-6, Kassel.
- \* Aug. 2-6. Circum-Pacific Prehistory Conference. Seattle. Circum-Pacific Prehistory Conference, Dr. Dale R. Croes, Conference Coordinator, 1001 4th Avenue Plaza, Seattle, WA 98154-1001 (206-464-6580); CROES@WSUVMI,BITNET). Program topics include Human Evolution in the Pacific Region.
  - \* Aug. 6-10. Global Change: American Institute of Biological Sciences Annual Meeting; affiliated societies include American Society of Plant Taxonomists, Botanical Society of America, Ecological Society of America, International Society of Ecological Modeling, Society for Mathematical Biology. Toronto. Louise Salmon, Meetings Manager, AIBS, 730 11th St., NW, Washington, DC 20001 (202-628-1500). Symposia include: The Past as a Key to Global Change; Disturbed Ecosystems; Environmental Impact of Global Climate Change. Field trips include Quaternary Geology and Paleoenvironments of the Metro Toronto Region.
  - \* Aug. 6-11. Electron Microscopy Society of America Annual Meeting. San Antonio. Mort Maser, Electron Microscopy Society of America, PO Box EMSA, Woods Hole, MA 02543 (617-540-5594).
  - \* Aug. 7-10. Joint Mathematics Meeting. Boulder. Kathleen Holmay, Public Information Director, Joint Policy Board for Mathematics, 2722 Washington Avenue, Chevy Chase, MD 20815 (301-588-6168).
  - Aug. 22-29. 5th International Theriological Congress. Rome. Secretariat, ITC-5, Department of Animal and Human Biology, Viale dell 'Universita' 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. 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; Microanalysis of works of art - Present state, trends and perspectives (M. Schreiner, Institut für Farbchemie, Akademie der Bildenden Künste, Wien, Austria).
  - \* Aug. 28-Sept. 1. 11th International Symposium on Microchemical Techniques. Wiesbaden. Gesellschaft Deutscher Chemiker, Abteilung Tagungen, Varrentrappstrasse 40-42, PO Box 9004 40, D-6000 Frankfurt am Main, Federal Republic of Germany.
  - 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.
- September 1989**
- \* Sept. 3-7. European Society of Evolutionary Biology, 2nd Congress. Rome. Professor Valerio Sbordoni, Dipartimento di Biologia, II Università di Roma "Tor Vergata," Via Orazio Raimondo - La Romanina, I-00173 Roma, Italy.
  - Sept 3-9. 2nd International Conference on Geomorphology. Frankfurt am Main. Dr. Dietrich Barsch, Geographisches Institut, Universität Heidelberg, Im Neuenheimer Feld 348, D-6900 Heidelberg, Federal Republic of Germany. Abstract deadline: 8/31/88. Includes many field trips in central Europe.
  - \* Sept. 4-8. International Conference on the Applications of the Mossbauer Effect. Budapest. Denes Lajos Nagy, Central Research Institute for Physics, POB 49, H-1525 Budapest 114, Hungary.
  - \* Sept. 5-9. EUREM 88 - International Electron Microscopy Congress and Exhibition. York, UK. The Administrator, Royal Microscopical Society, 37/38 St. Clements, Oxford, OX4 1AJ, United Kingdom.
  - \* Sept. 5-9. 1st European Conference on Accelerators in Applied Research. Frankfurt am Main. K. Bethge, Institut für Kernphysik, August-Euler-Str. 6, D-6000 Frankfurt am Main, Federal Republic of Germany (-69-798 42 42).
  - Sept 10-16. 3rd International Conference on Palaeoceanography. Cambridge. I.N. McCabe, Department of Earth Sciences, University of Cambridge, Downing Street, Cambridge CB2 3EQ, England (223-333422). Abstract deadline: 2/1/89.
  - \* Sept. 11-15. 150th Anniversary Commemorative Meeting of the Royal Microscopical Society (Sept. 11-12); EMAG-Micro '89 Conference and Exhibition - The Future of Microscopy (Sept. 13-15). London. The Royal Microscopical Society, 37/38 St. Clements, Oxford OX4 1AJ, United Kingdom.
  - \* Sept. 11-15. Science 89. Sheffield, United Kingdom. Peter Briggs, British Association for the Advancement of Science, Fortress House, 23 Saville Row,

London W1X 1AB, 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. 12-14. Microscopy of Ceramics III. The Royal Microscopical Society, 37/38 St. Clements, Oxford OX4 1AJ, United Kingdom.
  - \* Sept. 17-22. American Society for Photogrammetry and Remote Sensing/American Congress on Surveying and Mapping, Fall Convention. Cleveland. Don Hemenway, Director of Communications, ASPRS, 210 Little Falls Street, Falls Church, VA 22046 (703-534-6617).
- 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.
- \* Sept. 19-22. International Symposium on Archaeometallurgy '89: From Bloom to Knife. Kielce-Ameliowka, Poland. Dr. Elzbieta Nosek, Secretary of the Organizing Committee, Symposium on Archaeometallurgy, Archaeological Museum of Krakow, Senacka 3 Str, 31-002 Krakow, Poland (22-71-00).
  - \* Sept. 20-27. International Union for the Scientific Study of Population, 21st General Population Conference. New Delhi. Bruno Remiche, Executive Secretary, IUSSP, 34 Rue des Augustins, B-4000 Liege, Belgium.
  - \* Sept. 24-29. 28th Annual Eastern Analytical Symposium. New York. Program Committee, PO Box 633, Montchanin, DE 19710-0633. Abstract deadline: 3/3/89.

#### October 1989

- \* Oct. 1-6. 16th Annual Meeting of the Federation of Analytical Chemistry and Spectroscopy Societies. Chicago. Paul Bourassa, Memphis Environmental Center, Suite 100, 2603 Corporate Avenue, East, Memphis, TN 38132 (901-345-1788). Abstract deadline: 3/1/89.
  - \* Oct. 2-5. Materials Weeks '89. Indianapolis. George A. Mentzer, ASM International, Metals Park, OH 44073 (216-338-5151).
  - \* Oct. 12-14. 2nd Interdisciplinary Conference on Natural Resource Modeling and Analysis. Tallahassee. M. Mesterson-Gibbons, Department of Mathematics, Florida State University, Tallahassee, FL 32306-3027 (904-644-2580). Purpose: To facilitate collaboration on developing and using quantitative modeling to analyze biological, economic, social and technical aspects of conserving natural resources.
  - \* Oct. 13-15. Midwest Archaeological Conference. Iowa City. William Green, Office of the State Archaeologist, Eastlawn, University of Iowa, Iowa City, 52242 (319-335-2389). Abstract deadline: 9/8/89.
  - \* Oct. 17-20. CIS '89 Tokyo - International Symposium on Chromatography. Tokyo. T. Hoshino, Secretary General, Pharmaceutical Institute, School of Medicine, Keio University, 35 Shinano-machi, Shinjuku-ku, Tokyo 160, Japan.
  - \* Oct. 29-Nov. 2. Society of Exploration Geophysicists, 59th Annual International Meeting. Dallas. James D. Robertson, 1989 SEG Annual Meeting, PO Box 702740, Tulsa, OK 74170-2740, (214-880-5860). Abstract deadline: 5/1/89. Includes special session on Archaeology and Geophysics.
  - \* Oct. 29-Nov. 2. Managing Information and Technology. Washington, DC. Linda Resnick, Executive Director, American Society for Information Science, 1424 16th St. NW, Suite 404, Washington, DC 20036 (202-462-1000).
  - \* Oct. 31-Nov. 3. Ceramic Science and Technology Congress. Anaheim. The American Ceramic Society, Inc., 757 Brooksedge Plaza Drive, Westerville, OH 43081 (614-890-4700).
- #### November 1989
- \* 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 of Archaeological Geology and Geomorphology in the Central-Mississippi-Lower Illinois Valley Region, Illinois and Missouri. See SAS Bulletin, 12(1), for details.
  - 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. Abstract deadline: 6/1/89.
  - \* Nov. 15-19. American Anthropological Association Annual Meeting. Washington, DC. David Givens, Director of Information Resources, American Anthropological Association, 1703 New Hampshire Avenue NW, Washington, DC 20009 (202-232-8800).
  - \* Nov. 17-19. Southeast Friends of the Pleistocene, 3rd Annual Conference. Art Schultz, US 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.

#### December 1989

- \* Dec. 4-8. American Geophysical Union Fall Meeting. San Francisco. A Fred Spilhaus, Jr., Executive Director, AGU, 2000 Florida Avenue NW, Washington, D.C 20009 (202-462-6903).
- \* Dec. 27-30. Linguistic Society of America, 64th Annual Meeting. Washington, DC, Margaret W. Reynolds, Associate Secretary-Treasurer, Linguistic Society of America, 1325 18th Street NW, Suite 211, Washington, DC 20036-6501 (202-835-1714).
- \* Dec. 27-30. Archaeological Institute of America, Annual Meeting. Boston. Joan Bowen, Director, AIA, 675 Commonwealth Avenue, Boston, MA 02215 (617-353-9361).
- \* Dec. 27-30. American Society of Zoologists Joint Annual Meeting; cosponsors include the American Microscopical Society and the Society of Systematic Zoology. Boston. Mary Adams-Wiley, Executive Officer, American Society of Zoologists, 104 Sirius Circle, Thousand Oaks, CA 91360 (805-492-3585). Abstract deadline: 8/4/89.

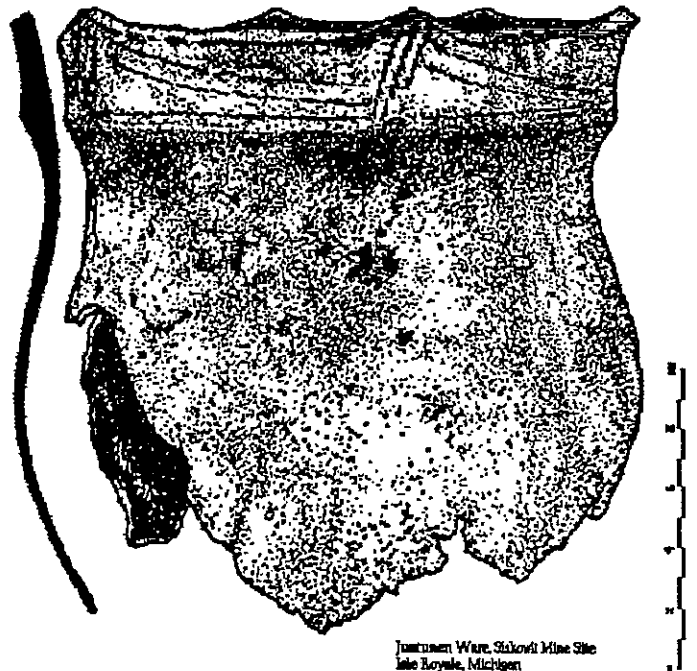
#### 1990

- \* Jan. 17-20, 1990. American Mathematical Society, 96th Annual Meeting. Louisville, KY. H. Daly, American Mathematical Society, Meetings Department, PO Box 6248, Providence, RI 02940. Abstract deadline: 9/28/89.
- \* 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).
- \* 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 theme session on Chronology and Environment of Early

Man - The Archaeometric Approach.

- \* April 4-6. Climate Change on the Great Plains. Lincoln. Ken Dewey, Center for Great Plains Studies, 1213 Oldfather Hall, University of Nebraska, Lincoln, NE 68588-0314. Proposal deadline: 7/1/89.
- \* April 16-20. Materials Research Society Spring Meeting: Material Issues in Art and Archaeology. San Francisco. Pamela Vandiver, Research Physical Scientist, Smithsonian Institution Conservation Analytical 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 23-27. General Assembly of the European Geophysical Society. Copenhagen. EGS Office, Postfach 49, D-3411 Katlenburg-Lindau, Federal Republic of Germany. Abstract deadline: 1/31/90.
- \* 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. Topic: The nature and implications of human/animal interactions over time. See SAS Bulletin, 12(1), for details.

Rob Sternberg, Department of Geology, Franklin and Marshall College, PO Box 3003, Lancaster, PA 17604-3003. BITNET: R\_STERNBERG@FANDM. Phone: (717)291-4134.



Jomon Ware, Siskiyew Mine Site  
Lake Royale, Michigan

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Society for Archaeological Sciences

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