

SAS Newsletter

Society for Archaeological Sciences

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From the Editor

It is my intention, as a rule, to refrain from addressing the membership directly in the *Newsletter*. However, the past few months have been busy ones for your Editor in regards to the SAS, and it is necessary to offer some observations.

Our Membership Survey, circulated in Volume 10 Number 1, met with some success, eliciting a respectable response from the membership. Erv Taylor has promised a report on the results in the next issue.

The Ninth Annual Meeting, held in Toronto, was also successful, with the SAS well represented in the paper sessions and symposia. In addition, the Coalition for Applied Preservation Technology was discussed at some length, as was the Advisory Council for Archaeometric Technology (see report and Yellen's response in this issue). SAS representation in both of these important groups will help ensure careful consideration of archaeometric concerns as policy recommendations are developed.

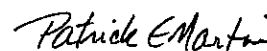
You will note that this issue of the *Newsletter* contains advertisements for two publications of interest to our members: *Archaeometry* and *The Journal of Field Archaeology*. These ads are the result of exchange agreements recently arranged with the editors of these publications, agreements that will also result in SAS membership ads appearing in those journals. Similar agreements are under development with two other related journals.

This issue also contains the first "Work in Progress" piece to be published in the *Newsletter*, an interesting

paper comparing results of thermoluminescence and radiocarbon dates from controlled contexts, authored by Mark Lynott. I hope that this paper, and others that follow, will stimulate some lively interchange of information and opinion.

Our inquiries regarding computer networks have resulted in a mixed bag of responses. In general, these reactions have been positive, but some concerns have been voiced regarding the implicit endorsement of one network to the exclusion of others. Make no mistake, neither your Editor nor the Board endorses any particular telecommunication medium. Problems with any and all systems are apparent, especially in regards to international communication. To help remedy some of these problems for our members, Foss Leach of the Archaeological Laboratories, Otago University, Dunedin, New Zealand has agreed to contribute a piece to an upcoming *Newsletter* and to chair a standing committee on the matter.

Finally, I will leave you with the ever-present call for contributions. I am especially interested in seeing your offerings of "Research Reports," "Works in Progress," and "New Publications."



Patrick E. Martin

Meeting Announcements

International Working Meeting on Soil Micromorphology

San Antonio, Texas July 10-15, 1988

Sponsored by: Sub-commission B of the International Society of Soil Science

The program will emphasize applications of soil micromorphology. Topical areas include: cracking clay soils (Vertisols), soils of dry regions (Aridisols), hydromorphic soils, soils enriched with carbonates, gypsum and other salts, micromorphological techniques in teaching and research, mineral weathering, applications of micromorphology to agronomic and earth sciences, and paleopedology. With the exception of invited papers, all work presented during the meetings is expected to be original research. Both oral and poster sessions will be included. Post-conference and mid-conference field trips are planned.

For additional information, contact: Dr. Richard Drees, Department of Soil and Crop Sciences, Texas A&M University, College Station, TX 77843-2474

Fifth Meeting, Working Group 1, "Unspecialized Bone Industries"

Mainz, West Germany

in conjunction with

XIth International Congress of U.I.S.P.P. August 31-September 5, 1987

Topics to be discussed at the meeting include: recognition of tools made from bone, modifications of bone surface by human and non-human agents, establishment of a common detailed description of bone tools showing little elaboration, establishment of a map showing geographical distribution of bone tools in Eurasia, establishment of a multilingual index.

Potential participants should make contact as soon as possible with: Dr. Marylene Patou, Institut de Paléontologie Humaine 1, rue René Panhard F-75013, Paris, France. Telephone: 1/43-31-62-91

Thermoluminescence Dating of Prehistoric Ceramics in Southeast Missouri A Progress Report

Mark J. Lynott □ Midwest Archeological Center □ National Park Service □ Lincoln, Nebraska
February 1987

The Midwest Archeological Center, National Park Service has been involved in a multi-year study of the archeological resources at Ozark National Scenic Riverways since 1979. A primary objective of the study has been to develop and refine the chronology for the Eastern Ozark region. Very little archeological research had been conducted in this rugged and heavily wooded area of Missouri before this project. Consequently, few radiometric dates had been obtained from the region.

Growing sophistication of archeological research questions regarding culture process and culture change are placing increased demands on precision in measurement of chronological relationships. Despite increased reliability of radiocarbon dating of different materials (e.g. charcoal, bone, and shell), standard error/deviations still generally produce age ranges larger than a century. The most reliable method of refining chronologies has been through processing large numbers of samples (e.g. Story and Valastro 1977). This is particularly effective when samples are carefully collected from reliable contexts and are associated with diagnostic artifacts.

Since preservation of archeological resources is a major mission of the National Park Service, the research being conducted in this project is generally limited to evaluative testing. Unfortunately, limited testing often fails to uncover radiocarbon samples in features or other suitable contexts. Acquisition of a large number of suitable samples during limited testing at a single site occurs very infrequently. Consequently, in an effort to acquire radiometric dates from limited testing projects in southeast Missouri, we have made a strong commitment to the use of thermoluminescence dating of ceramics as a supplement to radiocarbon dating. Thermoluminescence dating techniques have been widely used to date artifacts from Europe and the Near East, but have received only limited application in North America. Several laboratories in the United States are engaged in research relating to thermoluminescence dating, but only two labs have actively processed samples on a commercial basis. Our research program initially involved Mr. Stephen Sutton, Center for Archaeometry, Washington University. We have recently also worked with Dr. Jerry Stipp, Dr. Murray Tamers, and Dr. Ann Wintle, Alpha Analytic, Inc.

Thermoluminescence is light energy that is released when crystalline substances are heated to about 500 degrees C. Electrons from various types of background radiation become trapped in imperfections in the crystal lattice structure of certain minerals, and accumulate with the passage of time. This energy is released along with a proportional amount of normal light when the minerals are heated to high temperatures. The amount of thermoluminescence that is emitted during laboratory heating is measured and is a direct reflection of the length of time and the radiation dose rate to which the sample has been exposed. The radiation dose rate can be determined empirically, and used to calculate the length of time the sample has been accumulating energy.

Thermoluminescence dating applications in southeast Missouri archeology relate largely to minerals such as quartz, calcite, and feldspar which are included in the paste of prehistoric ceramics as tempering materials, or are natural components of the clays themselves. The dating of ceramics through measurement of thermoluminescence is

based upon the understanding that the original firing of a ceramic vessel releases all thermoluminescence acquired by minerals incorporated in the paste during geologic time. By reheating a ceramic sherd and measuring the amount of thermoluminescence that is emitted, and calculating the radiation dose rate to which it has been exposed, it is possible to determine the period of time that has elapsed since the vessel was originally fired. The principles of thermoluminescence dating are described in a variety of texts (e.g. Winter 1971; Aitkens 1974, 1985; Michels 1973; Fleming 1976, 1979) and interested readers are urged to consult these for more detailed descriptions of thermoluminescence principles and methods.

During the past eight years, the Midwest Archeological Center has submitted over fifty thermoluminescence samples from sites in southeast Missouri for dating. These sites generally date to the Woodland or Mississippian stages, with virtually all thermoluminescence dates falling between 500 and 1500 years before present. In situations where comparable radiocarbon or archeomagnetic dates occur, the thermoluminescence dates have been largely consistent with the other dating techniques. We have found thermoluminescence dating to be useful in dating sites in the western Great Lakes as well (Lynott and Perry 1984; Lynott, Richner, and Thompson 1986).

While we have been generally satisfied with the results of the thermoluminescence samples we have submitted, we thought it would be useful to process multiple samples from a single context of relatively well known age. The Powers Phase archeological complex in southeast Missouri represents an ideal subject for an experiment of this type. The Powers Phase represents a Mississippian manifestation found primarily in the Western Lowlands of southeast Missouri and northeast Arkansas. Total excavation of several villages (Price and Griffin 1979; Price 1978) and at least one farmstead (Smith 1978) have been reported. Excavation of these sites indicate that nearly all houses in the villages, hamlets, and farmsteads of the Powers Phase were burned after only a relatively brief occupation. While the precise length of occupation that occurred at these sites is unknown, it appears to be clearly less than 100 years. Radiocarbon dates from Powers Phase sites have been used to estimate the range of Powers Phase occupation from A.D. 1275 to A.D. 1350 (Price 1978).

In an effort to secure samples from one of the Powers phase houses, Dr. James E. Price was contacted, and arrangements were made to collect samples from one of the houses at the Powers Fort site. Powers Fort is the largest site of the Powers Phase, and represents a civic-ceremonial center with temple mounds, a plaza, residences, borrow pits and fortifications (Thomas 1894). This is clearly the largest and longest occupied site of the Powers Phase.

Previous work at the site by Dr. Price made it possible to locate a house basin without exploratory excavation. A single 5 ft by 5 ft test pit was excavated into the fill of the house basin and 29 thermoluminescence samples were collected from the house. Excavations revealed that the house had been abandoned and used as a midden, rather than burned like most of the other houses associated with the Powers Phase. This suggests that the ceramics in the house fill were deposited somewhat earlier than the burning and abandonment of Powers Fort. Since the entire occupation

span of the Powers Phase is believed to be relatively brief by archeological standards, the samples collected from the house basin were judged to be suitable for this experiment in thermoluminescence dating.

The samples were collected while trowelling and shovelling through the fill of the house basin. Samples were collected beginning at 0.6 ft below surface, with all samples being taken from below the plowzone. Each sample was exposed and promptly placed in a zip-lock plastic bag and sealed. A soil sample from the area adjacent to the ceramic sample was also taken and sealed in a zip-lock plastic bag. Ceramics and soil were given corresponding sample numbers and bagged together in a larger zip-lock plastic bag. These were then placed inside a paper sack.

The ceramics were removed briefly (1 to 3 minutes) from the bags in the laboratory to examine the temper, surface treatment, vessel profile, rim shape, etc. of the samples. Samples were then ordered by weight (uncleaned). While an attempt was made to select larger sherds for dating, some smaller sherds were deliberately selected to evaluate the effect of weight on the dating process. Thus both labs (Alpha Analytic, Inc. and Washington University) were sent ten samples that were generally comparable in sample weights. A comparable set of controlled samples has been retained in storage at the Midwest Archeological Center. A list of the 29 samples collected is presented in Table 1.

Table 1: Thermoluminescence Samples, 23BU10

Sample Number	Weight (g) Uncleaned Sherds	Average thickness (mm)	Type of sample	Lab assigned
MWAC-TL-11	15	6.7	body sherd	Alpha
MWAC-TL-13	160	25.6	cone fragment	Alpha
MWAC-TL-14	20	9.4	body sherd	Alpha
MWAC-TL-17	52	8.7	neck sherd	Alpha
MWAC-TL-21	48	9.0	body sherd	Alpha
MWAC-TL-24	147	12.6	rim sherd	Alpha
MWAC-TL-25	70	10.0	rim sherd	Alpha
MWAC-TL-27	64	8.0	body sherds	Alpha
MWAC-TL-28	32	6.5	body sherd	Alpha
MWAC-TL-30	74	31.0	cone fragment	Alpha
MWAC-TL-1	19	7.0	body sherd	Wash. U.
MWAC-TL-4	56	8.5	body sherd	Wash. U.
MWAC-TL-9	32	8.5	body sherd	Wash. U.
MWAC-TL-16	25	7.3	body sherd	Wash. U.
MWAC-TL-19	71	9.6	rim sherd	Wash. U.
MWAC-TL-20	171	7.0	rim sherd	Wash. U.
MWAC-TL-22	49	9.2	neck sherd	Wash. U.
MWAC-TL-23	63	9.4	rim sherd	Wash. U.
MWAC-TL-29	193	45.0	cone fragment	Wash. U.
MWAC-TL-31	108	40.0	cone fragment	Wash. U.
MWAC-TL-2	6	5.0	body sherd	control
MWAC-TL-3	14	8.6	body sherd	control
MWAC-TL-5	16	9.2	rim sherd	control
MWAC-TL-6	31	10.0	body sherd	control
MWAC-TL-12	29	7.4	body sherd	control
MWAC-TL-15	43	9.7	body sherd	control
MWAC-TL-18	31	6.8	body sherd	control
MWAC-TL-26	29	10.5	body sherd	control
MWAC-TL-32	37	10.8	body sherd	control

The samples consist of two types of ceramic material. Shell tempered ceramics are the most common and represent the largest portion of the sample. Several samples of ceramic cone fragments were also submitted. These conical artifacts are believed to be pot supports associated with fire hearths and cooking activities (Price and Griffin 1979).

The samples submitted to Washington University were processed using the predose and high temperature methods (Kornmeier and Sutton 1985); the samples submitted to Alpha Analytic, Inc. were processed by the fine-grained method (Tamers 1983; Wintle and Stipp 1985). The methods for these different techniques have been described

by Fleming (1970, 1973, 1979) and Aitken (1985). The results of these dates are presented in Table 3, while Table 2 presents the range of radiocarbon dates available for the Powers Phase.

A total of 31 radiocarbon samples has been processed from five sites of the Powers Phase (Crane and Griffin 1970, 1972; Price and Griffin 1979; Smith 1978). Detailed information about the nature of the samples submitted is not always available but it is clear that the samples were generally burned architectural elements from Mississippian houses. Samples processed from the Snodgrass and Turner sites (Crane and Griffin 1970, 1972) apparently included burned posts, cane, bark, and corn. Identified wood taxa include oak (both red and white), hickory, and ash. The nature of the burning of the houses at the Snodgrass site indicates that the entire village was burned in a single event (Price and Griffin 1979; 50-53). It is likely that the other Powers Phase sites were similarly destroyed about the same time. While it is probably that these sites were abandoned about the same time, some of the wood samples submitted may have included wood which was as much as 100 years older than the burning of the villages.

In several publications (Price and Griffin 1979, Price 1978) the duration of the Powers Phase has been estimated to range from A.D. 1275 to A.D. 1325 or A.D. 1350. These estimates for the age of the Power Phase have been based upon uncorrected radiocarbon dates. As part of this study, the Powers Phase radiocarbon dates were averaged following directions provided by Long and Rippeteau (1974). The average of these dates is A.D. 1361 ± 17.8. This is somewhat more recent than previous estimates for the Powers Phase, but it is consistent with corrections for tree ring calibrations (e.g. Klein et al. 1982). Based on radiocarbon dating, the duration of the Powers Phase is more accurately estimated within a 95 percent confidence level at A.D. 1325 to A.D. 1397.

The ten thermoluminescence samples that were sent to Washington University were processed using both the "predose" and "high temperature" methods (Kornmeier and Sutton 1985). One of the samples of ceramic cone which was submitted was rejected, because examination indicated that it may not have been fired sufficiently to release geologic thermoluminescence. The two techniques which were used concentrated on extracted quartz grains in the 74 to 149 micron fraction. The high temperature method was judged to be inappropriate for all but one of the nine samples, because the ratio of natural thermoluminescence to artificial thermoluminescence did not produce the required plateau at 350 degrees C. The resultant ages are consequently derived mainly from the predose method.

The dose rates for these samples were determined from the uranium, thorium, and potassium contents of associated matrix samples. A mean gamma ray plus cosmic dose rate for the combined samples was estimated at 93 mrad/year. Direct measurement of the gamma ray plus cosmic dose rate with a CaF2 dosimeter was attempted. The dosimeter was buried in the site for seven months (10/28/82 through 5/30/83) and produced a dose rate of 105 mrad/year. A mean of 100 mrad/year was used as the gamma ray plus cosmic dose rate for all nine samples. The water content of the ceramic samples was measured at 15 percent.

Despite high hopes for comparing the high temperature and predose methods in the dating of these samples, Kornmeier and Sutton (1985) found that only the predose method provided satisfactory results. Unfortunately, they also found that some of the samples behaved in a manner that suggested they were subjected to ambient activation while buried. The Washington University dates were then calculated in two ways, using the measured thermoluminescence sensitivity, and assuming the initial sensitivity was zero. The ages reported in Table 3 represent an average

Table 2: Radiocarbon dates from Powers Phase sites, southeast Missouri

Sample No.	Site name	Uncorrected date (A.D.)
1	Gypsy Joint	1330 ± 55
M-2276	Powers Fort	1410 ± 100
M-2277	Powers Fort	1290 ± 100
M-2278	Powers Fort	1360 ± 100
M-2279	Powers Fort	1290 ± 200
M-2280	Powers Fort	1300 ± 100
M-2434	Neil Flurry	1570 ± 100
M-2135	Snodgrass	1320 ± 100
M-2432	Snodgrass	1290 ± 100
M-2430	Snodgrass	1160 ± 100
M-2185	Snodgrass	1140 ± 100
M-2182	Snodgrass	1330 ± 100
M-2181	Snodgrass	1220 ± 110
M-2275	Snodgrass	1330 ± 100
M-2181	Snodgrass	1330 ± 100
M-2274	Snodgrass	1390 ± 100
M-2183	Snodgrass	1390 ± 100
M-2134	Snodgrass	1390 ± 150
M-2137	Snodgrass	1430 ± 100
M-2433	Snodgrass	1410 ± 100
M-2133	Snodgrass	1480 ± 100
M-2136	Snodgrass	1520 ± 100
M-2184	Snodgrass	1540 ± 100
M-2180	Snodgrass	1550 ± 100
M-1957	Turner-Snodgrass	1450 ± 100
M-1958	Turner-Snodgrass	1380 ± 100
M-1959	Turner-Snodgrass	1230 ± 100
M-1960	Turner-Snodgrass	1390 ± 100
M-1961	Turner-Snodgrass	1140 ± 110
M-1962	Turner-Snodgrass	1390 ± 100
M-1963	Turner-Snodgrass	1390 ± 100

of these two calculations. However, it is worth noting that in the only sample where both the high temperature and predose methods could be utilized, the dates for the high temperature method and the predose method using the measured thermoluminescence are in close accord. This indicates that little ambient activation occurred in this sample (Kornmeier and Sutton 1985).

The ten samples submitted to Alpha Analytic, Inc. were processed using the fine-grained technique (Tamers 1983, Wintle and Stipp 1985). This technique focused on minerals in the four to eleven micron size range. Alpha Analytic, Inc. calculated the gamma dose rate (99 mrad/year) by measurement of the uranium, thorium, and potassium content of the associated matrix samples. The cosmic dose rate was estimated at 14 mrad/year. Alpha Analytic, Inc. used individual gamma dose rates for each matrix sample and the estimated water content of individual sherds to calculate each of the thermoluminescence ages, but if combined these would yield a mean of 85 ± 7 mrad/year and water content of 19.5 ± 5.5 percent. The reported ages are presented in Table 3.

In plotting the distribution of the 19 thermoluminescence dates against the distribution of all Powers Phase radiocarbon dates, the thermoluminescence dates generally appear to concentrate toward the more recent end of the radiocarbon distribution (Figure 1). Averaging of the thermoluminescence dates produced by the two labs is complicated by the presence of both random and systematic errors in thermoluminescence dating. Consequently, the ten dates from Alpha Analytic, Inc. were averaged using formulas presented by Aitken (1985:250), and yielded an average of A.D. 1462 ± 54 (Wintle and Stipp 1985).

The two different thermoluminescence dating techniques used in this study are quite different, and they have different systematic errors built into the dating process. As noted earlier, the predose method utilized by Washington University for this study is potentially affected by ambient

activation. The resultant dates are presented with combined random and systematic errors (Kornmeier and Sutton 1985), and an average comparable to that presented by Alpha Analytic, Inc. cannot be computed at this time. An average of the Washington University thermoluminescence dates using a formula similar to that applied to the Powers Phase radiocarbon dates produces an average of A.D. 1399 ± 30 . A comparison of the average of the Alpha Analytic, Inc. and Washington University thermoluminescence dates indicates that they overlap at one sigma.

A comparison of the thermoluminescence dates with the radiocarbon dates clearly indicates that the thermoluminescence dates tend to compare most favorably with the more recent Powers Phase radiocarbon dates. However, it must be pointed out that accuracy in radiocarbon dating requires that a large number of samples be processed in order to reduce the impact of random error. For example, the five radiocarbon dates from Powers Fort (Table 3) are all processed from samples collected from the same burned house, yet they vary by 120 years. This illustrates that random error factors can produce widely ranging results, even when dating a single event. Reliable dating of archeological features is best accomplished with multiple samples, and the use of two or more dating techniques (Johnson et al. 1985).

If the averages of the two groups of thermoluminescence dates are compared, they are in accord within one sigma. The average of the radiocarbon dates and the average of the Washington University thermoluminescence dates are also in close accord. The Alpha Analytic, Inc. dates are also in reasonable accord, but slightly more recent in age. The reason for this very slight difference may relate to systematic errors in dating, sampling variability, the nature of the samples being dated, or other factors which have yet to be identified. As noted earlier, the use of older wood in the construction of Powers Phase houses could also explain why the thermoluminescence dates tend to concentrate at the more recent end of the radiocarbon distribution. While we will continue to analyze these data, it is clear that the combination of radiocarbon dates from six Powers Phase sites and thermoluminescence dates from Powers Fort provide an accurate framework for interpreting the temporal range of the Powers Phase occupation in southeast Missouri and northeast Arkansas.

While we have been quite satisfied with the results of the thermoluminescence samples which have been generated by the labs at Washington University and Alpha Analytic, Inc., it is regrettable that neither of these labs is still

Table 3: Thermoluminescence dates from Powers Fort

Lab No.	TL date (A.D.)	Field sample No.
WU-TL-116a	1415 ± 125	MWAC-TL-1
WU-TL-116b	1400 ± 70	MWAC-TL-4
WU-TL-116c	1400 ± 85	MWAC-TL-9
WU-TL-116d	1305 ± 130	MWAC-TL-16
WU-TL-116e	1540 ± 70	MWAC-TL-19
WU-TL-116f	1250 ± 95	MWAC-TL-25
WU-TL-116g	1240 ± 200	MWAC-TL-22
WU-TL-116h	1445 ± 120	MWAC-TL-23
WU-TL-116j	1365 ± 70	MWAC-TL-31
A-481	1460 ± 80	MWAC-TL-11
A-482	1400 ± 85	MWAC-TL-13
A-483	1460 ± 70	MWAC-TL-14
A-484	1535 ± 45	MWAC-TL-17
A-485	1505 ± 65	MWAC-TL-21
A-486	1540 ± 50	MWAC-TL-24
A-486	1225 ± 115	MWAC-TL-25
A-487	1450 ± 70	MWAC-TL-27
A-488	1460 ± 65	MWAC-TL-28
A-489	1290 ± 60	MWAC-TL-30

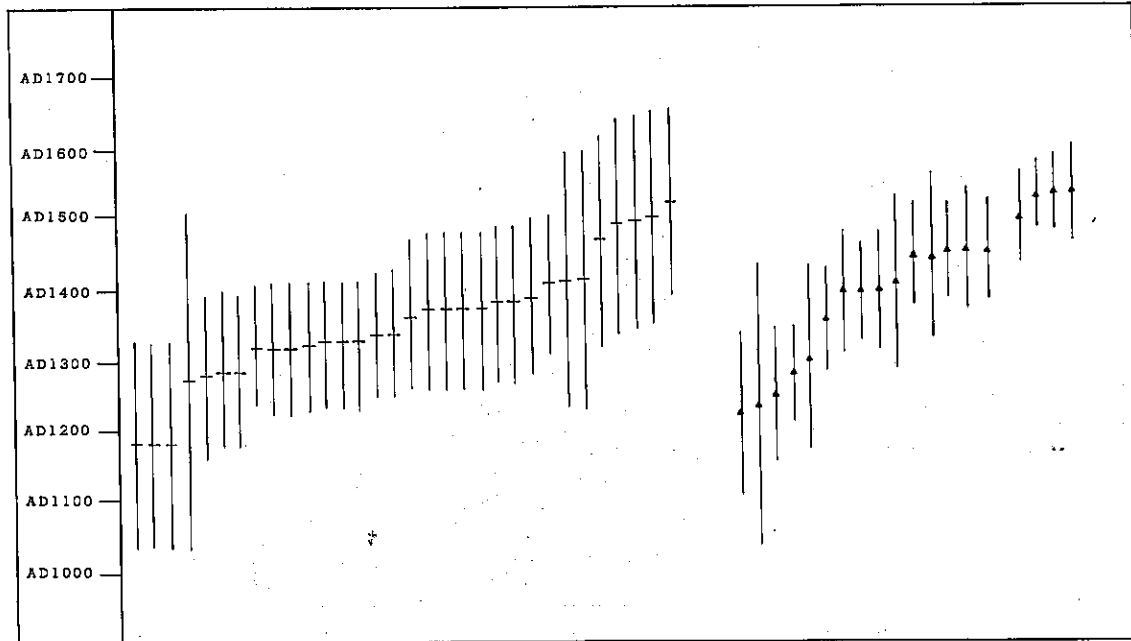


Figure 1.

— Corrected C¹⁴ dates - Powers phase

▲ TL dates - Powers Fort (23BU10)

processing samples at this time. Thermoluminescence represents an invaluable compliment to radiocarbon and other dating techniques. Hopefully, other labs in the United States will acquire the equipment and training necessary to begin processing thermoluminescence samples. Accurate dating of archeological manifestations is essential for explanation of past human behavior, and thermoluminescence dating has the potential to assist us in more accurate dating of the archeological record.

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Figure 2. The Viking Age wicker buildings of 16-22 Coppergate, York during excavation. (Photo M. S. Duffy, York Archaeological Trust)

Laboratory Profile

Environmental Archaeology Unit, University of York

The Environmental Archaeology Unit was established as part of the Department of Biology, University of York, in 1975. Its brief is to examine and report on the sediments and animal and plant remains from archaeological excavations in York and other sites, mainly in northern England.

The current staff have major research interests in the following areas: plant macrofossils, palynology and timber identification (Dr. Allan R. Hall); recovery of artifacts, animal and plant remains, detailed analysis of fish bones and eggs of intestinal parasites (Andrew K. G. Jones); insect remains, mainly Coleoptera and Hemiptera (Harry K. Kenward—Director); molluscs, mammal and bird bones (Dr. Terry P. O'Connor); fly puparia (Prof. John Phipps) and plant remains, particularly vegetative fragments (Philippa R. Tomlinson). There is thus expertise available to work on almost any class of animal and plant fossil from archaeological deposits. In addition, a team of volunteers and workers funded by the Manpower Services Commission (Department of Employment) and the Historic Buildings Commission for England (English Heritage) helps with sample processing. The total staff of the unit comprises 7 full-time employees and 15 part-time workers.

Each year, members of the Unit examine many thousands of wood, bone and shell fragments recovered by hand during the course of excavations. An equally important aspect of the Unit's work is processing samples of the archaeological layers to find artifacts and biological materials too small to be reliably collected by hand from the site. Very large samples (500 kg) are coarse-sieved to recover bones and

pottery, dustbinsfuls (50-100 kg) are sieved on 1 mm aperture sieves to retrieve small bones and larger plant remains. Smaller samples (5-10 kg) are processed meticulously in the laboratory in order to study fragments of beetles, fleas, mosses, seeds, small snail shells, the eggs of intestinal parasites, and a remarkable range of other animal and plant remains. Whilst a great deal of work has been carried out during the life of the Unit on animal and plant fossils from Viking Age layers (ninth-eleventh centuries A.D.), remains from other periods, from the Roman to post-medieval, have also been studied.

An important aspect of the laboratory's work is the examination of modern deposits and observations on living animals, plants and contemporary communities. From such work, insights can be gained into taphonomic processes and the methods by which animal and plant death assemblages accumulate.

By drawing together the results of the different kinds of analysis it is possible to produce a coherent picture of many aspects of life in the past. Some of the more important discoveries of the work have been finds of rare foodstuffs, for example olives and dormice in Roman York; the recognition of the remains of plants used in dyeing Viking-Age cloth; insights into the problems of insect pests in stored grain; the widespread occurrence of human excrement; changes in the kinds of fishes in local rivers; and invaluable information on the changing nature of the town's insect and plant communities and hence concerning living conditions in the settlement. We are discovering just what York was really like in the past.

Much of the early work of the Unit concentrated on material from the period of Viking Age occupation and subsequently considerable input was directed at the extremely popular and successful Jorvik Viking Centre during its development. The Jorvik Viking Centre is a hi-tech reconstruction of life in Viking-Age York coupled with an explanation of archaeology and a display of artifacts from the 1976-81 dig at Coppergate, York.

In addition to contributing to learned journals and conference proceedings (to the end of 1986, the EAU had amassed over 250 publications), detailed accounts of the work of the Unit are published in a series of definitive reports—forming a series called *The Archaeology of York*—which are available from the York Archaeological Trust, 1 Pavement, York, YO1 5DD. Members of the EAU often contribute popular articles on different aspects of the Unit's work to the *Bulletin of the York Archaeological Trust—Interim*—also available from the Y.A.T. The twice-yearly bulletin of the Association for Environmental Archaeology, *Circaea*, is edited and published at the EAU.

Andrew K. G. Jones
Environmental Archaeology Unit
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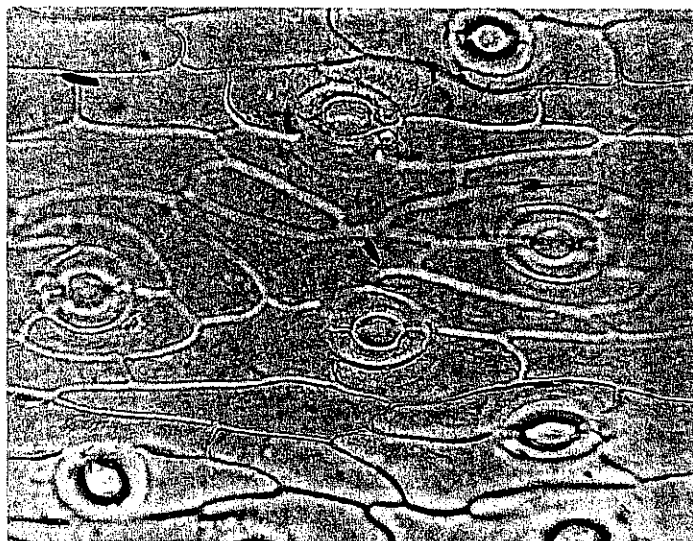


Figure 3: Photomicrograph of stem epidermis of the dyeplant, Dyer's Greenweed *Genista tinctoria* L., from Viking Age deposits at 16-22 Coppergate, York. (Photo P. Tomlinson, Environmental Archaeology Unit, University of York)

Meetings Calendar

June 21-25. American Society of Mammologists, 67th Annual Meeting. Albuquerque. James S. Findley, Department of Biology, University of New Mexico, Albuquerque, NM 87131 (505) 277-6681.

June 21-26. American Society of Ichthyologists and Herpetologists, 67th Annual Meeting. Albany, NY. Robert A. Daniels, New York State Museum, CEC 3132, Albany, NY 12230.

June 22-25. Society for Economic Botany, 28th Annual Meeting. Chicago. Charlotte Gyllenhaal, PCRPS, College of Pharmacy, University of Illinois-Chicago, P.O. Box 6998, Chicago, IL 60680 (312) 996-2246.

June 22-26. X-ray Powder Diffraction, short course. Albany, NY. Henry Chessin, Department of Physics, State University of New York, 1400 Washington Ave., Albany, NY 12222 (518) 442-4512.

June 29-July 1. 1st Conference of the International Federation of Classification Societies. Aachen, Federal Republic of Germany. Professor Dr. H. H. Bock, IFCS 87, Institut für Statistik und Wirtschaftsmathematik, Technical University Aachen, Wüellnerstrasse 3, D-5100 Aachen, Federal Republic of Germany. Presentation of theoretical and applied papers on classification and related methods of data analysis in the broad sense.

July 12-15. Spectroscopy Across the Spectrum: Analytical Applications of Spectroscopy. Norwich, United Kingdom. C. S. Creaser, School of Chemical Sciences, University of East Anglia, Norwich NR4 7TJ, U.K.

July 24-26. 1987 National Educational Computing Conference. Philadelphia. NECC '87, Office of Computing and Information Sciences, Temple University 038-22, Philadelphia, PA 19122 (215) 787-6864.

July 24-August 1. 14th International Botanical Congress. West Berlin, Federal Republic of Germany. Dr. W. Greuter, Kononen-Luise-Strasse 6-8, D1000 Berlin (West) 33, FRG.

July 31-August 4. International Quaternary Union. Ottawa. Alan V. Morgan, Department of Earth Science, University of Waterloo, Ontario, N2L 3G1 Canada.

August 4-7. 6th International Conference on Mathematical Modelling: An Interdisciplinary Integrative Forum for Researchers and Educators in Engineering, Economics, Biological, Medical, Environmental, Social and other Sciences. St. Louis. E. Rodin, Department of Systems Sciences and Mathematics, Washington University, Box 1040, St. Louis, MO 63130.

August 9. Paleobotanical Methods, short course. Columbus, Ohio. William DiMichele, Paleocology Short Course, MRC 164, Natural History Building, Smithsonian Institution, Washington, DC, 20560.

August 9-13. American Institute of Biological Sciences, 38th Annual Meeting. Participating societies: Botanical Society of America; Ecological Society of America; International Society for Ecological Modeling. Columbus, OH. Charles C. King, Ohio Biological Survey, Columbus, OH 43210 (614) 422-9645. Program announcement in *BioScience*, 3/87.

August 9-15. Joint Annual Meeting of the Herpetologists' League and the Society for the Study of Amphibians and Reptiles. Veracruz, Mexico. Richard C. Bogt, Estacion de Biología Tropical "Los Tuxtlas," Apt. Post 94, San Andres Tuxtla, Veracruz, Mexico.

August 9-22. International Union of Geodesy & Geophysics. Vancouver. Secretariat, Venue, West Ltd. 801-750 Jervis St., Vancouver, British Columbia V6E 2A Canada (604) 681-5226. Program in *Transaction*, American Geophysics Union, 68:5.

August 16-19. Canadian Society of Soil Science, 32nd Annual Convention: Land Management in a Changing World. Ottawa. CSSS 87 Conference, Tour and Conference Centre, Commons Building, Carleton University, Ottawa, Ontario, K1S 5B7 Canada.

August 17-20. 1987 Joint Statistical Meetings. San Francisco. American Statistical Association, 806 15th St., NW, Washington, DC 20005.

August 17-21. X-ray Spectrometry, short course. Albany, NY. Henry Chessin, Department of Physics, State University of New York, 1400 Washington Ave., Albany, NY 12222 (518) 442-4512.

- August 20-30. 16th Pacific Science Congress. Seoul, Korea. Organizing Committee, 16th Pacific Science Congress. Seoul 1987, KPO Box 1008, Seoul 110, Korea (2-733-4478).
- August 20-22. X-Ray Powder Diffractometry (International Union of Crystallography). Perth, Western Australia. E.H. Nickel, Division of Minerals and Geochemistry, CSIRO, Private Bag PO, Wembley, W.A., Australia 6014.
- August 27-29. Conference on Recent Developments in Statistics and Their Applications. Seoul, Korea. J. Rustagi, Ohio State University, Department of Statistics, 1958 Neil Ave., Columbus, OH 43210 (614) 292-2866.
- August 30-September 4. 194th American Chemical Society, National Meeting. New Orleans. Barbara Hodsdon, 1155 16th St., N.W., Washington, DC 20036.
- September 9-11. Remote Sensing Society, Annual Meeting. Nottingham, U.K. P.M. Mather, Remote Sensing Unit, the University, Nottingham, NG7 2RD U.K. (0602-587611).
- September 9-12. Indo-Pacific Prehistory Association/Micronesian Archaeology Conference. Guam. R.L. Hunter-Anderson, WERI, University of Guam, Mangilao, GU 96923.
- September 13-18. 26th Annual Eastern Analytical Symposium and Exhibit. New York, NY. J.P. Luongo, AT&T Bell Laboratories, Rm. 1A-352, Murray Hill, NJ 07974.
- September 11-17. Paleoenvironmental Interpretation of Paleosols; GSA Penrose Conference. Warm Springs Indian Reservation, Oregon. Greg J. Retallack, Department of Geology, University of Oregon, Eugene, OR 97403.
- September 21-23. Pyrometallurgy. London. Institution of Mining & Metallurgy, 44 Portland Place, London, W1N 4BR U.K.
- September 21-25. Natural Glasses. Prague. V. Bouska, Faculty of Science, Charles University, Albertov 6, 128 43 Prague 2, Czechoslovakia.
- September 23. Symposium on the Use of Reference Materials in the Metals Analysis Laboratory. Savannah, GA. Norma Bottone, Union Carbide Corp., Parma Technical Center, 12900 Snow Rd., Parma, OH 44130 (216) 676-2313.
- September 23-October 1. Rocks, Fossils & History Symposium. (International Commission on the History of Geological Sciences). Pisa, Italy. Nicoletta Morelio, Istituto di Storia Moderna e Contemporanea, Via Balbi 6, 16126 Genoa, Italy.
- September 24-26. Council for British Archaeology, Conference on Science and Archaeology. University of Glasgow, Glasgow, Scotland. Write: Science Conference, Department of Archaeology, University of Glasgow, Glasgow G12 8QQ, Scotland.
- September 27-October 2. 5th International Flint Symposium. Bordeaux, France. Michel Lenoir, Institut du Quaternaire, Batiment de Geologie, Avenue des Facultes, Universite de Bordeaux I, 33405, Talence Cedex, France. The aim of this symposium is to bring together geologists and archaeologists who are interested in the study of flint, including its origin and geologic evolution, as well as its prehistoric use: geology of flint formations; flint origin and evolution; flint alteration; flint technology; use wear studies; economy of sources; mining and exploitation; methodology of flint studies; field trip to the main flint formations of the north Aquitaine and the archaeological sites of the Les Eyzies.
- September 28-October 1. Symposium on Accuracy in Trace Analysis-Accomplishments, Goals, Challenges. Gaithersburg, MD. Kathy Stang, National Bureau of Standards, A353 Physics Building, Gaithersburg, MD 20899.
- October 19-22. Clay Minerals Society, Annual Meeting Socorro, NM. George S. Austin, Bureau of Mines & Mineral Resources, New Mexico Institute of Mining & Technology, Campus Station, Socorro, NM 87801 (505) 835-5125.
- October 23-25. Ontario Archaeological Society, 14th Annual Symposium. Skyline Hotel, Ottawa. 1987 OAS Symposium Committee, P.O. Box 4939, Station E, Ottawa, Ontario, Canada, K1S 5J1.
- October 26-29. Geological Society of America, Annual Meeting. With associated societies, including Paleontological Society. Includes following field trips: Archaeological Geology of Paleo-Indian Sites in Southeastern Arizona; Late Pleistocene Alluvium and Megafauna Dung Deposits of the Central Colorado Plateau; Late Holocene Alluvial Processes, Southern Colorado Plateau. Phoenix. Jean Kinney, GSA, Box 9140, Boulder, CO 80301 (303) 447-2020.
- October 28-30. 1987 Pacific Congress on Chemistry and Spectroscopy. Irvine, California. Howard J. Sloane, Savant, P.O. Box 3670, Fullerton, CA 92634 (714) 870-7880.
- November 5-7. American Society for Ethnohistory Annual Meeting. Berkeley, California. George Collier, Program Chairperson, AES 1987, Center for Latin American Studies, 582 Alvarado Row, Stanford University, Stanford, CA 94305 (415) 723-4444.
- November 8-13. American Nuclear Society, Winter Meeting. San Francisco. A.N.S. Headquarters, 555 N. Kensington Ave., LaGrange Park, IL 60525.
- November 18-22. American Anthropological Association, 86th Annual Meeting. Chicago. AAA, 1703 New Hampshire Ave. NW, Washington, DC 20009. Call for papers, *Anthropology Newsletter*, 1/87.
- December 7-11. American Geophysical Union, Fall Meeting. San Francisco. AGU Meetings, 2000 Florida Ave. NW, Washington, DC 20009, (202) 462-6903.
- December 27-30. Archaeological Institute of America, 89th General Meeting. Includes colloquium on Archaeometallurgical Perspectives: Challenging the Old Picture with Recent Findings. New York. AIA, P.O. Box 1901, Kenmore Station, Boston, MA 02215. See *SAS Newsletter*, 10:1.
- December 27-30. 1987 Meeting of the American Society of Zoologists (along with American Microscopical Society; Crustacean Society; Society of Systematic Zoology). New Orleans. Mary Adams-Wiley, Executive Office, American Society of Zoologists, Box 2739, California Lutheran University, Thousand Oaks, CA 91360 (805) 492-3585. Abstract deadline: 8/10/87.

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- January 10-14, 1988. 171st Meeting of the American Astronomical Society. Austin, Texas. David Evans, University of Texas.
- February 11-16. American Association for the Advancement of Science, 154th Annual Meeting. Boston. AAAS Meetings Office, 1333 H St. NW, Washington, DC 20005, (202) 326-6450.
- April 27-May 1. Society for American Archaeology, Annual Meeting. Baltimore. Jerome Miller, Society for American Archaeology, 1511 K St., NW, Suite 716, Washington, D.C. 20005 (202) 638-6079.
- May 16-22. 26th International Symposium on Archaeometry. Toronto, Canada. Ursula Franklin, Department of Metallurgy, University of Toronto, Toronto, Ontario M5S 1A7 Canada (416) 978-3012.

August 21-23. 7th York Quaternary Symposium. Lethbridge, Alberta, Canada. Dr. R. W. Barendregt, Quaternary Symposium, Department of Geography, University of Lethbridge, 4401 University Drive, Lethbridge, Alberta T1K 3M4 Canada.

August 29-September 2. 1st Congress of the Australian Rock Art Research Association. Darwin, Australia. Australian Rock Art Research Association, P.O. Box 216, Caulfield South, 3162, Victoria, Australia.

September 19-23. International Symposium on Engineering Geology as Related to the Study, Preservation, and Protection of Ancient Works, Monuments, and Historic Sites; organized by the International Association of Engineering Geology, Athens, Greece. Paul G. Marinos, Greek Committee of Engineering Geology, 1988 Symposium Secretariat, P.O. Box 19140, GR-117 10 Athens, Greece; Telex:45 4312 POLX (c/o Marinos). Principal themes of the meeting will be the application of engineering geology to the protection of historical sites; building stone used in historical monuments; archaeological exploration; natural hazards in history; environmental geology and historical sites; engineering works of antiquity.

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New Publications

Eidt, Robert C.

1984 *Advances in Abandoned Settlement Analysis: Application to Prehistoric Anthrosols in Colombia, South America.* Center for Latin America, University of Wisconsin-Milwaukee, P.O. Box 413, Milwaukee, WI 53201, \$17.00, second printing.

Rice, Prudence M.

1987 *Pottery Analysis: A Sourcebook.* University of Chicago Press, 5801 Ellis Avenue, Chicago, IL 60637; ca. 570 pages, expected available mid-June, \$49.95.

Rosen, Arlene Miller

1986 *Cities of Clay: The Geoarchaeology of Tells.* University of Chicago Press, \$9.00 with SAA convention discount.

Schiffer, Michael B.

1987 *Formation Processes of the Archaeological Record.* University of New Mexico Press, expected available early summer.

Styles, Thomas R.

1985 *Holocene and Late Pleistocene Geology of the Napoleon Hollow Site in the Lower Illinois Valley. Kampsville Archeological Center Technical Reports, Volume 5.* Center for American Archeology Press, Kampsville Archeological Center, Kampsville, IL 62053, \$7.95.

Waters, Michael R.

1986 *The Geoarchaeology of Whitewater Draw, Arizona.* University of Arizona Press, Tucson, AZ, \$14.95.



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Editor: Creighton Gabel
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Geoarchaeology: An International Journal

Editor: Jack Donahue
Address: Department of Anthropology
University of Pittsburgh
Pittsburgh, PA 15260
\$95.00/year

Geoarchaeology is published quarterly by John Wiley & Sons, Inc., 605 Third Avenue, New York, New York 10158. Members of the Geological Society of America-Archaeological Geology Division, Society of American Archaeology, Society for Archaeological Sciences and American Quaternary Association are entitled to a 50 percent discount on the subscription price. There is a \$16.00 surface mail charge and \$52.00 air mail charge for postage and handling outside the U.S.A. At the time of this review the four numbers of Volume 1 had been published.

As the name indicates, this is a new journal dedicated to the publication of papers concerned with various aspects of the interface between Earth Sciences and Archaeology. It is emphasized that an interface involves two-way interaction, so that research making use of archaeological data to expand geologic interpretation and understanding is just as valuable as the reverse.

Under the overall editorship of Jack Donahue, the papers so far have attended to the prescribed philosophical approach and have been related to either specific archaeological sites or broad problems of earth sciences or anthropological interest. Several papers on geoarchaeological methods and theory have also been presented. Climatic and paleoecological interplay with geologic and archaeological interpretations have also been represented in the first volume.

The journal is international in scope with papers in the first volume covering North America, South America, Europe, Africa and the Near East. Along with the feature articles, books, and professional meetings of interest to geoarchaeological studies are reviewed.

The lead off articles of the first volume are excellent examples of the dynamic interaction between Earth Sciences and Archaeology. The first paper by Rollins, Richardson

and Sandweiss utilize geoarchaeological data to support their hypothesis for the timing of the "Birth of El Nino." The following related paper by Sandweiss is on beach ridge uplift and its effect on prehistory, while in a third paper, Craig and Shimada utilize the geologic evidence of El Nino events to resolve archaeological problems of chronology, site function and settlement patterns. The scale seems equally balanced between archaeological and geological data throughout the rest of the volume, in a true blend of interdisciplinary research.

In the last several decades the importance of earth sciences in archaeological interpretations has become increasingly clear. However, the archaeological publication of most of this information has been relegated to either chapters on geology or soils in various monographs or attached to the publications as appendices. Many of these publications may not come to the attention of earth scientists. Only recently have any general volumes on geoarchaeology been published and only occasionally do geoarchaeology papers appear in specialized earth science journals. This new journal dedicated to the publication of geoarchaeological articles is extremely welcome and will no doubt increase our information flow.

Geoarchaeology is well edited, published in 8" by 11" format with bold easy-to-read type. It has high quality glossy paper and the plate and figure reproduction are generally excellent. Based on Volume 1, it looks like *Geoarchaeology* will be an informative addition to the libraries of those scientists who are concerned with interdisciplinary research.

Dennis Stanford, Curator, Paleo-Indian
Archeology, Department of Anthropology,
Smithsonian Institution, Washington, D.C.

News of Geoarchaeology

- A conference on "Stable Isotopes in Quaternary Research" was held May 16 and 17, 1987, at the Quaternary Research Center, University of Washington. Although many speakers gave talks, the two archaeologists who spoke were Stanley Ambrose (University of Illinois, "Diet and Habitat Reconstruction Using Stable Carbon and Nitrogen Isotopes in Terrestrial Mammal Bone: Problems and Prospects") and Erle Nelson (Simon Fraser University, "Stable Carbon and Prehistoric Northwest Coast Diet").
- At the "International Union for Quaternary Research," Ottawa, Canada July 31-August 4, 1987, Jack Donahue and Paul Goldberg have organized two sessions on geoarchaeology. Titles of talks and authors are as follows:
 - Radar, Tertiary Paleodrainages, and Locations of Middle Pleistocene Archaeological Sites in the Egyptian Sahara, by J. F. McCauley.
 - Settings of Middle and Late Acheulian Assemblages Along the Radar Rivers in Southern Egypt, by W. P. McHugh.
 - Sediments, Pollen, and Algal Pigments From Quaternary Groundwater-Supported Lakes, Northwestern Sudan, by J.C. Ritchie, C.H. Eyles, C.V. Haynes, and M. Rybak.

- Geochronology of Quaternary Groundwater-Supported Lakes, Northwestern Sudan, by C.V. Haynes, J.C. Ritchie, and C.H. Eyles.
- Late-Holocene Human Impact on Lake Basins in Central Mexico, by S.E. Metcalfe, R.B. Brown, P.E. Hales, S. O'Hara, R.A. Perrott, F. Steininger, and F.A. Street-Perrott.
- The Environmental Setting of Khok Phanom Di, Central Thailand, by F. K. Maloney.
- Holocene Settlements in the La Plata River Littoral (Argentina): Methodological Approach, by M. Salemme, L. Miotti, and M. Aguirre.
- Palaeoenvironment and the Archaeological Record at the L'Anse Aux Meadows Site, Northern Newfoundland, by A. M. Davis, B. Wallace, J.H. McAndrews.
- Palaeoenvironments From Prehistoric Cave Sediments: A Micromorphological View, by Paul Goldberg and M.A. Courty.
- Sandstone Rockshelter Development in Eastern North America: Application to Archaeological Sites, by Jack Donahue and J.M. Adovasio.
- Ecological Systems in the Late Quaternary of Glaciated Portions of Middle Europe and The Northcentral United States: A Framework for the Study of Prehistoric Man-Land Interactions, by J. Bower and M. Kobusiewicz.

- Stable Isotope Studies of Bone for Paleoclimate and Paleodiet, by H. P. Schwarcz and A. B. Cormie.
- Insect Fossils as Paleoenvironmental Indicators in Archeological Studies: An Example from the Late Glacial of the Lamb Spring Site, Colorado, by S. A. Elias.
- Neoboreal Climatic Influences on the Late Prehistoric Agricultural Groups in the Upper Mississippi Valley, by J. T. Penman.
- The Impact of Prehistoric Man on Vegetation in Central Europe (Results of the Working Group 'Anthropogenic Indicators in Pollen Diagrams')," by Darl-Ernst Behre.
- Macro- and Microenvironmental Reconstruction Using Plant Opal Plectolith Data From Archaeological Sediments, by I. Rovner.

These papers will be presented in two morning sessions. A poster session is also planned, but the timing has not yet been scheduled.

- Geological Society of America Annual Meeting, Phoenix, Arizona, October 26-29, 1987. At GSA this year the Archaeological Geology Division will sponsor a symposium, organized by Fekri Hassan. The name of the Symposium is "Geology of Human Origins and Cultural Evolution." The Division will also sponsor a field trip "Archaeological Geology of Paleo-Indian Sites in Southeastern Arizona." Call Michael R. Waters, Department of Anthropology, Texas A&M University, College Station, Texas if interested in attending.

Also of interest at GSA is a field trip "Late Pleistocene

Alluvium and Megafauna Dung Deposits of the Central Colorado Plateau." Looks like a great time! If you want to attend write Larry D. Agenbroad or Jim I. Mead, Northern Arizona University, Flagstaff, Arizona.

Last year's GSA, Archaeological Geology Division Field Trip was "Classic Paleoindian Sites on the Southern High Plains Texas and New Mexico." This trip has resulted in a Guidebook, edited by Vance T. Holliday, available through The Department of Geography, Texas A & M University, College Station, Texas.

- GSA Archaeological Geology Division Annual Award. Every year the Division gives an award to a scholar who has contributed significantly to Archaeological Geology. This year's award is to John C. Kraft, Department of Geology, University of Delaware. CONGRATULATIONS!
- The Fifth International Flint Symposium will be held September 27-October 2, 1987, in Bordeaux, France. If you are interested in any further details about this symposium, please write to Secretaire General, c/o Michel Lenoir, Institut du Quaternaire, Batiment de Geologie, Avenue des Facultes, Universite de Bordeaux I, 33405 Talence Cedex, France.

If you have news of geoarchaeology, please call Julie K. Stein at (206) 543-5240, or write her at Department of Anthropology, University of Washington, Seattle, WA 98195.

The Advisory Council for Archaeometric Technology

The Advisory Council for Archaeometric Technology was formed to provide a long-term perspective for funding expenditures by the Archaeometry Panel of the Anthropology Program of the National Science Foundation. The Council is composed of representatives from the Society for Archaeological Sciences, the Society for American Archaeology, and the American Association of Physical Anthropologists. Primary concerns of the Council are (1) the acquisition of major equipment (> \$15,000) and new technologies dedicated to anthropological research, (2) the development of laboratories for archaeometric research, and (3) training in these new technologies. The Council met in February 1987 to consider the current state of archaeometric funding and to consider recommendations to the National Science Foundation. Some information on the background and mission of ACAT, and on the February meeting and resultant recommendations, is provided below.

Background and History

Two factors are primarily responsible for the formation of the council. John Yellen has been discussing the direction of funding for archaeometric research with members of the discipline for several years. He indicated that there was little clear direction provided by the field as a whole (in contrast to programs such as astronomy) and mentioned that NSF would very much like to receive advice from a group of experts. Second, a Research Seminar on Bone Chemistry in Archaeology was held at the School of American Research in Santa Fe in March of 1986. There was strong consensus among the participants in this seminar that certain equipment was essential for the advancement of the field. In fact, a letter was drafted by the seminar group and sent forward to John Yellen at NSF urging (1) the establishment of national laboratories of archaeological chemistry, and (2) the purchase of one or more dedicated mass spectrometers.

Subsequent discussions indicated that NSF would support a meeting of a wider ranging group of experts in archaeometry (as well as bone chemistry) to provide advice to the program. Price agreed to organize such a council and

a meeting. Letters were sent to the presidents of major anthropological organizations with interests in archaeometric research: the Society for American Archaeology, the Society for Archaeological Sciences, and the American Association of Physical Anthropologists. These organizations each recommended three participants and the present panel is a result of these process of nomination.

Dr. Yellen, in his letter of invitation, outlined the role that NSF anticipates for the Council: "This Spring [1987] will mark the third year awards will be given [in the archaeometry competition] and we can now see the direction in which the competition is developing. The Program will provide just over a million dollars in support to archaeometry per year . . . The modal award duration for laboratories is for three years and we estimate that we can support up to 15 at one time.

"Given this framework we would appreciate your advice on a number of issues. Is there any way to assess the needs of the anthropological community? For any particular area of research—trace element analysis of bone for example—it is possible to estimate how many analyses are currently performed each year, where are they done, and whether the existing facilities are adequate? Secondly, in what directions do you think anthropological archaeometry will and should go in the next five or ten years? What are the most important, most promising areas of research? In this light, how should NSF respond? Are there particular kinds of laboratories which we should encourage or perhaps establish? Given limited program funds, it would be valuable if priorities could be settled. Finally we would appreciate advice on how such laboratories might be run. Should they provide service to the entire anthropological community? How does one determine what samples should be run? Should fees be charged? Advice on all these issues would be valuable?"

The Mission of the Advisory Council

The Advisory Council for Archaeometric Technology (ACAT) was formed to provide directions for future funding in archaeometric research by the National Science Foundation, particularly regarding the nature and scope of research laboratories, their location, and the types of equipment that

will be needed in the next 10-20 years. This is a critical period in the development of archaeometry. New technologies in chemical and physical analysis must be incorporated into anthropological research. It seems clear that many of the major discoveries in our field will come from the laboratory, not fieldwork, over the next decades.

The mission of the Advisory Council for Archaeometric Technology then is to act in an advisory role to the Anthropology Program of the National Science Foundation to provide perspective and planning for funding expenditures. ACAT is concerned primarily with basic research in archaeology and biological anthropology. The primary focus of ACAT is to make both immediate and long-term recommendations regarding the acquisition of important new technologies and instruments, laboratories, and personnel for archaeometric research. The Council is concerned primarily with (1) the acquisition of major equipment ($>$ \$15,000) and new technologies dedicated for anthropological research, (2) the development of archaeometric research laboratories, and (3) the training of individuals in these new technologies. ACAT concern is less with radiocarbon and dendrochronological dating (areas already funded by the NSF archaeometry panel) and the computerization of the field. Isotopic dating and dendrochronology have established programs and laboratories; computers are an essential part of any modern instrumentation. Thus the purview of ACAT is primarily on the characterization of archaeological materials (including isotopic and elemental composition), new chronometric technologies, and geophysical prospecting.

The February ACAT Meeting

The Council met on February 26 and 27, 1987, at the National Science Foundation in Washington, D.C. In addition to the chairman, the nine council members, and Dr. John Yellen of NSF, visitors included Dr. Stuart Plattner, Associate Program Director, Anthropology, NSF, Dr. Nancy Paraiso, Assistant Program Director, NSF, Dr. Richard Louttit, Director, Biological, Behavioral, and Neural Sciences, NSF, and Dr. Erv Taylor, University of California-Riverside.

Council Recommendations

It was the sense of the meeting that the Anthropology Program has been very successful in implementing funding for archaeometric research. The announcements concerning laboratories and projects were carefully noted and applauded. There was agreement on the panel that the normal process of project proposal, review and award continue. The recommendations listed below reflect the unanimous opinion of the Advisory Council for Archaeometric Technology

as suggestions for long-term directions for archaeometry funding. A maximum amount was suggested for the awards for NSF centers so that funding for other archaeometric projects would remain available.

1. Establishment of New Laboratories

The Council urges the creation of NSF Centers for Archaeometric Research. NSF should bring to the attention of the anthropological community the availability of funding for such centers as a focus for training, service, and research. These research centers would be funded for a maximum of five years. The specific scope and facilities of these centers should be determined by the Archaeometry panel on the basis of proposals. Proposals should include funding for both technical staff and the training of students, perhaps through workshops. University contributions to the center should be detailed. Funding levels would be phased in over time relative to the operation of equipment and phased out over time so that continuous major funding from NSF would not be available. Maximum funding in addition to equipment costs would be no more than \$125,000 per year. The nature of funding sources for continuation of the center following termination of NSF funding should be addressed. The kinds of equipment that we would hope to see in such laboratory centers are listed below. These proposals should also indicate the nature of multiuse aspect of the instrumentation.

2. Critical Instruments

The council urges the acquisition of dedicated capital equipment ($>$ \$15,000), especially for the characterization of both organic and inorganic materials, including isotopic and elemental composition, microscopy (especially SEM), archaeomagnetism, and remote prospecting. It is essential that archaeometrists be given access to such dedicated equipment for both research and service to the archaeological community. This recommendation is particularly relevant in the context of the Biological Instrumentation Program.

3. Initiative on Evolution of Human Diet

It appears that major increases in funding for anthropology at NSF will come from specific research initiatives, funded by Congress and appended to the NSF budget. In this light the Council recommended the organization of an initiative for funding in terms of the Evolution of Human Diet, coordinated by members of the Council. Dr. Solomon Katz will prepare a statement on the nature, scope, and ultimate value of this initiative that will be distributed shortly. Scientists and organizations from a range of fields will be invited to participate in this initiative. Preparations will continue through the AAAS meeting in Boston, 1988. A symposium on the human diet at that meeting will offer a point at which to intensify efforts.

Council Members

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Yellen Responds to ACAT

Editor's Note: On June 25, Dr. John E. Yellen, NSF Anthropology Program Director, responded to the recommendation of the Advisory Council for Archaeometric Technology, by means of a letter to SAS Past President Dr. Joseph Lambert. Yellen's response, regarding the NSF's support of new Archaeometric Centers, is contained below in order to facilitate potential applications for the program.

Through its archaeometry competition the National Science Foundation's Anthropology Program plans to support the establishment of one new anthropologically dedicated archaeometric laboratory facility. Except as revised in this announcement, applicants should follow guidelines in the *Archaeometry Announcement* which may be obtained from:

Anthropology Program
National Science Foundation, Room 320
Washington DC 20550

Proposals should be submitted by October 31, 1987.

Applicants may request up to \$125,000 per year for up to five years. In addition the applicant may request permanent equipment, including items which because of their cost normally fall beyond the Program's range. Because of budget constraints it will be at least several years before this opportunity is repeated.

The decision to establish such a dedicated facility results from an NSF supported March 1987 meeting of the Advisory Council for Archaeometric Technology. The council is composed of representatives selected by the Society for American Archaeology, the American Association of Physical Anthropology, and the Society for Archaeological Sciences. The group recognized that development and application to archaeology of important new technologies is impeded by lack of dedicated facilities. In response to this concern, the intended focus of the "new laboratory competition" will be such emerging areas and not established technologies. The Council's recommendation is summarized below:

The Council urges the creation of NSF Centers for Archaeometric Research. NSF should bring to the attention of the anthropological community the availability of funding for such centers as a focus for training, service, and research. These research centers would be funded for a maximum of five years. The specific scope and facilities of these centers should be determined by the NSF Advisory Panel for Archaeometry on the basis of proposals. Proposals should include funding for both technical staff and the training of students, perhaps through workshops. University contributions to the center should be detailed. Funding levels would be phased in over time so that continuous major funding from NSF would not be available. Maximum funding in addition to equipment costs would be no more than \$125,000 per year. The nature of funding sources for continuation of the center following termination of NSF funding should be addressed.

Prospective applicants are encouraged to write or call Dr. John Yellen (202) 357-7804.

News of Archaeometallurgy

- The 1987 annual conference of the Historical Metallurgy Society will be held September 19-20 in Snowdonia. The emphasis will be on Welsh gold, with site visits to be the local gold mine, copper mine, and several historical blast furnaces. The booking fee of £ 5 should be sent to Mrs. J. Thomas, Plas Tan y Bwch, Snowdonia National Park Study Centre, Maentwrog, Blaenau Ffestiniog, Gwynedd LL41 3YU Wales by July 18.
 - The schedule of future annual conferences of the Historical Metallurgy Society is: September 16-18, 1988 in the Forest of Dean, September 1989 at Matlock, and September 14-16 1990 in York.
 - The Archaeometallurgical Symposium in Poland that had been planned for this fall has been rescheduled for the fall of 1988. For information, write Elisabeth Nosek, Museum Arckeologiczne, ul. Senacka 3, 31-002 Krakow, Poland.
 - The ICCIH Conference 1987 is scheduled for September 6-12 in Austria. For information, write Stuart Smith, The Ironbridge Gorge Museum Trust, Ironbridge, Telford, Shropshire TF8 7AW England.
 - The Society of Jewellery Historians has announced its 10th Anniversary Conference on Jewellery History, to be held November 2-3 1987 in London. The conference fee is £ 40, £ 25 for SJH members, to be sent to Jack Ogden, 7 Georgian House, Bury Street, London SW1.
 - A course on Ancient Jewellery is being given in London July 20-24, 1987 at the Institute of Archaeology under the direction of Jack Ogden, with guest lecturers from the British Museum. The course fee is £ 145 or \$255. For information, write James Black, Coordinator, Summer Schools, Institute of Archaeology, 31-34 Gordon Square, London WC1H OPY or phone 01 387 9651.
 - A course in blacksmithing is being offered at Eastfield Village June 15- 20. For information, write Eastfield Village, Box 145, R.D., East Nassau, NY 12062, or phone (518) 766-2422.
 - AWGURS, the Anthropology Working Group on Use of Remote Sensing, publishes the *Remote Sensing Newsletter in Anthropology and Archaeology*. Subscriptions are \$15, sent to Dr. Scott Maudry, Editor, 113 N. Randall, Slidell, LA 70458. For information on AWGURS, write Warren R. Perry, Department of Anthropology, City College of New York, 138th and Convent Avenue, New York City 10031 or phone (212) 690-8163/6608. For information on training courses in remote sensing, write Dr. Fritz Hemans, Boston University, 232 Bay State Road, Boston, MA 02215.
 - The latest issue of the *IAMS Newsletter*, Number 9 reports on the excavations of last September at Monte Romero in the Sierra de Aracena in Spain, where nearly a dozen complete cupels were found in the context of a Phoenician silver smelting workshop. The issue also contains a review of tin, lead, and iron ingot types recovered from the Mediterranean, and a report of C-14 dates from Timna which identified Early Islamic (seventh century A.D.) secondary use of Late Bronze Age (thirteenth century B.C.) installations, including the adoption of ring-shaped tap slag. Subscriptions to the *IAMS Newsletter* are £ 10 per year (2 issues), sent to Miss L. C. Down, IAMS Secretarial Office, c/o The Institute of Archaeology, 31-34 Gordon Square, London WC1H OPY.
 - Professor Michael Notis of Lehigh University visited Dr. Trude Dothan's excavation at Tel Miqne, the biblical Ekron, this winter to collect samples. He reports that there appears to be evidence of lead and silver smelting at this site.
 - Dr. Aslihan Yener has been awarded a fellowship by the Smithsonian Institution to begin work this fall at the Conservation Analytical Laboratory on her silver ore and slag samples from the Taurus Mountains in Turkey.
 - Her many colleagues in archaeometallurgy will be saddened to learn that Inga Serning of the Institute of Archaeology of Stockholm University died suddenly this past February. She is survived by her husband, who resides at Hallsjo jerrgard, 772 00 Gransgesberg, Sweden.
- If you have any archaeometallurgical news to contribute, please call Martha Goodway at (202) 287-3733, or write her at CAL MSC, Smithsonian Institution, Washington, D.C. 20560.

Announcement of Dues Increase

The Executive Committee of the Society for Archaeological Sciences, meeting in Toronto on May 8, 1987, voted to increase the dues of some categories of membership in the society, effective January 1988. The new dues schedule is as follows:

Student members	\$5.00 (no change)
General members	10.00
Institutions	15.00
Lifetime members	150.00 (no change)

Membership in the society entitles one to receive four issues of the *Newsletter*, and a reduced subscription rate for the *Journal of Archaeological Science* and *Geoarchaeology*.

The raise in annual dues was enacted within the guidelines of the by-laws of the society, and was approved primarily to increase the operating efficiency of the society, since publication of the *Newsletter* has been running marginally. The last dues increase was so long ago it now lies beyond the corporate memory of Society officers. This increase is timed to coincide with the society's move to annualized billing, whereby all memberships will be on a calendar-year (January-December) basis, beginning January 1988.

General membership in the SAS, at \$10, is still an outstanding bargain; the lifetime membership at \$150 is unchanged and particularly attractive. It is also important to note that student memberships have not been raised.

Prudence M. Rice, *Outgoing Secretary-Treasurer*

Archaeometry

Archaeometry is a research journal dealing with the involvement of the physical sciences in archaeology and art-history. For the physical scientist **Archaeometry** provides a window on to an unusual and stimulating field of application involving techniques relevant to other fields, in particular geophysics and geochemistry. For the archaeologist and the art-historian **Archaeometry** provides up-to-date guidance on topics in this rapidly-developing area that may be of vital importance to the subject under study.

Archaeometry began in 1958 as the Bulletin of the Research Laboratory for Archaeology and the History of Art, Oxford University, but since its third volume it has been proud to include a high proportion of contributions by authors from other institutions on an international basis.

Some Papers Accepted for Forthcoming Issues

- TL dates for the Lake Mungo Aboriginal fireplaces and the consequences for radiocarbon dating*
... W. T. Bell
- Iron in ancient copper*
... P. T. Craddock, N. D. Meeks
- Patterning of skeletal lead content in Barbados slaves*
... R. S. Corrucini, A. C. Aufderheide, J. S. Handler, L. E. Wittmers Jr.
- Electron Spin Resonance (ESR) analysis of marine gastropods
from coastal archaeological sites in southern Africa*
... A. Goede, M. A. Hitchman
- The remanent magnetization of ancient struck coins*
... L. P. Goulpeau, P. Lanos, L. Llangouet
- Technological investigation of the coatings on some "haematite-coated pottery" from southern England*
... A. P. Middleton
- Initial notes on the X-ray fluorescence characterization
of the rhyodacite sources of the Taos Plateau, New Mexico*
... J. R. Newman, R. L. Nielson
- Cluster analysis applied to spectrochemical data of European mediaeval stained glass*
... G. Rauret, E. Casassas, F. X. Ruis, M. Munoz
- Analysis of bone from the Bronze Age site of Bovenkarspel-Het Valkje,
the Netherlands: a preliminary report*
... L. T. Runia
- Absolute dating of the Aegean late Bronze Age*
... P. W. Warren
- Radiocarbon dates from the Oxford AMS system: Archaeometry datelist 6*
... R. E. M. Hedges, R. A. Housley, I. A. Law, C. Perry, J. A. J. Gowlett

The subscription price of Volume 29 (1987), is £ 16 sterling for Europe and US \$41 elsewhere. For individuals whose institution already subscribes or who are not attached to an institution there is a reduced price of £ 11 for Europe and US \$30 elsewhere. Single parts cost £ 11 for Europe and US \$30 elsewhere. All prices quoted include postage and packing and are revised annually. Back numbers of all volumes are available. If you would like to become a subscriber please write to the Archaeometry Manager, 6, Keble Road, Oxford, OX1 3QJ, England.

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Deadlines for Submissions

No. 1 November 15

No. 2 February 15

No. 3 May 15

No. 4 August 15

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