SAS Bulletin

Society for Archaeological Sciences

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From the Editor

After several double-issues, the production of the *SAS Bulletin* is more-or-less on track, and we have returned to our quarterly format. In coming issues we should be able to publish more timely material including job announcements, conference calls-for-papers, etc., but we can't do that unless our readers send us the material! We are easily reachable by email and fax, so send us your news.

About the same time that you receive this *Bulletin*, you will also be receiving your membership renewal for 1999. Unfortunately, we have been unsuccessful in forestalling a rate increase by the *Journal of Archaeological Science*, and the new rate will be reflected in those membership categories which include *JAS* subscriptions. As many of our readers have noted in response to a letter from President Rob Sternberg sent out on SAS-Net earlier this year, the new *JAS* subscription rate is still a tremendous bargain for 12 monthly issues of a leading scholarly publication in a format which allows reproduction of high quality illustrations (e.g. SEM photomicrographs). Concerns were raised, nevertheless, about the affordability of subscriptions for members outside North America and western Europe. Even within these regions, the institutional subscription rate is so high that at least one Ivy League university has cancelled its subscription. Your Society is doing what it can to address these concerns, but we need to hear from you too, especially those of you who are in Latin America, Asia, or Africa.

Archaeological Science continues its high visibility in both the scholarly and public communities. The November 20, 1998 issue of *Science* featured a large section on "Transitions in Prehistory" which included discussions of early agriculture and the contributions from phytolith analysis and AMS dating, paleoclimatic studies, and zooarchaeology. In *Time* (April 20, 1998), the role of science in the investigation of the Shroud of Turin was prominently, if uncritically, presented. Archaeological science will also be a significant component of the World Archaeological Congress in Cape Town, with sessions on ceramics, dating, archaeometallurgy, dietary studies, genetics, provenance studies, and remote sensing.

Lastly, we apologize for the poor quality reproduction of the graphics in our last issue and hope that problem is resolved.

Robert H. Tykot *December 1998*

Archaeological Ceramics

Charles C. Kolb, Associate Editor

New Publications

The proceedings of a conference on sixth and seventh century ceramics in Italy held in honor of John W. Hayes at the American Academy of Rome, the British School at Rome, and the University of Rome in 1995 were recently published in two volumes. This significant work, edited by L. Sagui, is entitled *Ceramica in Italia: VI-VII secolo: Atti del Convengo in onore di John W. Hayes, Roma 11-13 maggio 1995* (Florence: Edizioni All'Insegna del Giglio, Biblioteca di Archeologia Medievale 14, 1998. 822 pp., numerous illustrations, ISBN 88-7814-1128-3, *Italian Lira* 120,000 [approximately $77.00 U.S. currency]). These volumes contain 31 long articles and 25 short contributions. The contributions consider the classes of pottery traded throughout the Mediterranean World: ARS (with contributions by Hayes, Mackensen, Tortorella, Bonifay, and Fontana, among others),

(continued on page 18)

In This Issue

Harmon Craig wins Balzan Prize

Harmon Craig, a professor of oceanography and geochemistry at the Scripps Institution of Oceanography, University of California, San Diego, has been awarded the Balzan Prize for his fundamental contributions to the field of geochemistry. The Balzan Prize of the International Balzan Foundation of Milan, Italy, has several times been given in astrophysics and geophysics, but this is the first award in geochemistry.

Craig was presented with the award by the President of Italy at a ceremony held in the Palazzo del Quirinale in Rome on Nov. 23, 1998.

The Balzan Prize is considered the equivalent of the Nobel Prize in the fields of natural sciences, humanities, social sciences and international affairs that are not in Nobel awards categories. The Balzan Prize was established in 1961 by the late Italian heiress Lina Balzan in memory of her father, publisher Eugenio Balzan. Three awards were made this year. Andrzej Walicki of Poland and the United States was awarded the prize for history and Sir Robert May of Australia and the United Kingdom received the award for his work in biodiversity.

Craig was recognized by the Balzan Foundation for his work as "a pioneer in earth sciences who uses the varied tools of isotope geochemistry to solve problems of fundamental scientific importance and immediate relevance in the atmosphere, hydrosphere and solid earth."

A faculty member at Scripps since 1955, Craig has ventured to some of the remotest spots on Earth in search of elusive gases, rocks and other materials that provide clues to the composition of the Earth's interior. In his quest, he has descended into the crater of an active underwater volcano, led the first dives into the 2-mile-deep Mariana Trough, and sailed atop an erupting undersea volcano to collect rock and gas samples. He has led 28 deep-sea oceanographic expeditions and has made 17 dives to the bottom of the ocean in the ALVIN submersible.

His daresome adventures have yielded a host of significant scientific findings that have greatly enriched our understanding of the workings of the oceans, atmosphere and deep Earth. In 1969, he and colleagues from McMaster University in Canada demonstrated for the first time that helium 3, a rare isotope of helium that was trapped in Earth's interior at the time of its formation 4.5 billion years ago, is being released from mid-ocean volcanoes by a process called "degassing" that played a key role in the evolution of the atmosphere. Craig went on to use the helium 3 injected into the deep sea to track ocean currents, leading him to discover that the Pacific ocean deep water circulates in the opposite direction to what scientists had theorized.

In 1970, Craig joined forces with colleagues at Scripps, Columbia University's Lamont-Doherty Geological Observatory, and the Woods Hole Oceanographic Institution to direct an international project called the Geochemical Ocean Sections Study (GEOSECS) for a global investigation of chemical and isotopic properties of the world's oceans. Results from this program represent the most complete set of ocean chemistry data ever collected and contributed significantly to the advancement of chemical oceanography. One of Craig's discoveries during this program was that lead is rapidly scavenged from the deep sea by particulate material, which turned out to be the major route by which many trace metals are removed from the ocean. Later Craig led two expeditions on Lake Tanganyika, using the GEOSECS methodology to study the geochemistry and limnology of this 4600-foot-deep lake.

Craig and colleagues went on to discover the existence of submarine hydrothermal vents in the Galapagos seafloor spreading center, using the Scripps "Deep-Tow" vehicle to measure helium 3 and radon along the axis where the tectonic plates are rifting apart. Using the submersible ALVIN, he discovered similar vents in the caldera of an active volcano called Loihi, located 3,000 feet below the sea surface, that is erupting to form the next Hawaiian island. Another journey aboard ALVIN, into the Mariana Trough, discovered hydrothermal vents nearly 12,000 feet deep.

Craig also analyzed gases trapped in Greenland ice cores and showed that the methane content of the atmosphere has doubled over the past three hundred years, a finding which is important for studies of the atmospheric greenhouse effect. He is currently measuring temperatures of past glaciations, using his discovery of gravitational enrichment of heavy noble gases in the air trapped in polar ice cores.

Other projects have taken Craig to sample volcanic rocks and gases throughout the East African Rift Valley from Northern Ethiopia to Lake Nyasa, and to the Dead Sea, Tibet, and Yunnan, China. He has made field expeditions to all the major volcanic island chains of the Pacific and Indian Oceans collecting lava samples. Craig's goal was to delineate mantle hotspots where volcanic "plumes" are rising from the earth's core through the deep mantle and can be identified by their primordial helium 3 content. He has identified sixteen such hotspots where the helium 3 to helium 4 ratio is much higher than in the upper mantle and crust of the earth, fourteen in oceanic islands, and two on the continents, in Ethiopia and Yellowstone Park.

In 1972, Craig and his wife Valerie showed that carbon and oxygen isotopes can be used to determine the provenance of marbles used in ancient Greek sculptures and temples, a study that is still continuing.

Born in New York City on March 15, 1926, Craig did his thesis on carbon isotope geochemistry under Nobel Laureate Harold Urey. After receiving a Ph.D. in geology-geochemistry from the University of Chicago in 1951, Craig stayed on as a research associate at the Enrico Fermi Institute for Nuclear Studies at the University of Chicago. During this time he and Urey discovered that meteorites fall into discrete groups based on their oxidation states and content of iron. He went on to study the distribution of heavy hydrogen (deuterium) and oxygen isotopes in natural waters, establishing the "Global Meteoric Water" relationship of these isotopes which has become fundamental for studies in hydrology and climatology.

In recognition of his scientific achievements, Craig has received many honors. He was elected to membership in the National Academy of Sciences in 1979. He received the V.M. Goldschmidt Medal of the Geochemical Society in 1979, the National Science Foundation "Special Creativity" Award in Oceanography in 1982, the Arthur L. Day Medal of the

Geological Society of America in 1983, and the honorary degree of Docteur (Honoris Causa) of the University de Paris (Pierre et Marie Curie) in 1983. In 1987, he was awarded the Arthur L. Day Prize of the National Academy of Sciences and was co-recipient of the Vetlesen Prize from Columbia University. In 1991, he was awarded an honorary doctorate degree from the University of Chicago, and in 1993 he was named an honorary fellow of the European Union of Geosciences.

Rockshelter Sediment Records and Environmental Change in the Mediterranean Region

Boston/Harvard MA, USA 22-23 March 1999

An International Meeting convened by Jamie Woodward[1], Paul Goldberg[2] and Ofer Bar-Yosef[3]

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2 Department of Archaeology, Boston University, Boston, MA 02215, USA Email: paulberg@bu.edu
3 Department of Anthropology, Peabody Museum, Harvard University, Cambridge, MA 02138, USA, Email obaryos@husc.harvard.edu

Conference Website

www.geog.leeds.ac.uk/conferences/rockshelter/rockshelter.html

Keynote Address

Sediments and Stratigraphy in Rockshelters and Caves from Spain to the Near East: Principles and Pragmatics, Prof. W.R. Farrand, Dept. of Geological Sciences, University of Michigan

Call for Papers

Much of what we know about the Middle and Upper Palaeolithic is derived from artefacts and faunal remains excavated from cave and rockshelter environments in southern Europe and the wider Mediterranean region. Rockshelter and cave sediment records can provide both stratigraphic control and environmental context for these materials. They also constitute a vital linkage between the cultural record on-site and off-site sources of palaeoenvironmental data. The study of rockshelter sediment records is now an important part of Palaeolithic archaeology, Geoarchaeology and Quaternary Science more generally. Various approaches and methodologies for the scientific analysis and dating of rockshelter sediments have developed over the last four decades. This meeting will focus on sites in and around the Mediterranean region and intends to stimulate debate on the following themes:

1) The utility of rockshelter and cave sediment sequences as records of environmental change. 2) Local versus regional controls on sedimentation style. What can these sequences tell us about local, regional and global patterns of environmental change? 3) Is it possible to differentiate between "natural" and anthropogenic signatures in rockshelter sediment records? Approaches and methodological issues and the role of micromorphology. 4) Dating rockshelter and cave sediment sequences and rates of sedimentation. Issues of resolution, preservation, gaps in the record etc. 5) Sediment sources and depositional environments. On-site and off-site correlations. Rockshelter sediments as an interface (link) between the archaeological record and the climatic changes recorded in the wider Pleistocene and Holocene sedimentary record. 6) Comparisons between rockshelter sediment records and other proxy records of environmental change (e.g. faunal, pollen and lake level data, alluvial sequences etc.)

Titles and brief abstracts should be emailed to the convenors as soon as possible.

Radiocarbon Dating News

CALIB Software

A beta test version of CALIB 4.0 is available from http://depts.washington.edu/qil/. This version runs under DOS, Windows, or NT4. CALIB 3.0.3c (1993) is also still available at this site. All versions of CALIB are Y2K compatible.

Proceedings of the 16th International Radiocarbon Conference

The Contents and Abstracts of the Proceedings of the 16th International Radiocarbon Conference (Groningen, June 1997) are available online at http://www.radiocarbon.org/. The recently printed volumes were issued as *Radiocarbon* volume 40, numbers 1 and 2. Volume 40, number 3, is INTCAL98 (the 'New Calibration Issue') edited by Minze Stuiver. Individual subscriptions for all three issues of *Radiocarbon* volume 40 are a modest $55.00 (institutions $115).

Tribute to Minze Stuiver

A public version of the special tribute to Minze Stuiver on his retirement, published in INTCAL98, is available on the web: http://www.radiocarbon.org/Journal/v40n3/tribute.html and http://www.radiocarbon.org/Journal/v40n3/tribute.pdf

Full-Text Access to *Radiocarbon*

Subscribers to *Radiocarbon* now have web access to a full-text database of articles published from volume 36 (1994) onward. For more information, see http://www.radiocarbon.org/Subscribers/search.html

New WWW addresses for Waikato Radiocarbon Laboratory

home page: http://c14.sci.waikato.ac.nz/
C14 web-info: http://c14.sci.waikato.ac.nz/webinfo/

Radiocarbon Laboratory of the University of Texas Closed

The Radiocarbon Laboratory of the University of Texas, Austin closed as of August 31, 1998. For further information, you may contact the director, Ernest Lundelius, Jr. by email: erniel@mail.utexas.edu.

Geoarchaeology

Michael R. Waters, Associate Editor

Upcoming Meetings

The 64th annual meeting of the Society for American Archaeology is to be held at the Sheraton Chicago Hotel and Towers, March 24-28, 1999. Two symposiums will be offered that deal with geoarchaeology.

The Geoarchaeology Interest Group is sponsoring a symposium entitled, "Geoarchaeology of Big River Valleys." This symposium is organized by Sarah Sherwood, Ed Hajic, and Julie Stein. The participants of the symposium will discuss geoarchaeological research along major river systems of the world. They will address research approaches to the study of large river systems and the results of geoarchaeological studies and how they have helped in the interpretation and management of archaeological resources.

Another symposium, "Beyond Basic Formation Processes: Constructing Inferences from Archaeological Deposits and Depositional Contexts," has been organized by Vincent M. LaMotta and E. Charles Adams. This symposium will focus on human depositional behaviors (i.e., anthropogenic) processes of deposit formation and then demonstrate how deposits and depositional behaviors can be used to construct inferences about past cultural phenomena such as community organization, subsistence, and ritual.

Money for Students

Several funds are available to students pursuing geoarchaeological research.

1. Archaeological Geology Student Award: The Archaeological Geology Division of the Geological Society of America announces a $500 travel grant to be awarded to a student to attend the annual meeting of GSA in Denver, October 25-28, 1999. The grant is competitive and will be awarded based on the evaluation of an abstract and a 2000 word summary paper prepared by the student for presentation in the Division's technical session at the GSA meeting. The summary paper may include a figure and must be single authored. The deadline for receipt of the paper is May 1, 1999. Applications should be sent to John Albanese, Chair, GSA Archaeological Geology Division Awards Committee, P.O. Box 1397, Casper, Wyoming 82602. (E-mail: albanes@trib.com).

2. Claude Albritton Fund for Archaeological Geology: The Archaeological Geology Division of the Geological Society of America offers this memorial fund in honor of Dr. Albritton. The Albritton fund is to provide scholarships for graduate students in the earth sciences and archaeology. Awards in the amount of $500 will be given in support of thesis or dissertation research, with emphasis on the field and /or laboratory parts of this research. Recipients of these awards will be students who: (1) are working on a Masters or Doctoral degree in the earth sciences or archaeology; (2) want to apply earth science methods to archaeological research; and (3) want a career in teaching and academic research. Information about these scholarships can be obtained from Reid Ferring, Institute for Applied Sciences, P.O. Box 13078, University of North Texas, Denton, TX 76203. Proposals should be sent to John Albanese, Chair, GSA Archaeological Geology Division Awards Committee, P.O. Box 1397, Casper, Wyoming 82602. (E-mail: albanes@trib.com). The deadline for receipt of proposals is May 1, 1999.

3. Jonathan O. Davis Scholarship Fund: This is a memorial fund for J. O. Davis, a well known Quaternary geologists and geoarchaeologist, who was tragically killed in an automobile accident in 1990. This scholarship is given annually to support the field research of a graduate student working on the Quaternary geology of the Great Basin or surrounding areas. The grant is $2000. For information contact: Executive Director, Quaternary Sciences Center, Desert Research Institute, P.O. Box 60220, Reno, NV 89506.

4. Geochron Laboratories Awards: Geochron, a division of Krueger Enterprises, Inc., annually awards a series of research grants to graduate students. The awards consist of analytical services that are provided free of charge. Awards are offered in several categories: K-Ar dating, C-14 dating, and stable isotope ratio analyses (SIRA), SIRA in dietary studies, and SIRA of fluid inclusions in minerals. The awards are offered by Geochron Laboratories to encourage the application of isotopic analytical techniques to solve original and significant research problems. The deadline for submission is May 1, 1999. For Research Award Program Guidelines and official rules write Geochron Laboratories, 711 Concord Avenue, Cambridge, MA 02138.

New Books

Two new, general books dealing with geoarchaeology have recently been published. These are: (1) Geoarchaeology: The Earth-Science Approach to Archaeological Interpretation, 1998, by George (Rip) Rapp, Jr., and Christopher L. Hill, Yale University Press; and (2) Geological Methods for Archaeology, 1998, by Norman Herz and Ervan G. Garrison, Oxford University Press.

New Web Site

The Archaeological Geology Division of the Geological Society of America now has a homepage thanks to the efforts of Bill Johnson. It has information about Division officers, Division bylaws, newsletters, award information, guide to graduate programs, annual meeting information, publications of interest, and a lot more. It can be accessed either through the GSA's web site at www.geosociety.org or at www.geog.ukans.edu/gsa/gsa.htm. This is a great site and Bill is to be congratulated. Be sure to bookmark this one.

New Geoarchaeology Group

A formal Geoarchaeology Interest Group has been established by the Society for American archaeology. Group memberships is already over 500 and has plans to hold a symposium and field trip at each annual meeting of the Society for American Archaeology. The first will be held next year in Chicago. For additional information contact Julie Stein (Jkstein@u.washington.edu) or Rolfe Mandel (mandel@falcon.cc.ukans.edu).

Laboratory Profile

Department of Ancient Indian History, Culture and
Archaeology and Museum of Himalayan
Archaeology and Ethnography
H.N.B. Garhwal University
Srinagar (Garhwal) U.P. India

Faculty

Adviser: Prof. K.P. Nautiyal Former Head of the Department (1978-1993) Presently Vice Chancellor HNB Garhwal University, Srinagar, INDIA Himalayan Archaeology, Protohistory, Field Excavation, Art and Iconography.

1. Vinod Nautiyal: D.Phil., 1983 (Garhwal), Professor, Palaeodietry studies using trace elements and Carbon Isotope analysis, Anthropogenic Soil Chemistry (Phosphate Analysis), Application of Computers Graphics in Archaeology in Pottery Drawing,Ethnoarchaeology

E-mail address:
Vinod@ugrh.ernet.in
vinod1@nde.vsnl.net.in

2. B.M.Khanduri: D.Phil. 1986 (Garhwal) Professor (Head of Department), Field Archaeology main Specialisation Himalayan Archaeology, Excavation Techniques,

3. R.C. Bhatt: D.Phil. 1988 (Garhwal) Sr.Lecturer, Himalayan Archaeology, Excavation Techniques.

4. S.S. Negi: D.Phil. 1983 (Garhwal) Sr. Lecturer, Himalayan Ethnography, Medieval Archaeology, Folk Traditions of Central Himalaya.

5. P.M. Saklani: D.Phil. 1995 (Garhwal) Lecturer, Ethnoarchaeology, Himalayan Pastoralism, Folk and Living Traditions.

6. Y. S. Farswan: D.Phil 1989 (Zoology), (Garhwal) Lecturer, Archaeozoology (Main Specialisation Palaeodite using trace elements), Instrumentation, (ICP Spectroscope, Atomic Absorption Spectrophotometry), Anthropogenic Soil Chemistry,

Technical Staff

1. Sudhir Nautiyal: Research Assistance, (1994) Computer Graphics, use of Optical Plotter for pottery Drawing, Data Base for Internet.

2. Mohan Naithani: Research Assistant (1996) Autocad Application for 3D Pottery Drawing, Multimedia.

3. R.S. Rawat: Photographer (1984) Archaeological Photographer, Field Technician, Excavated many remote sites in High altitude Central Himalaya.

4. K.S. Negi: Archaeological Assistant (1990) Field Excavation in Himalayas, Pottery analysis, stratigraphy.

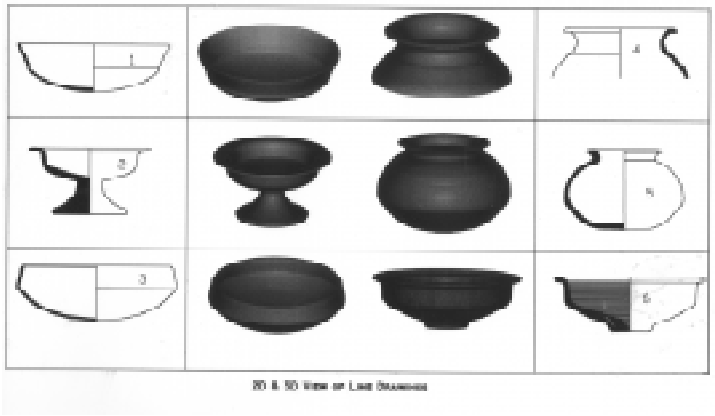
5. J.S. Negi: (1984) Sr. Draughtsman, Field contour mapping of Archaeological sites, Field Drawing of Excavated Structures.

6. R.S. Rawat: (1981) Curator Museum, Conservation Techniques for Antiquities Preservation, Display of Archaeological Ethnographic material.

Computer laboratory with Reflex metrograph and Autocad System

The department of Ancient Indian History culture and Archaeology was established in HNB Garhwal University, Srinagar U.P. India in 1976 with a modest beginning. During the last 20 years it has developed as one of the biggest departments of the University with 10 faculty members and other technical staff specialising in different branches of Himalayan Archaeology, Environmental Archaeology, Ethnoarchaeology, Living and folk traditions and related fields. The laboratory was established by Prof. Vinod Nautiyal under the overall guidance of Prof. K.P. Nautiyal. Now it has developed as a fullfleged laboratory which is well equipped with some of the latest equipments for analytical work. The department has recently established an AAS Lab for trace element analysis. The computer unit developed by the laboratory includes an optical plotter (Reflex Metrograph) imported from U.K. which is being used successfully for digitising and computerising the method of pottery drawing for the first time in the country. We have also made a breakthrough in using Auto-CAD for 3D graphics and regeneration of archaeological pottery drawings. The introduction of this new technique has opened a new field in the application of computers in archaeology.

The other areas of research being undertaken by this laboratory are specifically on palaeodiets and anthropogenic soil chemistry using analytical techniques. One of the major contribution of our work on phosphate enrichment of burial sites in Ramganga Valley in Central Himalaya, India has been rewarding (for details see *Journal of Archaeological Science* (1997) vol. 24: 251-258). Similarily the faunal and skeletal remains of protohistoric sites from Garhwal Himalaya have been analysed for trace elements and carbon isotopes (in other laboratories) for reconstructing the dietary shifts in different ecological zones in Himalaya. Dr. Y.S. Farswan has worked with Prof. T. Douglas Price in the Department of Anthropology, University of Wisconsin, Madison USA in 1994-95. He has been trained on the application of ICP spectroscopy. To further enhance our research activities it is also proposed to start and develop the technique of Gel-electrophoresis for isolating proteins in archaeological bones. Ethnoarchaeological investigations are being carried out in Yamuna valley in Garhwal Himalaya for specifically probing some of the complex issues of pastoralism in prehistoric times.



Drawings generated by optical plotter and Auto-CAD

Facilities

The Archaeological laboratory in housed in a small building of the department. The following facilities are available for Archaeometric analysis.

1. Spectronic-20 Spectrophotometer.
2. Microprocessor controlled Atomic Absorption Spectrophotometer (Chemito AAS-203).
3. Gel-Electrophoresis.
4. Analyser and Polarising Microscope.
5. Kjeldahl Nitrogen extraction Unit.
6. Flame Photometer.
7. Basic Pretreatment Laboratory equipped with Ultrasonic Bath, drying unit, fumigation chamber, muffle furnace, rotatory shacker, electronic microprocessor balance, centrifuge, distillation unit, digestion unit etc.
8. Computer Laboratory equipped with software driven optical plotter, Auto-CAD releases 13 and 14 for 3-D graphics.
9. Computers (Pentium 210 MHz, 32 MB RAM, 1.2 GB Hard Disc) with multimedia (five).
10. Photographic Unit equipped with latest still and video cameras for photography.

Owing to the achievements made by the department it is receiving special grants from University Grants Commission (UGC), New Delhi under the special assistance programme (SAP), Environmental Archaeology Programme and the state Government. The department has been identified as a major center of research in the country. The department has introduced Environmental archaeology as a special paper at Post-Graduate level. For the first time the laboratory practicals have also been introduced for the non- science background and also to attract students from other disciplines. The department also offers other programmes on Museology and archaeology at the undergraduate level.

Contributed by:
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CONFERENCE REVIEWS

International Council for Archaeozoology

Contributed by Jon Driver, Department of Archaeology, Simon Fraser University, Burnaby BC V5A 1S6 Canada

The 8th International Congress of the International Council for Archaeozoology was held for the first time in Canada at Victoria, British Columbia. Organized by Becky Wigen, the Congress brought together zooarchaeologists to discuss methods and results in a very congenial setting memorable for its fine weather and whale-watching excursions. Session topics included regional and temporal studies on the Middle East, the Mousterian, Mediterranean, Oceania, South Asia, Africa, prehistoric Europe, the Pleistocene/Holocene boundary, Arctic, and the Americas. Method and theory was covered by sessions on new directions in zooarchaeology, seasonality, age and sex, the study of ritual and ceremonial contexts, aquatic mammals, and a survey of world zooarchaeology. The most prominent theme of the conference was the study of domestic dogs, covered in a public symposium and a two day session on origins, regional variation and breed development organized by Susan Crockford, one of the conference co-organizers. A well-attended panel discussion on identification, quantification and interpretation produced some lively discussion. At a plenary session the history of ICAZ was reviewed by Anneke Clason, Arturo Morales and Elizabeth Wing, and future directions for the organization were discussed. With participants from more than 30 countries, this was indeed an international gathering and another very successful ICAZ meeting.

Patterns and Process: A Two-day Symposium in Honor of Dr. Edward V. Sayre

Contributed by Charles C. Kolb, Associate Editor

Patterns and Process: A Two-day Symposium in Honor of Dr. Edward V. Sayre was held at the Smithsonian Institution's Ripley International Center Auditorium in downtown Washington, DC on 21-22 September 1998. The symposium was sponsored by the Smithsonian's Center for Materials Research and Education (SCMRE), formerly the Smithsonian's Conservation Analytical Laboratory (CAL). Approximately 65 colleagues and friends honored Edward Vincent Sayre who for more than five decades has made outstanding contributions at the interface of science and the humanities, that have continued beyond his retirement from the Smithsonian Institution.

Sayre was born in Des Moines, Iowa in 1919, and took a B.S. in 1941, his Masters in 1943, and earned his Ph.D in 1949 – all in Chemistry. During World War II, Ed worked on the Manhattan Project (1942-1945), and afterwards was employed

as Research Chemist at Eastman Kodak, and taught at the Stevens Institute of Technology, New York University's Institute of Fine Arts/Conservation Center, and the American University of Cairo. He was Senior Chemist at the Brookhaven National Laboratory before becoming the Director of Research at Boston's Museum of Fine Arts in 1974. "Retiring" from the MFA in 1984, he joined the Smithsonian Institution's Conservation Analytical Laboratory before "retiring" again. As an inspired leader and colleague, he authored or coauthored 110 publications (1949-1985), including the landmark Sayre and Dodson paper, "Neutron activation study of Mediterranean potsherds," published in *American Journal of Archaeology* 61:35-41 (1957). In 1950 Ed was instrumental in founding the American Chemical Society's series publications on archaeological chemistry that were derived from the ACS's History of Chemistry symposia, and he also served as an associate editor of *Archaeometry*, *Journal of Archaeological Sciences*, and the Getty's *Art and Archaeology Technical Abstracts*.

Ed Sayre's contributions range widely from conservation science to analytical and technical studies of historic and artistic works, and his leadership in the effort to characterize archaeological objects has brought him international acclaim. His accomplishments also include formal and informal teaching that extended his influence well beyond his own meritorious research efforts. He has received international recognition and honors bestowed upon him by his peers in the sciences and in archaeology, and many individuals' careers have benefitted from his guidance, wise counsel, and honest, inspiring criticism. Ed's research involved the search for parameters and patterns to characterize ancient materials and their sources, but he left the explanations of the sociocultural processes responsible for the production and distribution of ancient objects to his social science and humanities collaborators – frequently archaeologists and art historians. Therefore, because he emphasized interdisciplinary research at the interface of chemistry and archaeology, his students, co-workers, and friends gathered to pay a tribute to Ed Sayre and his work. The organizers of this Festschrift symposium were Ronald L. Bishop and Lambertus van Zelst (both, Smithsonian Center for Materials Research and Education) and Julian H. Henderson (Department of Anthropology, University of Nottingham).

The symposium opened with a "Welcome" from Lambertus van Zelst (Director, Smithsonian Center for Materials Research and Education), who summarized Ed's accomplishments in chemistry and materials science and his international contributions to archaeometry. A presentation entitled "Ed Sayre: So far" by his long-time friend and colleague Frederick R. Matson (Emeritus Research Professor of Ceramic Engineering and Emeritus Research Professor of Archaeology, The Pennsylvania State University, University Park, PA), also celebrated Ed's career. Matson characterized Sayre as a bridge builder between science and archaeology, and as the founder of "The Sayre College of Analytical Knowledge."

Seventeen other papers were scheduled during the two-day symposium. I have summarized the salient points from each of these presentations, which are tabulated in the order in which they were presented.

"Integration of compositional analysis in archaeology" by Ronald L. Bishop, Daniela Triadan (both SCMRE), and M. Nieves Zedeno (Bureau of Applied Anthropological Research, University of Arizona, Tucson, AZ) was read by Bishop. In their paper, Bishop summarized the highlights of more than fifty years of Instrumental Neutron Activation Analysis, pointing out the interrelationships between science, archaeology, history, and art. Improvements in methodology, integration with archaeological research, an assessment of current techniques, and examples using ceramics were presented. Data from the Point of Pines site and from east central Arizona were shown to elucidate demography and migration patterns. However, Bishop contended that the archaeological use of characterization studies remains limited, and suggested that problems of interdisciplinary collaboration, the inherent complexity of compositional analysis, and a failure to integrate compositional studies within a broader perspective are constraining factors.

A paper entitled "A social history of archaeological materials characterization studies" by Marilyn P. Beaudry-Corbett (Institute of Archaeology, University of California at Los Angeles) reflected on the antecedents and present status of archaeological materials characterization studies. Beaudry-Corbett began her assessment by noting the methods initially employed in conservation science when the material object itself was emphasized rather than its sociocultural parameters. She also discussed the characterization of materials in cultural contexts, beginning with the American Chemical Society symposia in 1962. The writings of Dorothy Thompson, Sayre, Brill, Vandiver, and Shanks and McGuire, among others, were cited to differentiate multidisciplinary from interdisciplinary research. Advancing the multidisciplinary approach of science and archaeology, she stated, lies in the realm of education, and she contended that university faculty must do a better job of integrating the physical sciences with archaeology as a part of the academic preparation of the next generation of archaeologists.

"Crossing boundaries and reframing research agendas," a paper by Rita P. Wright (Department of Anthropology, New York University, New York, NY), was not presented due to illness. Wright's had indicated previously that she would consider ceramics as a primary indicator of culture contact in the Near East and western South Asia, and that she would comment upon the introduction of new analytical techniques (INAA, SEM, and electron microprobe) as tools to assess social and political variables.

The subsequent paper, "Problems and methods: Remembrances of some past source characterization studies" by Philip L. Kohl (Department of Anthropology, Wellesley College, Wellesley, MA) was read in Kohl's absence by M. James Blackman. Kohl reflected on the implications of collaborative research and how mineralogical variations within specimens of steatite and obsidian had archaeological implications. Sumerian sources, transshipment centers, and complex long-distance trade were considered. Shifts in the patterns of obsidian procurement were also noted, as were the successes of INAA and XRF in steatite analyses; he viewed XRF as a "flyswatter" rather than a finite approach.

"More than methodology: INAA and Classic Maya painted ceramics" by Dorie Reents-Budet and Ronald L. Bishop (both SCMRE) was read by the senior author. The Smith and Gifford ceramic type-variety system was reviewed, and the importance of stylistic analysis and chemical characterization were stressed. Several varieties of Maya buff polychrome ceramics dating to the Classic period (A.D. 250-850) were defined on the basis of INAA of pigments and slips. INAA has helped to identify the production locations of several painting styles and assists in the understanding of Classic period political geography, local distribution, and long-distance exchange or commerce. The technique verifies independently those groupings of similar vessels classified on the basis of stylistic attributes and is useful for Mayan scholars in developing models of sociocultural, political, and economic interaction.

"Chemical characterization of Arslantepe sealings" by M. James Blackman (SCMRE) documented an assemblage of 131 Anatolian clay sealings from the Uruk period that had been impressed with stamp seals or cylinder seals were evaluated by INAA. Three separate chemical groupings were defined, potential raw material sources were examined, and these data compared to five types of seal impressions and types of containers being sealed. "Bonded warehousing" was suggested whereby cloth bag cords or ties and ceramic jars with stoppers or cord ties were officially sealed. Clay plasticity was related to the seal types. Analyses showed that at Arslantepe a "clayey marl" was used for the sealings instead of the levigated clays utilized at other Uruk period sites. Therefore, a level of specialization not previously recognized was suggested.

"Modern measures of traditional Hopi pottery: Physical and behavioral sources of variation in Hopi pottery production and exchange, A.D. 1540-1980" by Veletta Canouts (United States National Park Service, Washington, DC) and Ronald L. Bishop (SCMRE) was presented by the former author. Chronological and spatial controls involved in the interpretation of polychrome ceramics from Antelope Mesa were considered. Major historic events (Coronado's 1540 incursion and missionization beginning in 1629), subsistence changes, transportation, and resource utilization are reflected in ceramic production. The so-called "decline" in ceramic form, decoration, and manufacture were evaluated. Fuel sources (coal and sheep dung) were assessed and firing tests conducted. Spanish and Mexican majolicas were also noted. The scale of ceramic production, shared technologies, and the covariance of technological and design attributes in historic assemblages were compared to Hopi pottery production and exchange.

"The dish-plate tradition at Palenque: Continuity and change" by Robert L. Rands (Center for Archaeological Investigations, Southern Illinois University, Carbondale, IL) and Ronald L. Bishop (SCMRE) was read by Rands. The distributions of selective groups of ceramics from Palenque, Mexico were evaluated in light of the chemical and petrographic analyses of pastes. Different ceramic shape classes (jars, dishes, cylindrical vases, etc.) do not undergo major changes in paste composition at the same time. The research reported emphasizes the dish as a single shape class. Among the variables reviewed were phytoliths, the substantial variations in local clays, lime-saturated water, and diachronic changes in rim form. Local rather than long distance trade is presumed.

"Usulutan decorated pottery and the southern frontier of Mesoamerica" by Frederick W. Lange (University of Colorado Museum, Boulder, CO), Erin L. Sears (George Washington University, Washington, DC), Ronald L. Bishop (SCMRE), and Roland H. Cunningham (SCMRE) was presented by Fred Lange. As part of the Greater Nicoya Ceramic Project, the authors considered the problems associated with local and imported ceramics and the importance of INAA. Distinct ceramic workshops and the "sociotechnological" techniques of production were also reviewed. The results of this research suggest that during the Mesoamerican Preclassic period ceramics fabricated in the Usulutan decorative style were exported to Lower Central America. The technology to manufacture the ware was also apparently transferred. "Imitation" Usulutan ceramic production implied either a motivation to emulate the pottery or the actual migration of potters.

"Data bases for the analysis of European ceramics in American archaeology" by Jacqueline S. Olin, M. James Blackman (both, SCMRE), and Gregory A. Waselkov (Center for Archaeological Studies, University of South Alabama, Mobile, AL) was read by Jackie Olin. Spanish and French majolica (tin-glazed ceramics) were compared with illustrations from seventeenth-century paintings from Seville. Specimens from Spain, Mexico, Guatemala, Panama, Ecuador, Peru, Venezuela, and the Dominican Republic were assessed. Chemical composition was used to identify new ceramic types. Mexico City white pottery, distinctive from Puebla (Mexican) majolica, was delineated. Olin pointed out how ceramic type names can inadvertently imply origins of production and she also commented that Spanish archaeologists have devised their own nomenclature that must be cross-referenced with New World studies. Olin suggested that chemical and typological classifications should be worked out simultaneously. French faience has not been studied adequately, but the preliminary studies of Waselkov's specimens (n = 114) from Old Mobile (1702-1711) already suggest numerous production loci.

"Microanalysis as a supplement to bulk chemistry in archaeological ceramic provenance investigations" by Hector Neff, James W. Cogswell (both, Missouri University Research Reactor, Columbia, MO), and Louis M. Ross, Jr. (Geological Sciences, University of Missouri, Columbia, MO) was presented by Hector Neff. Beginning with Sayre and Dodson's (1957) pioneering analysis, Neff and his colleagues demonstrate how paste preparation practices, compositional changes engendered by use, and/or post-depositional effects are reflected in bulk chemical compositional studies. SEM, EDS, and WDS analyses of examples from Cyprus and Guatemala were used to illustrate the modification of compositional groups, demonstrating how paste preparation and diagenesis can complicate source assessment. Microanalysis can be used to clarify the nature of the bulk chemical groups and contribute toward a better understanding of the archaeological significance of these groups.

"Total variation as a measure of variability in chemical data-sets" by Jaume Buxeda I. Garrigos (ERAUB, Department of Prehistory, Ancient History and Archaeology, University of

Barcelona, Catalonia, Spain) and Vassilikis Kilikoglou (Laboratory of Archaeometry, Institute of Materials Science, NCSR Demokritos, Attiki, Greece) was read by the latter author. Kilikoglou discussed the European GEOPRO integrated approach to ceramic analysis that involves a consortium of universities (Barcelona, Palermo, Sheffield, Nottingham, and Bonn), Epsilon Software, and the National Centre for Scientific Research (GR). The integration of geochemical and mineralogical techniques was seen as a "new" approach to the study of raw materials and archaeological ceramic provenance. Examples from production and consumption sites were assessed; distinctions were seen with XRF (24, major, minor, and trace elements) and INAA (17 minor and trace elements) – "high variations" in Pb and K in the former, and great variability in Na, Ru, and Ce in the latter. The development of a measure for the quantification of variability in chemical data-sets can provide an initial approach to the monogenic or polygenic nature of the ceramics being studied. The proposed measurement is "total variation" which results from the log-ratio "variation matrix" that was suggested initially by Atchinson (1986, 1992). Eight case studies, four XRF and four INAA, were considered.

"Discriminating power of mathematical techniques used in the Brookhaven Limestone Provenance Project: A test of the reliability of provenance attribution using INAA data and multivariate methodology" by Garman Harbottle and Lore Holmes (both, Brookhaven National Laboratory, Upton, NY, and The Metropolitan Museum of Art and the International Center of Medieval Art, New York, NY) was presented by Gar Harbottle. The ongoing Brookhaven Limestone Sculpture Provenance Project seeks to identify Medieval sculptures and the quarries from which they were derived. The research involves the analysis of 20-24 compositional variants for each specimen and the creation of a database (currently numbering nearly two thousand sculptures or quarry samples). The database differentiates provenance (original location or museum or collection) and origin (geological deposit). Trace elements in limestone derive from associated clays and can complicate the analyses. Examples from Caen, France were evaluated and variances in limestone from quarries with the same geological formation were considered. The Brookhaven multivariate programs used in the study were begun under the direction of Ed Sayre.

"Production, distribution, and control of silver: Information provided by elemental composition of ancient silver objects" was authored by Pieter Meyers (Conservation Laboratory, Los Angeles County Museum of Art, Los Angeles, CA). He stated that the characterization of ceramics, clays, and limestone were "easy" when compared to the complications presented by the compositional assessment of silver. Meyers also emphasized that cannot predict provenance from the silver artifact's composition. Examples of the analysis of specimens from the Byzantine Empire and the Sasanian Empire were presented. Complicating factors include the sources of the silver ore (native Ag or Pb versus AgCl, for example), intentionally added materials (Cu), silver ore impurities (Au and Ir), impurities from copper (As, Sb, Se, Sn, and Zn), and the inhomogeneous distribution of other elements (Na, K, Sc, Cr, Mn, Fe, Co, Ni, Br, and Hg). The criteria necessary for successful provenance studies were considered. Aegean, Anatolian, and Iran/Afghan (Bactrian) sources were differentiated, and that ICP-MS was a possible valuable assessment tool for future research.

"Lead isotope study of Chinese bronzes up to the end of the Shang" by William T. Chase (The Freer Gallery of Art and The Arthur M. Sackler Gallery, Smithsonian Institution, Washington, DC), Hirao Yoshimitsu (Department of Conservation Science, Tokyo National Institute for the Conservation of Cultural Property, Tokyo, Japan), and Jin Zhengyao (Institute for Research on World Religions, The Chinese Academy of Social Sciences, Beijing, China) was presented by Tom Chase. His multimedia presentation (slides, overheads, and dynamic computer graphics) included data and an assessment of Chinese bronzes from ca. 2000 B.C.-A.D. 1050. The earliest bronzes made in China have lead isotope ratios on the upper end of the Pb207/Pb206 scale, whereas later bronzes have ratios at the opposite end of the distribution. Differences in specimens from the same cast and crucible were noted, and a total change in lead source procurement was suggested for the later historic periods. Compositional studies can help to more firmly date some chronologies attributed to various specimens, such as the Sanxingdui (Sichuan Province) and Xingan (Jiangsi Province) specimens. The former site's dates are controversial but their affinity in lead isotopes with Xingan suggests a chronological contemporaneity with the Middle Anyang period.

"Glass recycling in antiquity? A technological reconstruction from Sardis" by Pamela Vandiver (SCMRE). The compositions of crown glass windows from the thirteenth-century A.D. Basilica E at Sardis in west central Turkey were compared to sixteenth-century glass bracelets. Vandiver noted that the recycling of materials had been common at Sardis (as an example, marble statues burned for limestone). Using SEM, she demonstrated that crown glass was ground, colorants and some calcium added, and dark-colored glass bracelets were fabricated from the recycled window glass. The thermal history was traced and the glass transition temperature was determined as 555 degrees C with a conversion of Alpha to Beta quartz at 573 degrees C. Pam noted that Sayre's article, "Compositional Categories of Ancient Glass," provided a starting point for her research.

"Ancient glass technology: Advances in cobalt blue and Islamic glass" by Julian Henderson (Department of Archaeology, University of Nottingham, University Park, Nottingham, UK). Henderson noted that Sayre's work laid the foundation for much subsequent research, and referred to Sayre and Smith's 1961 article in *Science* and studies by Brill (nd), Matson (1948), and Caley (1962) in order to place his own research into perspective. The use of plant ash or soda lime, the characteristics of a Syrian glass workshop, glass recycling, the production of lusterware, glass blowing and glass casting, and the manufacture of window glass were reviewed. Henderson presented the results of microprobe analysis and assessed examples cobalt blue glass from Roman, Medieval French, and Islamic contexts. He also determined that colorants were exported from the Islamic world to France.

A cocktail reception was held on Monday evening, 21

September 1998, and I had the honor and the pleasure of the company of Ed and Ginny Sayre, Gar and Naomi Harbottle, and Fred and Margaret Matson as tablemates at the dinner that followed that same evening. On Tuesday evening, the Sayres graciously invited the symposiasts and attendees to an open house at their new home located near Dupont Circle in Washington.

Bert Van Zelst announced that the Smithsonian Center for Materials Research and Education would undertake the publication of a Festschrift volume that would include the oral papers from the Sayre symposium as well as the contributions for former students and colleagues who were unable to attend. Ron Bishop will serve as the organizer of this effort, and a request was made that all contributions be submitted before the end of 1998 so that the papers could be assembled readily and published in 1999.

Book Reviews

Michael D. Glascock, Associate Editor

Traces of the Past: Unraveling the Secrets of Archaeology through Chemistry. Joseph B. Lambert. Addison-Wesley, Reading, Massachusetts, 1997. 319pp. $30.00 (cloth). ISBN 0-201-40928-3.

Reviewed by James H. Burton, Laboratory for Archaeological Chemistry, University of Wisconsin-Madison, Madison, WI 53706 USA

SAS Bulletin readers who have participated in archaeometric symposia of the American Chemical Society have likely questioned why the A.C.S. has archaeometry under the roof of its "History of Chemistry" division. In *Traces of the Past*, Joseph Lambert, the recent chair of that division, offers an explanation. *Traces* posits that what separates humankind from other species is the use of chemistry, humanity as "the chemical animal". Thus one can understand the past through the study of humankind's progressive use of chemistry to manipulate the environment and its materials.

While the human species as "the chemical animal" might be contestable, it is not offered as a proposition so much as an efficient heuristic scheme for a materials-oriented presentation of archaeological chemistry. Lambert partitions his subject in order of increasing chemical modification, starting with stone tools and soils and progressing through pottery, pigments, and glass to organic molecules and metals. He concludes with a thematic non-sequitur on the analysis of human remains themselves.

This "history of chemistry" theme works well within each of these sections to organize the technological developments chronologically. The chapter on pottery, for example, starts with early pottery from the eastern Mediterranean and progresses through the black color of Attic pottery through glazes and majolica to porcelain. "Colors" begins with ocher and other mineral pigments then moves through madder and indigo to Prussian Blue.

Nonetheless *Traces* is not simply another text on the history of technology. Lambert blends into the text a second theme, the "chemistry of history", i.e. the utility of archaeometric analyses for understanding these technological developments. For this Lambert draws abundantly from the proceedings of recent archaeometric symposia, from journals such as Archaeometry and the Journal of Archaeological Sciences, and from his experience as editor of *Archaeological Chemistry*. Lambert shows how chemical techniques can be used to address popular topics such as the Shroud of Turn, the Vinland Map, and mitochondrial Eve.

Rather than having an isolated section on techniques, *Traces* presents modern analytical methods within appropriate archaeological contexts, furthering the perspective of archaeometry as archaeology. One will find no detailed or separate discussions of mathematical methods, spectrophotometric principles, or organic nomenclature. The text uses terms with which some readers will be unfamiliar, terms such as "allele", "racemization", and "wootz", but a thirteen-page glossary covers much of this unfamiliar vocabulary.

Readability is strongly enhanced by an extraordinary number of illustrations, more than a hundred of which insure that one can hardly open the book without encountering graphical illumination. *Traces* includes more than a dozen color plates to portray Mayan frescos, Paracas textiles, the Lycurgus cup, and other examples for which line drawings would fail. Readability is further enhanced by omitting citations from the text itself and placing them in a nineteen-page collection of "Further reading", divided according to topic.

Although *Traces* could easily be used within an archaeology curriculum as an introductory survey of archaeological chemistry, the tenor of the text is aimed toward those more familiar with chemistry than archaeology. As such the text would be most appropriate within chemistry or material science programs. But a warning: although it is probably too late for our Bulletin readers, who have likely already succumbed to the siren's call of archaeology, this book could still be quite dangerous to physical-science students currently safely ensconced in a traditional career pathway in the physical sciences.

Bioarchaeology. Interpreting Behavior from the Human Skeleton. Clark S. Larsen, Cambridge University Press, 1997. xii + 461 pp., 10 tables, 60 figures (44 b&w photographs). $85 (hardback). ISBN 0-521-48641-1.

Reviewed by Elizabeth Miller, Department of Anthropology, California State University — Los Angeles, Los Angeles, CA 90032 USA

This volume was written as a result of Larsen's involvement in a series of interdisciplinary research programs in the Southeastern and Southern United States. Larsen is a

recognized authority on the subject of bioarchaeology, with several symposia, journal articles, and monographs (e.g. Larsen 1987; 1990a, b; 1994; Larsen and Milner 1994; Larsen and Ruff 1994; Larsen et al. 1996) to his credit; there is no doubt he has the credentials and expertise to prepare this informative, educational, and well-written synthesis of current information in the field of bioarchaeology. This volume, which represents to my knowledge one of the only comprehensive syntheses of bioarchaeological methods, techniques, and theory, will be useful both as a standard reference for professionals and as a textbook in advanced courses in bioarchaeology and the interpretation of human skeletal remains.

The book is divided into ten chapters, each focusing on a different aspect of bioarchaeology. The chapters are further divided into general sections and subsections; the format is easy to read and lends itself well to use as a textbook. The references cited will be useful in and of themselves to both students and professionals. All conditions and techniques are well-illustrated with examples from the literature and from the author's own research. The conditions are discussed within a social and temporal framework as well, giving even the beginning student reader insight into their importance in the understanding of archaeological populations. Basic knowledge of human skeletal anatomy is required for full understanding of this text. A familiarity with some medical terminology and the basic concepts of disease will make the text easier to comprehend, and will allow the reader to come away from the book with a better understanding of bioarchaeology.

The first chapter gives the reader a basic introduction to the field, along with a history lesson of its development. This introduction sets the tone for the remainder of the book — although the drawbacks of each theory and technique are given, the message is clear: bioarchaeology is an up-and-coming field of study, and archaeologists and physical anthropologists must be made aware of the benefits to the study of archaeologically derived human skeletal remains.

Chapter 2 begins the "meat" of the book, with a discussion on stress and deprivation during childhood, adolescence, and early adulthood. This chapter is concerned primarily with stress and deprivation during the growth process, and is divided into sections, including: Skeletal growth and development; dental growth and development; skeletal and dental pathological markers of deprivation; adult stress; and summary and conclusions. Subsections include topics such as: growth rates, cranial base height, long bone diaphyseal form, dental development rates, fluctuating and directional odontometric asymmetry, iron deficiency anemia (by far the longest subsection), dental micro- and macrodefects, and bone mass and histomorphometry

Chapter 3, titled "Exposure to infectious pathogens," is divided into the following sections: Dental caries; periodontal disease and tooth loss; nonspecific infection; and specific infectious diseases: trepanematosis, tuberculosis and leprosy. Again, each discussion is thorough and well thought out, and illustrated with many examples. Although dental caries is not often thought of in terms of a disease process, Larsen points out that it is, in fact, not the actual tooth lesion, but the process "characterized by focal demineralization of dental hard tissues by organic acids produced by bacterial fermentation of dietary carbohydrates, especially sugars" (pg. 65). Other conditions discussed in detail include periodontal disease, periostitis and osteomyelitis, and the three most common specific infectious diseases in the bioarchaeological literature, treponematosis, tuberculosis, and leprosy.

The fourth chapter, "Injury and violent death," includes the sections: accidental injury; intentional injury and interpersonal violence; medical care and surgical intervention; and interpreting skeletal trauma. The discussions of trauma are presented as case studies rather than as discussions of specific types of accidental and intentional injuries. Both accidental and intentional injury are discussed in a very general context first, and then specific injuries are discussed as part of case studies. While this may be the most efficient manner of presentation for Larsen's data, I must admit that I found this chapter wider ranging, but less informative, than the others. This criticism aside, Larsen does a good job with the case studies, bringing in a wide variety of information, from Neandertals to Sudanese Nubians to the American Plains. Trends in accidental and intentional trauma are discussed in both the social and temporal context. The section on medical and surgical intervention was rather short, but within the 2.5 pages devoted to the subject were 14 references, each of which the reader might use to find additional information.

By far, in my opinion, the most important section of this chapter was "Interpreting skeletal trauma," the last section before the summary. In this section, Larsen pulls together information presented in the previous sections, and gives the reader insight into how the raw information may be interpreted in a broader context. For example, he discusses a decrease in intentional trauma in the Tombigbee Valley of Alabama. The coincidence of the decrease in intentional trauma and an increase in dispersion of human settlement and increased political centralization may be interpreted to show that a reduced circumscription of the population may have had an influence on conflict in this setting. This example illustrates not only how trauma may be used to make observations on a population level, but also how culture and biology must be considered equally in bioarchaeological interpretation.

In Chapter 5, "Activity patterns: 1. Articular and muscular modifications," Larsen goes back to the format used in Chapters 2 and 3. Sections include: Articular joints and their function; articular joint pathology; nonpathological articular modifications; and nonarticular pathological conditions relating to activity. Osteoarthritis is discussed in detail, along with the arguments within the scientific community regarding the use of the term in describing skeletal changes without the ability to describe changes in soft tissue. Population patterns are discussed, and compared. Nonarticular pathological conditions related to activity are also given thorough consideration by Larsen, who includes in this chapter discussions of interpretations of cortical defects, enthesopathies, and stress fractures such as spondylolysis. Nonpathological articular modifications receive a more cursory treatment in this chapter. Only the behaviors of squatting and kneeling, and the skeletal changes associated with these behaviors, are discussed. The literature on nonpathological articular modifications associated

with specific behaviors is less well-known than that on enthesopathies and stress fractures; nevertheless, it was somewhat disappointing to see the rather superficial attention paid to the interpretation of behavior from nonpathological articular modifications.

Chapter 6, "Activity patterns: 2. Structural adaptation," begins with a thorough discussion of bone form and function, leading into sections on: Cross-sectional geometry; histomorphometric biomechanical adaptation; and behavioral inference from whole bone measurement. The author's strength in the area of cross-sectional geometry is obvious in this chapter, with 22 of the chapter's 31 pages devoted to the subject.

"Masticatory and nonmasticatory functions: craniofacial adaptation" is the title of the seventh chapter of Larsen's text. Sections include: Cranial form and function; dental and alveolar changes; and dental wear and function. All aspects of cranial and dental form and function are discussed well; the treatment of dental macro- and microwear is especially well-done, to the extent that there are five pages discussing the severity of occlusal surface wear versus interproximal wear in numerous populations, in addition to a discussion of occlusal surface wear patterning across time, space, and social systems.

Isotopic and elemental analysis are treated in Chapter 8, "Isotopic and elemental signatures of diet and nutrition." This subject is often the most difficult for students to understand, in my experience, yet Larsen's explanations are clear and concise. Isotopic analysis is separated by isotope, with subsections on stable carbon, nitrogen, strontium, and oxygen. Elemental analysis is separated into alkaline-earth elements (strontium and barium), multi-element analysis, and single-element analysis (iron, zinc, and lead). Methodological issues are treated somewhat lightly, with only one paragraph devoted exclusively to the topic, however, within each section methodological issues are also discussed.

Chapter 9, "Historical dimensions of skeletal variation: tracing genetic relationships," is primarily concerned with methods of establishing the relatedness of two or more skeletal populations. Sections include: Classes of biodistance data; biohistorical issues: temporal perspectives; biohistorical issues: spatial perspectives. For many bioarchaeologists, this information is among the most important, especially given the recent emphasis placed on the determination of biological affiliation made necessary by the Native American Graves Protection and Repatriation Act (NAGPRA) of 1990. The information is presented in a clear and concise manner by Larsen, and again, many examples are given, both on the large scale (New World population origins, Europe, South and Central Asia, for example) and a smaller scale (e.g., American Midwest, Great Plains). Especially interesting is the discussion of New World population origins. New and old data are presented in an unbiased manner, leaving it up to the reader to decide which of the conflicting theories to accept.

The tenth chapter, "Changes and challenges in bioarchaeology," is perhaps the most important chapter in the book. In this final chapter, Larsen takes the opportunity to discuss topics such as sample representation, data recording standards, and bioarchaeology and cultural patrimony. The idea of the osteological paradox, first presented by Wood and co-workers in 1992, is one that bioarchaeologists have hotly debated. And Larsen's final words, concerning NAGPRA and the impact of the law on bioarchaeology, seem to cover the tone of the entire text:

"The chance is now at hand for sharing this information widely, especially regarding the large and crucial part that human biology and bioarchaeology play in understanding the history of the human condition." Larsen, in this book, takes a big step in that direction.

To summarize, this work is a valuable addition to the libraries of skeletal biologists, archaeologists and bioarchaeologists, paleopathologists, and others interested in studying human remains from archaeological contexts with a bio-cultural perspective. Students will find the text relatively easy to read and comprehend, and will appreciate the emphasis on case studies in understanding the techniques, methods, and theories. Professionals will appreciate the extensive literature reviews Larsen incorporates into the text.

Geoarchaeology: The Earth-Science Approach to Archaeological Interpretation. George (Rip) Rapp, Jr., and Christopher L. Hill, Yale University Press: New Haven and London, 1998. xiii + 274 pp., 80 figures, 4 tables, 1 appendix, notes, glossary, bibliography, index. $40.00 (cloth), ISBN 0-300-07075-6; $22.50 (paper), ISBN 0-300-07076-4.

Reviewed by William E. Boyd, School of Resource Science & Management , Southern Cross University, Lismore, New South Wales 2480, Australia.

"Geo-archaeology implies archaeological research using the methods and concepts of the earth sciences. The term is not synonymous with archaeological geology, and it is not necessarily linked to geology....Geo-archaeologists dedicated to elucidating [environmental] contextual issues must be more than casual practitioners of applied science. They should be committed archaeologists....[G]eo-archaeology must extend its roots deep within archaeology, the better to serve the discipline." (K.W. Butzer, **Archaeology as Human Ecology** (1982), pp. 35, 42)

In this flurry of ideas (albeit somewhat condensed in the quote), Butzer encapsulates some of the dilemmas faced by practitioners of geoarchaeology. Archaeology, at one level, is about humans, human behaviour, and human culture. However, the evidence most frequently drawn upon is, in essence, geological. Geoarchaeology provides the medium through which to address the myriad of physical problems faced by archaeologists in their search for a soundly contextualised understanding of past human behaviour — issues of palaeoenvironmental and landscape context and evolution, sources of natural resources, their extraction, modification and deposition, site construction, metamorphosis and preservation, and so on. On the one hand, geoarchaeology is grounded in the earth sciences, and yet on the other, it is distinct and separate from them; to be effective geoarchaeology needs to be grounded within the archaeological domain, and yet it draws its vitality

from conceptions of landscapes and landscape analysis which lie beyond the constructions of archaeology. A geoarchaeologist must be geologist, geographer and archaeologist, probably with a healthy touch of palaeoecologist thrown in for good measure. To progress, Butzer finally called upon geoarchaeologists to "contribute actively towards implementing a contextual approach in training and research." (p.42). Geoarchaeology must indeed extend its roots deep within archaeology.

And this is where Rapp and Hill's textbook enters the scene. Here we have a full and nicely presented review of much of what geoarchaeology does. The book is a text book, aimed, according to the authors, first to archaeologists in the early stages of their careers, and secondly to geologists who may be involved in archaeologically-related problems. There is, of course, a broader anticipated audience — senior archaeologists, historians, anthropologists, ethnologists and Quaternary scientists. The text is structured (although not explicitly) around several themes: intellectual context and methods; the construction of the archaeological record; and geological process.

The intellectual context is set in the opening chapter, "Theoretical and historical overview", in which the problems of discipline definition (which, it should be noted, are often encountered in the related fields within the Quaternary sciences), are briefly aired: What are the relationships between geoarchaeology and archaeological geology, geoarchaeology and archaeology, and geoarchaeology and other environmental archaeological fields? What is the scope of geoarchaeology? And so on. While this discussion is most important, the authors manage it is a succinct manner, providing enough food for thought without getting too bogged down in it. Their approach to the discussion of these points, indeed, reflects the general tenor of the book. As a textbook presumably largely aimed at undergraduate university or college students, there needs to be a fine line drawn between the superficial and the overly complex: Rapp and Hill have to a large extent succeeded in achieving this. Returning to the issue of definition, the authors' conclusion that "geoarchaeology may best be considered a meeting ground where the full range of earth sciences is applied to artefactual evidence to infer past processes and events" provides, for me, a partially satisfactory evaluation of the scope of the discipline. While it begs the question of geoarchaeology as merely an applied science (or, by the definition above, just another term for "geology", or "Quaternary science"?), it still leaves open the issue of, what in my view, is the essential (but often absent) integration of geoarchaeology into archaeology. My concerns have long lain in the emphasis on method (the usual interpretation of the "full range of earth sciences") rather than on the intellectual integration of these earth sciences into the archaeological issue. To some extent this textbook continues this tradition, with a strong emphasis on the *geo*archaeology.

The two other themes identified above — the construction of the archaeological record, and geological process — overlap throughout the book. Whereas chapters 2 ("Sediment soils and the creation of the archaeological record"), 3 ("Contexts of archaeological record formation"), 5 ("Raw materials and resources"), 6 ("Provenance studies") and 9 "(Construction, destruction, site preservation, and conservation") overtly consider the creation of the archaeological record, the content is predominantly geological, and whereas there are passing references to archaeological example, these are relatively uncommon and generally not developed. Chapters 7 ("Estimating age in the archaeological record", which could have contained the oddly-placed and short (4 page) appendix, "Geological time divisions") and 8 ("Geological mapping, remote sensing, and surveying") are standard methods sections. Dating of archaeological and geoarchaeological materials is, of course, crucial, and with a rapidly expanding collection of available dating tools, it is helpful to review these. However, with the growth of methods such as ESR, TL and so on, issues of the non-equivalence of age estimates from multiple methods are increasingly becoming debated. While the examples used in this chapter showed what *can* be done with dating techniques, some discussion of the problems which arise when alternative dating methods do not agree would be most useful if not essential. Chapter 8 ("Geological mapping ...") is, to my mind, one of the most useful; the role that the most elementary of geological tools, field mapping, can play in archaeological studies, is, in my opinion, under-rated. This chapter illustrates the potential neatly, culminating in an example of the Holocene landscape evolution model of the Yellow River Plain. Using landscape are a medium, geoarchaeology has the opportunity to integrate fully into archaeology by providing a perspective which differs fundamentally from the archaeological perspective. In this way, it is possible to contribute details of environmental context (past, contemporary and future) (this is often the only expectation of geoarchaeology), but go further to consider analytical issues of the relationships between people and past landscapes, and to contribute the development of archaeological strategy by providing a full understanding of the dynamics and structures of the landscapes within which the archaeological record is lodged.

The broader palaeoenvironmental context is covered in chapter 4 ("Palaeoenvironmental reconstructions, humans, climates, and ancient landscapes"). Something of a catch-all, this chapter offers an introductory glimpse into the world of palaeoecology and climatology, and with less details, is something of a contrast to the other chapters. Given the importance of regional and global climatic change, the few pages on this issue and its relationship with human behaviour is surprisingly brief. All the more surprising is the absence of reference to El Niño or ENSO as a potential crucial climatic force in interpreting the prehistoric record throughout (at least) the circum-Pacific and Asian regions. This subject area of global and regional climatic reconstruction provides another opportunity where geoarchaeology may make some fundamental contributions to the archaeological construction of social and cultural change in antiquity. Without running an environmental determinist line, it is nevertheless clearly essential to understand the major palaeoenvironmental processes which have been operating throughout the Pleistocene and Holocene and demonstrably influences the course of human action. The Quaternary sciences are well able to provide the palaeoenvironmental reconstructions we may use in this context. However, it is the geoarchaeologist who has the advantage of an intimate archaeological perspective and knowledge allows

him or her to identify the critical indicators of environmental change, the very specific processes, barriers and thresholds, which may influence, hinder, advance or redirect the course of human action. By being able to integrate geological and archaeological perspectives, the geoarchaeologist has something quite unique to offer. Chapter 4 could have been the springboard for such discussion.

The text is unlikely to provide much new to geologists and Quaternary earth scientists, but does provide accessible overviews of the earth sciences for archaeologists. However, how to apply these earth science approaches to specific archaeological issues is less clear. This book is clearly more a source book than a handbook, and as such, performs the duty well. It is comfortable and accessible to read, well referenced and supported by a set of explanatory notes, a glossary and an extensive bibliography. The illustrations are clear and well annotated with usually long captions. Despite my reservations implied above, the text is most useful, and is one I am already recommending to my (geoarchaeological) students as a point of departure for specific issues. Undoubtedly I will continue to do so for some time to come, and I have no difficulty in recommending it to students and colleagues for purchase.

Principles of Geoarchaeology: A North American Perspective (Paperback Edition). Michael R. Waters. University of Arizona Press, Tucson, 1996. xxiv + 398 pp., 139 figures, 7 tables, bibliography, index. ISBN 0-8165-1770-3. $24.95.

Reviewed by Hector Neff, Missouri University Research Reactor Center, University of Missouri, Columbia, MO 65211 USA.

I found this book both extremely useful and enjoyable to read. The new, paperback edition is affordably priced, and I highly recommend it to both students and professional archaeologists.

Whereas some other books with "geoarchaeology" in the title cover such topics as dating, geophysical prospection, and provenance determination, Waters limits his coverage to sedimentology and pedology in Quaternary North American contexts. The latter contexts are, of course, of special interest because they contain the archaeological record most of us trained in North America will be studying. Chapter 2 should be required reading for every student during his/her first field class or field school. It succinctly describes processes of sediment accumulation and how sediments are described; what happens to sediments during soil formation and how to describe soils; and how to interpret stratigraphy as the result of sedimentological and pedological processes operating over time. The last part of Chapter 2 deals with landscape reconstruction and site formation processes, ending up with a brief synthesis of geoarchaeological investigations at the Lubbock Lake site; this example is extremely well chosen, for it effectively highlights all of the main topics covered in earlier sections of the chapter and demonstrates the importance of situating archaeological remains within their geological context.

Chapters 3 through 6 examine in more detail the various geological contexts in which the North American archaeological record is preserved. Alluvial environments (Chapter 3) are of special interest because humans have always made intensive use of the rich and varied biotic resources they contain. Eolian environments (Chapter 4); springs, lakes, rockshelters and caves, glacial deposits, and slopes (Chapter 5); and coastal environments (Chapter 6) likewise contain substantial remains of prehistoric and historic human activity. Waters succinctly describes how physical processes create landforms and how archaeological deposits accumulate in each of these environments. Examples are presented both within the text and in lengthy, informative captions to the numerous well-chosen figures.

Chapter 7 describes the processes that affect the integrity of archaeological deposits once they are buried. These processes include both physical processes (freeze-thaw cycles, shrinking and swelling of clayey soils, mass wasting on slopes, and deformation) and biological processes (root growth and decay, tree fall, and effects of burrowing animals). Again, illustrations are used effectively to clarify key points.

In Chapter 8, Waters briefly describes what geoarchaeologists do. He points out the differences between the geoarchaeologist's field and lab procedures and those of the archaeologist and argues for close interdisciplinary cooperation from research design through final report. I certainly endorse the need for integrating specialists with different skills into archaeological research. But what this book brought home to me most of all is how central geoarchaeology is to our field. Do we really just need more interdisciplinary collaboration, or might we also need curriculum changes that produce archaeologists with better backgrounds in earth sciences? Waters editorializes on the first need, and his book makes a solid contribution toward fulfilling the second.

Environmental Archaeology: The Journal of Human Palaeoecology. Coordinating Editor: Glynis Jones. Numbers 1 and 2 published in 1998 by Oxbow Books and the Association for Environmental Archaeology. Annual subscription rates: institutional £24; ordinary member £16; student member £8.

Reviewed by Zhichun Jing, Archaeometry Lab, University of Minnesota-Duluth, Duluth, MN 55812 USA

This new journal is the replacement for *Circaea, the Journal of the Association for Environmental Archaeology (AEA)* distributed mainly in England. The first issue, published in 1998, was for 1996 subscribers to the *AEA*; and the second issue, also published in 1998, was for 1997 subscribers. This new journal is still not published regularly, which may make it very difficult to circulate widely, particularly outside Britain and other European countries. The lack of a journal for environmental archaeology has limited the airing of many studies in environmental archaeology to a very narrow audience. Hopefully, this new journal of *Environmental Archaeology*

will act as a forum for not only British but also international scholarship in the field.

The first issue is subtitled *Fodder: Archaeological, Historical and Ethnographic Studies*, edited by Michael Charles, Paul Halstead, and Glynis Jones. It is a collection of papers presented to a symposium on *The Archaeology of Fodder* at the 1995 annual meeting of the Association of Environmental Archaeology in Sheffield, England. Most of the topics are devoted to the study of livestock feeding and its interactions with landscape and social changes. In its introduction an acclaim is made about the complementary use of different forms and classes of evidence, environmental *versus* cultural, on-site *versus* off-site, animal *versus* plant, macroscopic *versus* microscopic. But an emphasis remains heavily on the ethnographic observation and/or ethnoarchaeological study; only a few case studies involve the analyses of fodder-related material from archaeological context. However, this issue is indeed a timely attempt to summarize or introduce the approaches and methods in the study of archaeologically related fodder and its interrelationships with agricultural regimes and strategies.

Palmer illustrates the complex interactions between livestock holding and crop management for arable farmers in present day Jordan, and she emphasizes the interdependency of the factors that affect the decision-making in crop and animal husbandry. She demonstrates the utility of ethnographic observation in the interpretation of archaeological data. Using an example from Plikati, NW Greece, Halstead and Tierney also explore the potential of ethnographic observation of leafy hay collection and use in the interpretation of leaf-foddering evidence within archaeological contexts. Based on ethnographic evidence of crop processing, storage and use from the Island of Amorgos, Greece, Jones argues that the flexible boundary between food and fodder is of considerable significance to human survival and social differentiation as well as to the productivity in mixed farming economies. Anderson and Ertug-Yaras describe their ethnographic survey of modern dung fuel usage and botanical analyses of dung and fodder samples. Foxhall looks at the use of agricultural 'waste' products as fodder and the links between animal husbandry and agricultural residues in the early historical Mediterranean. Amorosi et al. use many lines of paleoecological evidence to address the role and nature of hay fodder in the farming economies of the Norse North Atlantic. The paleoecological sources considered in their discussion include animal bones, plant macroremains, invertebrate fauna, and pollen. Karg provides a case study of fodder pattern and animal diet using multiple forms of biological remains from the Bronze Age site of Fiave-Carera, northern Italy, including macroremains, pollen, twigs, and sheep/goat pellets. With particular reference to the charred plant remains recovered from the Bronze Age site of Abu Salabikh in southern Iraq, Charles explicitly discusses the taphonomy, recognition and interpretation of dung-derived material, and relates it to mobility and seasonality of livestock herding and the use of crop products and waste-products for animal as well as human consumption. Dental microwear analysis, the examination of microscopic tooth wear patterns, is a new technique to study livestock diet. Mainland's discussion on dental microwear analysis is definitely a breath of fresh air. She describes the diet-related dental microwear features in modern domesticated sheep and goats and their implications in the reconstruction of ancient animal diet.

The second issue includes research papers, short contributions and book reviews covering a variety of subjects, such as fishing patterns, the impact of crop rotation on weed composition, the recording of archaeological insect remains and their preservation, and the organization of bird bone collection for zooarchaeological study. In a short review article, O'Connor discusses the definition and aims of environmental archaeology as a multidisciplinary science. Like many others, he sees the difference between North American and European perspectives on the practice of environmental archaeology. Biological emphasis seems to be distinctively European while the environmental archaeology in North America is more concerned with the physical environment. The European tendency to focus on plant and animal remains are well reflected in many of the contributions to the first two issues of *Environmental Archaeology* as well as its predecessor *Circaea*.

Feeding Colonial Boston: A Zooarchaeological Study. David B. Landon. *Historical Archaeology* Volume 30, Number 1, 1996, Journal of the Society for Historical Archaeology. vii+153 pp. $12.50 (paper). ISSN 0440-9213.

Reviewed by Barry W. Baker, Department of Anthropology, Texas A&M University, College Station, Texas 77843 USA

While zooarchaeology has received increasing attention by North American prehistorians over the past 25 years, less emphasis has been placed on understanding the role of animals in historic contexts. Landon's study of faunal remains from colonial Boston provides an excellent example of the potential of historic faunal samples and the innovative methods that can be used to study them.

His analysis, constituting an entire issue of the journal *Historical Archaeology*, draws from four zooarchaeological assemblages from Massachusetts dating from ca. 1630-1825. Two of the assemblages were from sites within Boston, while two others were from farms located outside the city. Landon focuses on questions regarding the provisioning and distribution of meat within colonial Boston. He questions whether those animals supplied to the city from the rural areas represent a surplus, or market oriented production. The overall approach is refreshing and represents a departure from typical North American historic faunal analyses.

Landon takes a broad foodways approach, combined with innovative methodology and technical data collection (tooth sectioning and cementum increment analysis). He moves away from the typical emphasis in historical archaeology on ethnicity and socioeconomic status. Rather than focusing on a simple comparison of these urban and rural assemblages, Landon deals instead with the interrelationships of these areas to better understand how meat moved from the farms to the city. Through seasonality studies based on tooth sectioning, he identifies seasonal cycles of meat availability within the city, an issue

more commonly addressed for rural than urban settings. In contrast to many historical analyses that focus on the role of goods moving from the city to the rural areas, Landon turns this issue on its head, examining instead the role of rural production for urban consumption. This approach, emphasizing the interplay between rural production and urban consumption, is one that has great potential for future studies, and works well in Landon's study.

One of the strengths of Landon's work is his attention to detail. Based on his dissertation research, this work would have been much less meaningful and convincing had it been presented in the format of a shorter journal article. It represents an excellent model of zooarchaeological methods, and illustrates the benefits of pursuing multiple lines of inquiry in zooarchaeology. Landon is able to maintain this level of detail while still keeping sight of the bigger picture. He moves through and beyond the cautionary tale of many zooarchaeological reports to come full circle; critiquing approaches that are less useful, as well as drawing from those that are productive. He never tries to force the data, acknowledging when results are ambiguous.

Historical archaeology, of course, has the advantage of insight from written records. Landon is able to combine his biological and taphonomic analyses with such interesting discussions as who lived at the four sites being studied. We also learn that live goats were banned from Boston in 1642 because of their destructiveness, an important fact when attempting to learn the source of meats for the city. Landon also notes 17th and 18th century recipes showing that pigs heads were consumed, thus emphasizing that their cranial bones should not necessarily be regarded as butchering waste. These historical documents help provide a clearer picture of how animals were used in colonial Boston.

Among his conclusions, Landon convincingly argues that meat entering Boston represented rural surplus, rather than animals raised specifically for urban markets. This also suggests that the availability of meat in the city was influenced by the rural agricultural cycle. That is, different animals were available for consumption at different seasons of the year. Once within the city, exchange and distribution was relatively unspecialized. Meat portions entering the city and households were typically large, with further butchering occurring once the meat entered the home. Patterns of butchery between the rural and urban sites were very similar.

Major changes in this system of provisioning began in the late 18th and early 19th centuries when some farmers began shifting their emphasis toward market production. This coincided with the expansion and centralization of urban markets. The amount of home butchering in the urban setting decreased, while new carcass division and exchange patterns emerged.

Overall, this is a detailed, well executed study showing the multifaceted potential of faunal collections for addressing broad questions of economic systems in a historic context. It will be of interest to a wide range of archaeologists and historians and should be required reading for anyone working with historic North American faunal samples.

Every Living Thing. Daily Use of Animals in Ancient Israel. Oded Borowski, AltaMira Press, Walnut Creek, 1998, 296 pp., 57 figures, references, indices. ISBN: 0-7619-8918-8 $42.00 (cloth) or 0-7619-8919-6 $19.95 (paper).

Reviewed by Jonathan C. Driver, Department of Archaeology, Simon Fraser University, Burnaby BC V5A 1S6 Canada.

"Every Living Thing" is a well written account of the role of animals in ancient Israel. The intended audience is not zooarchaeologists, yet it offers useful data for zooarchaeologists working in the Near East and provides enough examples of the complexity of human/animal relationships to make it of general interest to all zooarchaeologists.

The book makes no pretensions to being heavily theoretical, but chapter 1 and the first part of chapter 2 lay out some theoretical considerations. Although parts of the book deal with wild animals, the book begins with a section on domestication, largely drawn from European archaeozoologists such as Ducos and Clutton-Brock. The social context of domestication (as discussed by Bender or Hayden, for example) is not considered, and domestication is seen largely as an economic response to the need to feed more people. This is surprising, because in later chapters Borowski clearly demonstrates the social importance of domestic animals.

Chapter 1 concludes with a brief guide to the potential and problems of zooarchaeology, drawn mainly from the textbooks of Davis and Hesse and Wapnish, and again emphasizing paleoeconomy. There is no discussion of the methodology of Biblical research or of the use of artistic representation, although both methods are used extensively when discussing the role of animals in ancient Israel. This suggests that Borowski's intended audience is composed on Biblical and Near Eastern scholars, who are familiar with the problems of using text and art in the interpretation of earlier cultures.

The first part of Chapter 2 is a discussion of the herding way of life, an important consideration for the history of Israel. Borowski defines three herding systems (nomadic, transhumant and sedentary) and shows how each can be identified in Biblical events. He also considers the attention and care required by domestic herds and flocks, and using Biblical examples notes the importance of the shepherd.

The remainder of chapter 2 and the next 5 chapters form the main body of the book. In each section Borowski defines a group of animals and discusses their use in ancient Israel. Data for each section are drawn from four major sources : archaeological material culture, zooarchaeological analysis, the Bible, and artistic sources. Recent history and ethnography of the Near East supplement these sources. For the reader who is not familiar with the region, there is a lack of basic information about the history and archaeology. A brief discussion in the preface did not provide much enlightenment to this reviewer, who had to go elsewhere to find out what period is covered by the biblical account of Israel. Once one understands the complex traditional history of the Israelites, from their origin in

Mesopotamia in the second millennium B.C.E. through slavery in Egypt, to the establishment and eventual defeat of the monarchy by the Babylonians in 586 B.C.E., it is easier to understand why Borowski draws so much of his data from Mesopotamian, Egyptian and Assyrian sources.

The chapter themes do not follow a standard zoological system, but reflect to some extent the Biblical classification of animals. This results in some overlap and inconsistencies. For example, Chapter 2 (on cattle, sheep and goat) is titled "Ruminants", but ruminants are also discussed in chapters on draft animals and wild animals. A chapter on "The Birds and the Bees" includes all winged animals, from bats to locusts, but rodents and lizards find their way into the insect section. "Water Fauna" includes fish and molluscs but not crocodiles, which are briefly mentioned in "Wild Animals". However, because the chapter themes are linked fairly convincingly to Israeli folk classification, they have an internal logic which makes the organization of the book effective. Furthermore, there are a series of useful indices at the end of the book which list animals, Hebrew names, and Biblical references, all linked back to the main text. If one is interested in a particular species, it is very easy to locate information in the text and to obtain references to mention of the species in the Bible.

Each chapter contains a wealth of information about the role of animals in the social, economic and ideological life of Israel and neighboring societies. Economic data refer to human consumption of animals and animal products, breeding and care of domestic animals, and methods for obtaining wild species, as well as the crucial role of animals in transportation. Social data include the role of animals in maintaining social position and wealth, the use of animals as war booty, and trade in exotic and commonplace species and their products. The ideological importance of animals is treated in a separate chapter, but discussion of animal symbolism and dietary laws pervades the other chapters.

For the zooarchaeologist who does not specialize in the Near East, the most useful feature of the book is the way in which it exemplifies the complex relationship between people and animals. This can be seen throughout the book, and the section on equids in the chapter on draft and pack animals will serve as a good example. Borowski discusses donkeys, horses, mules, camels and oxen. Draft animals are relatively rare in zooarchaeological collections, but were of great economic and social importance. Donkeys seem to have been the pickup trucks of ancient Near Eastern societies - widely used, well adapted to their surroundings, crucial to domestic economy, and providing little in the way of prestige to their owners. In contrast, horses were more difficult to look after, yet were prized for their use in war and may have had religious significance. The significance of these two species for the Israelites and their neighbors is demonstrated by texts, artistic representations and archaeological context. This is the sort of detail which cannot be achieved solely through zooarchaeological analysis, yet the differing roles of donkeys and horses in Near Eastern society must affect their presence in the archaeological record.

For specialists in Near Eastern zooarchaeology, this book provides a useful introduction to the role of animals in ancient Israel and neighboring cultures. It lacks a critical treatment of much of the data, and seems (to this reviewer's untutored perception) to take artistic and textual data too much at face value. For zooarchaeologists working in other areas, the book is a very readable case study of the complicated relationships between human society and domestic and wild animals, and should encourage us to direct our attention more to the social and symbolic implications of faunal assemblages.

The Archaeology of Human Bones. Simon Mays. Routledge, London and New York, 1998. xiii + 242 pages, 120 figures, 22 tables. Paperback: $32.99, ISBN 0-415-17407-4. Hardback: $99.99, ISBN 0-415-16621-7

Reviewed by Andrew Millard, Department of Archaeology, University of Durham, South Road, Durham, DH1 3LE, UK

When I heard that this book was coming out I assumed it would be something like a replacement for Brothwell's (1981) *Digging Up Bones*. It isn't that, but it is an excellent introductory text on what we can learn from human bones in archaeology, and how we go about doing it. Two introductory chapters discuss human skeletal anatomy and the nature of archaeological assemblages of human bones. Consideration is then given in the next six chapters to the methods and applications of ageing and sexing, metric and non-metric variations, bone and tooth diseases and injuries. The strength of these chapters, and indeed of the book as a whole, is the consistent use of examples to illustrate the outworking of the methods. There follow two chapters on chemical analysis and ancient DNA studies of bone, and a final chapter on cremation.

The archaeology of human bones is a welcome addition to the selection of books available on this subject. It fills a gap at the introductory level, where there a few texts which treat the methods, without giving too much detail for the novice, and then illustrate them with clear examples of their application. The collection of studies of population data is especially welcome, as previously I have had no compilation like this to which I could refer students. For my students taking their first lectures and practicals in human remains in archaeology during the last academic year, this book had become a popular text even before I could add it to reading lists or the library had obtained a copy.

With regard to my particular interests in bone chemistry I was also pleased to see chapters on chemical analysis and ancient DNA in bones integrated into a textbook on human remains. In terms of palaeodietary analysis, the principles and major applications of carbon and nitrogen stable isotopes are covered, and Sr/Ca ratios, with an emphasis on Sillen's solubility profile technique. Lead levels are given a cursory treatment, as are the problems of diagenesis.

A chapter on ancient DNA might be expected of a book like this nowadays, though after an explanation of the principles there are only three examples and a discussion of future directions from the perspective of 1996 (and that is already becoming outdated). Other biochemical analyses such as detection and use of proteins and lipids are not mentioned. The

final chapter on cremations seems out of place after two chapters which have moved from macroscopic to molecular analysis: perhaps it should have preceded them. The book ends with this chapter, in fact with a discussion of quantities of bone in cremation urns, which gives and abrupt end if one is reading the book as a whole. A couple of pages of afterword to round off the preceding 240 pages would not have come amiss.

Although overall I am positive about this work I do have some reservations. There are omissions of features which I expected to see at least given a mention in an introductory text of this scope. For example, in discussing sexing, two indicators which are pretty certain (though buy no means always present) are the pre-auricular sulcus for females and the penile root attachment for males; neither appear here. Discussion of elemental analyses of bone mineral focuses on Sr and Pb, with a mention (and dismissal) of Zn, and no mention of the wide range of other elements which have been analysed and interpreted with more or less success. The limitations of the discussion are indicated by the absence from the bibliography of the key volume edited by Price (1989).

There is a strong bias to English examples (the author is the Human Skeletal Biologist in English Heritage's Ancient Monuments Laboratory), and particularly to Mays' own work, including a number of his unpublished studies, notably the churchyard at Wharram Percy. I found it annoying that a textbook should use unpublished examples, as students cannot follow them up in the literature to gain a more detailed understanding of a method and its limitations. For example, there is an interesting and innovative comparison of stature and growth rates in children from medieval Wharram Percy, with 19th century and modern British growth data, but all we have is the outline of a methodology and its results, without the details of the data and without it having gone through a peer review process.

In general the photographs and drawings are excellent but a few are of lower quality. One that stood out as poor was fig. 3.13 showing age related changes in the pubic symphysis. The use of the same lighting for 3 specimens in one photograph does not bring out the surface morphology at all well. I shall still refer students to the wonderful photographs of this feature in Chamberlain (1994).

My final and strongest criticism of this textbook is that it is a classic example of 'pure' science divorced from any ethical implications or social involvements of that science. The excavation and study of human remains is a controversial issue in certain quarters and widely debated amongst archaeologists and anthropologists. However, I found no mention, let alone discussion, of issues of:

when and why we should excavate human remains; whether in principle we should study them (the implication of the preface is that there is no question "studying human remains is a central component of archaeological enquiry"); whether they should be repatriated, reburied, or stored; whether they should be displayed to the public. These are all questions which in recent years have loomed large in the minds of those of us who work with human skeletal material, whatever answers we give to them, and an introductory textbook is lacking without some consideration of them.

My review has majored on the weaknesses of this book, but I do find it very useful. It will be on my reading lists from now on, and I recommend it to those who, like me, have to teach some basic palaeopathology without having great expertise or active research interest across this field. The bibliography runs to well over 500 items and is a valuable resource in itself.

References

Brothwell, D. 1981. *Digging Up Bones*. London: Oxford University Press.

Chamberlain, A. 1994. *Human Remains.* London: British Museum Press.

Price, T.D. (ed.). 1989. *The Chemistry of Prehistoric Human Bone.* Cambridge: Cambridge University Press.

A Most Indispensable Art: Native Fiber Industries from Eastern North America. James B. Peterson, ed. University of Tennessee Press, Knoxville, 1996. xxii + 212 pp. 53 figures, 13 maps, 24 tables, contributors, index. Price $45.00 (cloth). ISBN 0-87049-915-7

Reviewed by Azriel Gorski, Laboratory for Fibers and Polymers, Israel National Police, Jerusalem 91906 Israel

The book is a monograph arising out of the perceived need by several of the contributors to correct a deficit of research and literature in the area. It is not a textbook. Nor does it address, in any depth, the methodologies for fiber identification. It is a source book of works dealing with fiber perishables in the archaeological record from eastern North America. As such it would be useful in courses concerned with the value, analysis and interpretation of fibers, fabric, basketry and their impressions. It would also be useful to researchers, archaeologists, anthropologists, ethnographers, conservators and others, and the material is presented so as to be understandable, useful and address their issues.

The chapters of the book are articles on independent topics, but they can be grouped into several broad areas of focus. One group presents chronological sequences of perishable fiber materials. Another group uses fiber perishables as a marker to define ethnic boundaries and migrations. There are also chapters that are not easily associated with either of the above two groups. The ungrouped chapters focus on things as diverse as the reconstruction of a culture from its perishable fiber artifacts and proper methods for the conservation of such artifacts. While the groups are discernible, they do not have strict boundaries, and each article stands as a complete work on its own.

Following is a list of the chapters and a brief summary of each:

Chapter 1. The Study of Native Fiber Industries from Eastern North America: Resume and Prospect. (Peterson) - This article is an introduction to the book and an overview of the area. It deals with the history of past research; methods and classification systems; the theory and anthropological significance of fiber industries; and the problems, directions

and tasks that need to be addressed in the future. It notes that while fabric and cordage may be mundane things, which have not previously been studied in depth, they contain a wealth of information about the people and therefore the culture by whom and in which they were used and produced.

Chapter 2. The Origin of Fiber Perishables Production East of the Rockies (Anderson and Adovasio) - A broad and extensive chronological study of fiber perishables from the Paleoindian (?-8000 BC) through the late Archaic (4000 - 1000 BC). It contains a wealth of detailed information and data, which can be the basis of future studies.

Chapter 3. Fiber Industries from the Boucher Site: An Early Woodland Cemetery in Northwestern Vermont (Heckenberger, Peterson, King and Basa) - The authors describe fiber perishables recovered from graves from a fairly narrow time period (800-100 BC). The collection is relatively large, containing 155 specimens. The fiber specimens are described; and cultural, religious and medical interpretations are ascribed. Inter-site and intra-site comparisons are made. Preferential preservation is noted; most of the found fiber remains were associated with copper. Other areas of the same skeleton are devoid of fiber remains. The need to consider this preferential preservation when doing intra-site comparisons, especially to different and drier climatic condition sites, is discussed.

Chapter 4. Inferring Behavior and Function from an Etowah Fabric Incorporating Feathers (Sibley, Jakes and Larson - A fabric fragment found in a burial is described. High status is inferred to the buried individual in part due to this fiber fragment. The methodology of the fabric analysis is presented. The cognitive processes involved in fabrication are discussed. The intended use and labor invested in the item are also considered. The placement of the fragment relative to the body is also discussed. Based on the above, the authors make inferences about human behavior

Chapter 5. Cordage Twist and Ethnicity (Maslowski) - The author discusses cordage and spin twist as represented in imprints on pottery from a number of sites in different areas. He found these features to be stable within a site. He also found that these patterns were more culture specific than pottery in defining archaeological complexes and phases

Chapter 6. Fiber Industries from Northern New England: Ethnicity and Technological Traditions during the Woodland Period (Peterson) - This article deals mainly with impressions of fibrous materials on pottery. The need to do this is illustrated by the fact that only 10 of 558 specimens from a wide range of sites are actual fiber specimens. The chapter's illustrations give the reader an appreciation and understanding of the actual specimens and terminology used. The potential for using fibrous material impressions on pottery to determine learning networks, cultural boundaries and migrations is discussed.

Chapter 7. Fiber Industries in the Upper Great Lakes: A Late Woodland Case Study from the Juntunen Site (Hamilton, Petersen and McPherron) - This article discusses the impressions of fibers on the upper one third of pottery from a site in the Great Lakes area in the period from 800 to 1400 AD. These markings were judged to be decorative and not to represent a functional use of cordage. The chapter is excellent in its definition of terms and in its description of the characteristics found. Its photographs were excellent and helpful. Inter-site and external correlations to the region are made and discussed. Conclusions made on ethnicity based on the fiber evidence are contrasted against such conclusions made on the basis of pottery. It was found that one supported the other. The comparisons were made based on coding the items, and the coding keys used are presented at the end of the chapter.

Chapter 8. A New Twist to an Old Tale: Analysis of Cordage Impressions on Late Woodland Ceramics from the Potomac River Valley (Johnson) - The author examines cordage/fiber markings left on pottery from a small geographical area. Specifically he looks at cordage spin and twist directions and correlates these to ethnicity. The patterns found are contrasted against previous hypothesis of ethnic intrusions or migrations into the area, and the findings discussed.

Chapter 9. Mississippian Textile Evidence on Fabric-Impressed Ceramics from Mound Bottom, Tennessee (Kuttruff and Kuttruff) - This article deals with fiber impressions on "salt pans" from a single site during the Mississippian period (900-1250 AD). Salt pans had a mundane use and were not expensive or ritualistic. Therefore, in looking at them we get a look at the "day to day" of the people of the period. The authors consider whether the markings are decorative or marks left by the process used to construct the pans

Chapter 10. The Role of Storage and Handling in the Preservation of Fibrous Materials in Museums and Other Repositories (Gardner) - This article could be described as a "do" or "how to" list for anyone dealing with ancient fibrous perishables. It is written in a common sense manner and uses commonly available materials. This chapter is written in simple terms, and is easily understood and followed by those without specific training in conservation. But, if its suggestions were followed, the amount of fiber perishables conserved in a usable fashion would jump exponentially. Those with a need for greater or more specific knowledge will find sources in the bibliography.

Chapter 11. Eastern North American Textiles: A Western Perspective (Fowler) - The author first summarizes the previous 10 chapters. She then provides and Appendix in which she summarizes like works and studies from Western North America. The reader, using the above two sections, may easily follow her comments and compare the work being done in these two geographical areas.

As a monograph the scope of this book is, by definition, narrow, but I would recommend it highly to fulfill two needs. The first is as a basic source book for courses dealing with the area. The second is as a basic reference to those who may come across ancient fiber perishables. The second group will find information on what can be and has been done with these materials, and recommendations as to how they should be handled and preserved.

I specifically saved comment on the bibliographies until now. I found the bibliographies, for the most part, to be extensive but dated. Most of the papers cited are 1990 or earlier. Having said that, I must point out that compilation of this volume was plagued with problems to include the untimely death of contributors and those who had promised contributions. I thank the contributors who persevered and add to it my special thanks to the editor for his perseverance and efforts.

Archaeological Ceramics (continued from page 1)

DSP (authored by Rigoir), Late Roman C ware (by Martin), lamps (written by Pabolini), amphorae (contributions by Keay, Arthur, and Pacetti, and others), and regionally-based articles on ceramics beginning with northern Italy. Clementina Panella prepared the conclusions. Additional information about this two-volume set is available from the publisher: Edizioni All'Insegna del Giglio, Via R. Giuliani 152 r., Firenze, 50141, Italy.

A volume entitled *Explaining Change in the Matt-Painted Pottery of Southern Italy: Cultural and Social Explanations for Ceramic Development from the 11th to the 4th Centuries B.C.* by Edward Herring was recently published as a number in British Archaeological Reports (Oxford, England: Archaeopress, British Archaeological Reports BAR S722, 1998. 255 pp., 176 illustrations [line drawings, maps, and photographs], ISBN 0-86954-899-6, *Pounds Sterling* 32.00). The author examines native Matt-Painted pottery from the Iron Age and Classical Southern Italy within the context of native social change and the relationships between the Greeks and natives. It is an attempt to move away from a purely typological approach to Matt-Painted pottery and to assess it within its cultural context, casting light on ceramic innovation and sociocultural development. Additional information may be obtained from the publisher by e-mail: bar@archaeopress.demon.co.uk The volume is available from Hadrian Books Ltd, 122 Banbury Road, Oxford OX2 7BP (telephone and FAX: +44(0)1865-311914). The North American distributor through which the volume may be ordered is David Brown Book Co., P. O. Box 511, Oakville, CT 06779; Telephone 800/791-9354, FAX 860/945-9468.

Published late last year is *Materials Analysis of Byzantine Pottery*, edited by Henry Maguire (Washington, DC: Dumbarton Oaks Research Library and Collection, 1997. vii +175 pp. 131 figures, 10 plates, 8 tables, 354 footnotes, and 15 references, ISBN 0-88402-251-X [hardbound, printed on alkaline paper], $75.00). This specialized volume contains nine papers, all but one of which had been presented at a colloquium held at Dumbarton Oaks, April 1-2 1995. The emphasis of these contributions is the analysis of glazed tiles from the collections of the Walters Art Gallery in Baltimore and at Dumbarton Oaks; a corpus of tiles at the museum at Sevres, France; sgraffito ware from Seres and Thesoloniki; and Zeuxippus ware from Italy. The authors of the papers include Armstrong and Hatcher; Gerard, Metzger, Person, and Soldini; Durand; Vogt, Bouquillon, Dubus, and Querre; Lauffenburger and Williams; Berti and Gelichi; Waksman and Spieser; Papanikola-Bakirtzis; and Wisseman, De Sena, Landsberger, Ylangan, Altaner, and Moore. The volume can be ordered through Dumbarton Oaks http://doaks.org/Publications.html. A review of this volume by Charles Kolb will appear in the 1999 issue of the *Journal of Roman Archaeology*.

The American Ceramic Society has announced the publication of *The Prehistory and History of Glassmaking Technology*, edited by Patrick McCray and W. David Kingery (Westerville, OH: American Ceramic Society, Ceramics and Civilization, Vol. VIII, 1998. 351 pp., ISBN 1-57498-041-6; $95.00 list price, $76.00 for ACerS Members [hardbound]). Collectively, the chapters in this volume consider the technical developments that took place in glassmaking, as well was associated social and cultural phenomena, for the period 3000 B.C. to A.D. 1800. Major topics include glass as a form of material culture, the technology of glassmaking, glassmaking and its cross-craft interactions with other technologies, and ancient and historical glassmaking in its social and historical contexts. Further information may be obtained from The American Ceramic Society, P.O. Box 6136, Westerville, OH 43086-6136, telephone 614/794-5890, FAX 614/794-5892, e-mail: accounting@acers.org (Order Code CC08). The ACerS website is accessible at: http://www.acers.org

The American Ceramic Society is also the publisher of technical serials including *Journal of the American Ceramic Society* (monthly print and annual CD-ROM versions), *Ceramic Bulletin* (12 issues per year), *Ceramic Engineering and Science Proceedings* (5 issues per annum), and the annual *ceramicSOURCE 2000*. For ceramic artisans and craftspersons, ACerS also publishes *Ceramics Monthly* (10 issues per annum), a new magazine *Pottery Making Illustrated* (4 issues per year), and *Potters Guide 1999* (published annually). Additional information may be obtained by e-mail: customersrvc@acers.org The potters' journals have their own websites: http://www.ceramicsmonthly.org and http://www.potterymaking.org

Conferences

EMAC '99, the Fifth European Meeting on Ancient Ceramics: Modern Trends in Research and Applications is scheduled for 18-10 October 1999 in Aghia Paraskevi, a suburb of Athens (11 km from the center of the city). This conference is organized by the Laboratory of Archaeometry, Institute of Materials Science, National Centre for Scientific Research "Demokritos," Aghia Paraskevi, 15310 Attiki, Greece. The Organizing Committee includes Y. Maniatis, V. Kilikoglou, C. Michael, G. Vekinis, A. Hein, and E. W. Faber. The meeting will include formal presentations and discussions on some recent developments in the field of ceramic studies. The official language of the meeting will be English. Special emphasis will be given to the integrated approaches of scientific and archaeological/typological methods. The organizers also encourage the submission of papers with a sound interpretation of scientific data as well as contributions on methodology.

The organizers plan to group together the oral and poster presentations on specific topics, and the oral presentation will include invited or review papers "on subjects that are likely to generate speculation (debate)." Five topics have been proposed: 1) Chemical, physical, and mineralogical characterization for provenance and technology: 2) methodological considerations; 3) studies of kiln materials and the reconstruction of kiln function; 4) handling data; and 5) developments on dating. The proceedings of the meeting will be published. Additional information about the submission of abstracts (hardcopy and electronic versions must be submitted) may be obtained by e-mail: emac@cyclades.nrcps.ariadne-t.gr, telephone +30-1-6503392, FAX +30-1-6519430, or by writing to: EMAC 99, c/o Laboratory of Archaeometry, Institute of Materials Science,

N.C.S.R. Demokritos, Aghia Paraskevi, 15310 Attiki, Greece. The deadline for the receipt of the abstracts is 31 May 1999. A "First Circular" may also be obtained at the address listed above.

"Mesoamerican Ceramic Figurines, Too: More Interpretations" is the title of a symposium organized by Charles C. Kolb (National Endowment for the Humanities) and Cynthia Otis Charlton (Independent Scholar) and submitted for the Society for American Archaeology Annual Meeting to be held in Chicago, 24-28 March 1999. Kolb will also chair the session. Papers will be presented by James J. Sheehy; Warren T. D. Barbour; Kim C. Goldsmith; Lisa M. Montiel; Janet Montoya; Sue Scott; Jan Olsen, Michael Smith, and Elizabeth Dipippio; Charles C. Kolb; and Cynthia Otis Charlton. An open discussion will follow the presentations.

"The 15th Conference on Clay Mineralogy and Petrology of the Czech and Slovak National Clay Group" was held 6-9 September 1998 in Brno, Czechoslovakia. Approximately 250 persons from twenty countries attended. The Conference Chairman, Petr Sulovsky (Department of Mineralogy, Masaryk University, Brno), created a website for the conference (http://www/sci.muni.cz/~sulovsky/15clays.html). The site includes "General Information," "Conference Program," "Papers Presentation," and a link to the abstracts of the papers presented at this meeting.

Ceramics on the Listserves

"CERAMICS-L," an Archaeological Ceramics Discussion List, was formed on 17 February 1998 by Tom Brunton, a Graduate Student at State University of New York at Buffalo. This list was developed for the scholarly discussion of all aspects of archaeological ceramics. Topics include all time periods and geographic areas in order to foster cooperation and the exchange of ideas across the discipline. Likewise, discussion is encouraged on all subjects related to ceramics, ranging from technology to style. To subscribe, send a message to LISTSERV@LISTSERV.ACSU.BUFFALO.EDU. with no message in the subject line, but with the following message in the text: <SUB CERAMICS-L Your First-name Last-name>.

"ARCH-L," an archaeology list owned by David L. Carson (Anthropology Department, Texas A&M University), currently has more than two thousand subscribers in fifty countries (1,476 are from the United States, 110 from Canada, and 109 from Great Britain). Archaeological ceramics are among the topics considered. Subscriptions may be sent to LISTSERV@LISTSERV.TAMU.EDU. leaving the subject line blank, but with the following message in the text: <SUB ARCH-L Your First-name Last-name>. Log files of past ARCH-L postings are available on the web at http://listserv.tamu.edu/archives.arch-l.html.

"CLAYART," the Ceramic Arts Discussion Group, is a forum for the discussion of issues relating to clay and ceramics. This moderated listserve is particularly useful to art potters in academia, private studios, and galleries, but the postings include such topics as aesthetic issues, technical problems and solutions, exhibition opportunities, workshops and seminars, conference information, reviews (exhibitions, books, and videos), job announcements, and grant information. The list moderator is Joe Molinaro, Associate Professor of Art, Eastern Kentucky University; the co-moderator and Ceramics Web Coordinator is Richard Burkitt, Associate Professor of Art, San Diego State University. Subscriptions may be sent to LISTSERV@LSV.UKY.EDU. leaving the subject line blank, but with the following message in the text: <SUBSCRIBE CLAYART Your First-name Last-name>. All messages are automatically archived and the CLAYART database is accessible at LISTSERV@UKCC:INFO DATABASE. The San Diego State University has some selected CLAYART archives available at their "CeramicsWeb" URL: http://apple.sdsu.edu/ceramicsweb/ceramicsweb.html

"PotteryInfo" is a new website announced on 3 March 1998 by Marshall Talbott. He reports that this website features bulletin boards "with the potter in mind." Although like CLAYART the site is designed for the art potter, the website bears watching since archaeologists can learn a great deal from contemporary art potters and practicing artisans. The website URL is: http://www.PotteryInfo.com. The 12 bulletin boards include: Kilns and Kiln Building, Raku and Pit Firing, Glazing Techniques and Finishes Other than Fired, Glaze Composition — High Fire, Glaze Compositions — Medium and Low Fire, Firing Schedules and Techniques, Workshops/ Conferences/ Exhibitions/Fairs, Business of Clay, Equipment Recommendations and Supply Sources, Wanted and For Sale, Claybodies, and Production Methods. Marshall can be reached at "Pottery by Celia," Route 114, P. O. Box 4116, Naples, Maine 04055-4116, Telephone 207/693-6100, and by e-mail: clupus@ime.net.

Ceramics on the Web

The December 1997 issue of *Antiquity* (Volume 71, Number 274) includes a "Special Review Section: Electronic Archaeology" (1997:1026-1075) that our readers will find informative. Electronic archaeology centers on the Internet (text files, e-mail, file transfer, and Telenet) and its hypertext- and graphics-capable arm, the World Wide Web (WWW); it also includes CD-ROM and its successors, and electronic archives. Sara Champion and Christopher Chippendale wrote an introduction and authored several of the 12 essays. The topics considered (and their authors) include a survey of archaeology on the WWW (Sara Champion), *Internet Archaeology* as an electronic journal (Julian D. Richards, Alan Vince, and Sandra Garside-Neville), electronic journal publishing (Stephen Harnad), scholarly publishing (Mike Hayworth), electronic communication (David L. Carlson), listserves (John G. Younger), electronic archiving (Harrison Eitljorg II), CD-ROMs (Dominic Powlesand and Phil Perkins), print and electronic journal publishing (Elizabeth Peachey and Chris Chippendale), and a case study on ancient Egypt (Lynn Meskell). This issue and other numbers of *Antiquity* are also accessible at: http://intarch.ac.uk/antiquity/. I suggest the following URLs to colleagues interested in ceramics.

ArchNet

"ArchNet," a virtual library for archaeology from the University of Connecticut (see "Archaeology's Virtual Library" by Jonathan Lizee, *Archaeology and Public Education* 8(1):3,

1998) contains links to archaeological ceramics at the URL: http://www.lib.uconn.edu/ArchNet One of the 14 subject areas listed is "Ceramics: pottery and ceramic artifacts" which currently contains nine catalogues, papers, and reports. Among these are: 1) "Hypertext Glossary of Ceramic Attributes" (authored in 1995 by Jonathan Lizee, Tara Prindle, and Thomas Plunkett, which considers technological attributes, morphology, and surface treatment and stylistic attributes); 2) "Type Catalogue of Prehistoric Ceramics from Southern New England" (also authored by Lizee, Prindle, and Plunkett); 3) "Medieval Pottery Research Group" (a link to an excellent website, http://www.pmiles.demon.ac.uk/mprg.htm, which details the purpose, activities, conferences, and publications of the group, and has a collection of "nacent" Medieval Potterty links); and 4) "A picture gallery of ceramics from the Osmore drainage, Peru" (prepared by Bruce Owen in 1996). The papers and reports include: 5) "Clay Acquisition and Vessel Distribution Patterns: Neutron Activation Analysis of Late Windsor and Shantok Tradition Ceramics from Southern New England" (authored by Jonathan M. Lizee, Hector Neff, and Michael D. Glascock, which appeared in *American Antiquity* 60(3):515-530, 1995), 6) "Cross-Mending Northeastern Ceramic Typologies" (by Lizee with Prindle and Plunkett, a paper revised in 1995 but presented initially at the 1994 Annual Meeting of the Northeastern Anthropological Association); 7) "Céramiques traditionnalles du Mali" [in French, "Ceramic Traditions of Mali"] (prepared by the Mission Archéologique et Ethnoarchéologique Suisse en Afrique de l'Oueste); and 8) "The Ruins at Rione Terra in Pozzuoli" (an analysis of the Roman occupation). Of particular significance is a ninth link, "Pottery and Pigments of Arizona: Salado Polychrome." This detailed paper, prepared by Arleyn W. Simon, was originally presented in 1996 at the symposium "Revelations Beneath the Surface: The Science of Art," and is also accessible through Arizona State University's website at http://archaeology.la.asu.edu/VM/sw/salado/title/HTM.

ARGE: Archaeological Resource Guide for Europe

ARGE, the Archaeological Resource Guide for Europe, a "Virtual Library for European Archaeology," was begun in 1995 at the University of Birmingham, UK, but has recently moved to the University of Groningen, The Netherlands, and is currently accessible at http://www.odur.let.rug.nl/ARGE/. The founder and webmaster is Martijn van Leusen. This important, award-winning website, is an indexed and ordered collection of nearly 1,100 hypertext links from 38 countries pointing to current archaeological communication and information resources across Europe. Database searching and text only access are provided on an experimental basis, but multilingual access and searching are currently being assessed. The homepage Navigation Bar includes 13 categories; among the more significant are: Geographical Index (40 countries, Albania to the Vatican); Thematic Index (92 major subjects spanning Academic Departments to Virtual Reality); Chronological Index (15 periods, including four undifferentiated eras such as "prehistory"); Search Page (under construction but designed for string searches of database links); ArchNet (discussed above); and Notice Board (conference announcements, requests for information, and new publications. A more extensive review of this URL, prepared by Charles C. Kolb, will be published later this summer in *CHOICE: Current Reviews for Academic Libraries*.

The ARGE Thematic Index includes seven hotlinks to "Ceramic Studies." These include: 1) "Frechener Keramik" (a report, in German, authored by Hans Mommsen, A. Hein, and D. Kleine which is entitled "Charakterisierung der keramikproducte der frechener töpfereinen durch neutronenaktivierungsanalyse," and concerns the neutron activation analysis of 13th-18th century Frechen pottery). 2) "Medieval Pottery Research Group" (noted above at http://www.pmiles.demon.ac.uk/mprg.htm.). 3) "Roman Ceramics" (information maintained on Roman and Samian wares and Banassac figurines by Allard Mees at the Römisch-Germanisches Zentralmuseum in Mainz). 4) "The Life and Times of Late Roman Ceramics (350-650 AD)" (a dissertation proposal by Sebastian Heath). 5) "Mit Neutronen auf den Spuren der Kelten" (a paper, in German, on neutron activation analysis of Iron Age ceramics). 6) "The Amphoras Project" (a site maintained at the University of Toronto, http://www.epas.utoronto.ca/amphoras/project.html, which contains detailed information on plain, unglazed storage and transport containers from the Mediterranean region. This URL also includes bibliographies, literary passages, translations of Russian research, other links, and a searchable database). 7) "Musées de Basse Normandie: Les poteries du Pé-d'Auge" (a website on French Medieval and post-Medieval ceramics).

Teotihuacan Notes

Saburo Sugiyama (Arizona State University) is responsible for a significant, award-winning website, "Archaeology of Teotihuacan, Mexico." Sugiyama, along with his colleague and mentor, George Cowgill, and Mexican colleague, Rubén Cabrera C., have conducted major excavations and explorations within the Classic period Feathered Serpent Pyramid located in the Ciudadela at Teotihuacan. General information about Teotihuacan (chronology, maps, major structures, and bibliography) and the Feathered Serpent Pyramid are accessible on the website at http://archaeology.la.asu.edu/VM/mesoam/teo/. "Teotihuacan Notes I: Images and Symbols in Social Contexts at Teotihuacan," edited by Saburo Sugiyama and Debra Nagao and published by the Department of Anthropology at Arizona State University, contains papers from a 1997 workshop, "Teotihuacan Archaeology and Iconography." Eight papers are scheduled for publication in Teotihuacan Notes I, of which five currently are available at the website http://archaeology.la.asu.edu/VM/mesoam/teo/notes/index.htm. Pottery and clay figurines are the subject matter of a majority of the papers whose authors include Sugiyama and Nagao, James Langley, Edith Ortiz, Rubén Cabrera C., Cynthia Conides, Warren T. D. Barbour, and Destiny Crider.

Archaeology on the Net: Web Ring

A web ring, "Archaeology on the Net," has recently been formed. Tumay Asena, Ring Manager, archonnet@hotmail.com and tumay@ug.bcc.bilkent.ed.tr, welcomes visitors and provides the following definition: "A web ring is a chain of sites linked to

each other with next and previous type of logos used in all participating sites. This allows the participating site to get visitors from each other thus providing the surfer an easy navigation tool on the net. [this ring] ... covers a broad range of subjects and is open to [the] participation of archaeology-related sites on the Internet." By early January 1998 there were more than 45 ring member sites. Site 011 is Roman Ceramics (Allard Mees). The web ring home page may be accessed at http://members.tripod.com/~archonnet.ring.html, visitors are welcome at http://members.triposdcom/~archonet.html, while participants can join at http://members.tripod.com/~archonnet.join.html

Rob Tykot's Website and Bookmarks

Robert H. Tykot (Department of Anthropology, University of South Florida) has compiled an excellent set of links to other websites, many of which have connections to ceramic materials and archaeological pottery. Among the categories he has devised are: Agencies & Foundations (12 sites); Excavations and Employment (10); Geographic Regions and Topics (over 100 links, sorted into categories including Archaeological Science, Human Origins, Fantastic Archaeology, Malta, Sardinia, Florida, North America, etc.); Journals (62); Libraries and Information Resources (30); Laboratories and Services (29); Museums (31); Organizations (28); Publishers (26); Software & Hardware (25); Travel (22); and Universities (15). The website may be accessed at http://luna.cas.usf.edu/~rtykot/Rob's%20bookmarks.htm

MASCA

The Museum Applied Science Center for Archaeology (MASCA) is the technical division of the University of Pennsylvania Museum of Archaeology and Anthropology in Philadelphia and was established in 1961. Current research on ceramic materials by Patrick E. McGovern may be found on MASCA's webpage under "Archaeoceramics" and "Archaeochemistry." The URL is: http://MASCA.museum.upenn.edu/.

Bibliographies

"Ceramic Analysis: Course Bibliography" was compiled by Barbara Mills and Kelley Hayes-Gilpin for Anthropology 652 [1991-1994] at Northern Arizona University. The URL is: http://taylor.anthro.umt.edu/syllabi/bib0002.htm.

"A General Samian Bibliography," prepared by Bridget Röder and Allard Mees in 1994, is accessible through http://archweb.leidenuniv.nl/anadecom/TS.htm. The authors hold a "copyright" on this 29-page document.

"Roman Ceramics in Northern France," a 21-page bibliography compiled by Fréderique Loridant, also has a copyright, and is also located at the University of Leiden website http://archweb.leidenuniv.nl/anadecom/N_FrBIBL.htm.

An "Ethnoarchaeology Bibliography," dated September 1997, was compiled by Nicholas David, Department of Archaeology at the University of Calgary, and contains entries on ceramic materials. The URL is: http://www.ucalgary.ca/UofC/SS/ARKY/e-abib97.html.

Pottery Museums

"The Museums of the Potteries" is a website maintained by the City of Stoke-on-Trent, England, that provides links to four pottery museums: The Potteries Museum and Art Gallery, The Gladstone Pottery Museum, Etruria Industrial Museum, and Ford Green Hall. The site is accessible at: http://www.stoke.gov.uk/museums

Japanese Ceramics

A URL that emphasizes ethnographic and contemporary Japanese ceramics may be accessed at: http://www.princeton.edu/~mpitelka/ceramics.html. The site features "A Brief History of Takatori Ware," "Japanese Ceramic Terminology," "Japanese Ceramic Links" (23 subjects), "Ceramic Hubs" (11 links), "Exhibitions" (22 URLs)," "Publications" (four popular works are linked: *Ceramics Art and Perception*, *Ceramics Monthly*, *Ceramic Review*, and *Studio Potter*), and "Miscellaneous" (15 links).

Rob Varman's Website

Dr. Robert V. J. Varman, and archaeologist and heritage consultant affiliated with the Department of Archaeology, University of Sydney, New South Wales, Australia, has established a valuable website which documents ceramic, glass, and metal artifacts from excavations in sites dating to the era of British Colonial Australia. Among the entries are artifacts from the Phillipsburgh site dating to the 1790s as well as ceramics from two long-drop privy pits from Kingston, Norfolk Island, NSW, dating from 1840-1880. As of 10 May 1998 more than one hundred images had been incorporated into the website, including illustrations and descriptions of Chinese Export Porcelain, English Creamware (Queensware), English earthenwares, Basalt ware, Comb ware, Incised ware, terracotta, salt glazed stoneware, and kaolin pipes. Ceramics from the 1840-1880 period include a variety of transfer-printed wares: Willow Pattern, Asiatic Pheasant Ware, Abbey Ruins and Castles, Patterned Cups and Saucers, Scenic Mugs, Plain Mugs, Chamberpots, and miscellaneous ceramics. Rob Varman continues to add images and text to the website. The color images are superb and the site is worth a visit even if one is not interested in ceramics from the historic era. The URL is most readily accessed through: http://www.geocities.com/Paris/LeftBank/6559/; type "Varman" in the search window.

Nautical Archaeology

The Nautical Archaeology Program at Texas A&M University has an elaborate and extensive website with a number of significant links that will be of interest and use to our readers: http://nautarch.tamu.edu. Of particular note are the Archaeological Preservation Research Laboratory and the Conservation Research Laboratory, accessible, respectively at: http://nautarch.tamu.edu/APRL/APRLWEB.htm and http://nautarch.tamu.edu/NAPCRL.htm. Dr. Donny L. Hamilton, head of the Nautical Archaeology Program and Director of the Conservation Research Laboratory, has made available his syllabus for Anthropology 605, Conservation of Archaeological Resources, on the WWW. The site also including a set of 18

conservation files containing significant information about archaeological conservation, adhesives and consolidants, the conservation of 17 categories of material culture (bone, wood, textiles, iron, gold, etc.); File 4, "Conservation of Pottery," and File 5, "Conservation of Glass," are especially useful summaries. The syllabus and the conservation files may be accessed through: http://nautarch.tamu.edu/class/ANTH605/File0.htm.

Conservation Research Laboratory Report No. 1, "Ceramic Firepots," documents the recovery of earthenware containers that were filled with combustibles and used as incendiary weapons during the sixteenth and seventeenth centuries. These artifacts were excavated during the Institute of Archaeology's Mombasa, Kenya Project; the report is available directly from the URL:http://nautarch.tamu.edu/CRL/firepots.htm. A report about the tinglazed earthenware recovered during the Port Royal, Jamaica Project may be accessed directly at: http://nautarch.tamu.edu/portroyl/delftware.htm.

Institute of Archaeology

The Institute of Nautical Archaeology (Egypt), College Station, Texas, has a URL that contains a report by Cheryl Haldane Ward entitled "Chinese Export Porcelain in the Red Sea." The report describes porcelains recovered from the Sadana Island Ottoman-period shipwreck. Interesting chronological implications are documented, suggesting that some of the ceramic pieces were manufactured "nearly a century later than scholars had expected some of the pieces to be made" (1755/6 and 1764 C.E.). Visit this website is at: http://www.adventurecorps.com/porcelain.htm.

Corning Museum of Glass

The Corning Museum of Glass (One Museum Way, Corning, NY 14830-2253) has an excellent website devoted to the history and manufacture of glass. The homepage contents include "A Resource for Glass," "Glossary of Glassmaking Terms," and "Curators' Choice" among 14 major topics. The resource component, designed for pedagogical purposes, contains 37 topics, many of which present archaeological or historical information and the properties of glass. Among the topics that are documented are volcanic glass, Egyptian inlay, the discovery of glassblowing, types of glass, glass vs. pottery/porcelain, glass in the Far East, glassmaking tools, glass chemistry, and the properties of glass (with separate sections detailing mechanical, electrical, optical, thermal, and chemical data). The glossary is also notable. Frank Starr, Corning's Education coordinator (e-mail: cmgeduc@servtech.com.) notes that the museum encourages the use curricular use of these resources – many would be useful for courses in material culture, materials science, and archaeological methods. The museum's URL is http://www.pennynet.org/glmuseum/corningm.htm.

Munsell System of Color Notation

The Munsell System of Color Notation, well-known to archaeologists and ceramics specialists, is a subject of a website established by the the parent company, GretagMacbeth. Information useful for instructional purposes includes the history and development of the Munsell system, an introduction to color, current work of the Munsell Color Laboratory, assessments of viewing conditions, descriptions of the specialized books of color, spectrographic equipment, product literature, services, seminars, and press releases. Munsell and GretagMacbeth are well worth a visit at their website: http://www.munsell.com/munsell1htm.

Petrology on the Web

For those colleagues who are interested in structural geology, mineralogy, petrography, and ceramic thin-section analyses, microprobe analysis, databases, and journal and book literature, the following websites will be of interest and are worthy of a visit:

Structural Geology and Metamorphic Petrology on the WWW

"Structural Geology and Metamorphic Petrology on the WWW" is a site hosted by the Canadian Tectonics Group and maintained by Jurgen Kraus, a doctoral student at the University of New Brunswick. Kraus has English, German, and Japanese versions of this website. There is an extensive Table of Contents, including Structure and Tectonics Groups, Metamorphic Studies Groups, Earth Science Groups, Employment Opportunities, and Upcoming Meetings. Subcategories include Listserves, Databases, Thin Sections, Journals, Courses, Glossaries, Tools, Earth Science Departments, Geological Surveys, Cooperative Research Centres, Computer Software, and Computer Animations, among others. http://craton.geol.brocku.ca/guest/jurgen/struct.htm

Structural Geology on the Web

"Structural Geology on the Web" was created and is maintained by Steven H. Schimmrich, currently Assistant Professor of Geology, Calvin College, Grand Rapids, MI. His site has 13 categories of hypertext links: 1) Data sets and Bibliographies, 2) Structural Images, 3) Computer Software, 4) Plate Tectonics, 5) Commercial Products, 6) Books and Journals, 7) Professional Organizations, 8) Research Groups, 9) Upcoming Meetings, 10) Academic Groups, 11) Courses and Field Trips, 12) Academic Employment, and 13) Structural Geologists. http://home.earthlink.net/~schimmrich/structure/structure.html

Links for Mineralogists

This site was created by Klaus-Peter Kelbers at the University of Wurzburg's Mineralogisches Institut Wurzburg. The Table of Contents Includes: What's New on Links for Mineralogists, Links for Mineralogists (with three groups of subtopics), Tools (also with three sets of subtopics), and Contact (three groups of subtopics). These subtopics include: Materials Science and Ceramics, Gemmology, Mineral Descriptions, Minerals in Thin Section, Geochemistry, Geophysics, Geostatistics, Microscopy, Photography, Museums, Geoscience Institutions, etc. The website is located at: http://www.uni-wuerzburg.de/mineralogie/links.html.

Minerals

"Alphabetical Mineral Reference" from the University of Wisconsin at Madison's Department of Geology is a 48-page summary of the formula and characteristics of nearly five hundred minerals. http://www.geology.wisc.edu/~jill/glossary2.html

"Minerals Chemistry" provides links to "Journals" (n = 10), "Resources" (n = 20), "Research Groups" (n = 2), and "Societies" (n = 10). http://www.netaccess.on.ca/~dcb/cic_hamilton/mineral.html

"Athena Mineralogy" is a site maintained by Pierre Perroud, Department of Mineralogy at UNIGE, that provides links to databases on the following mineral topics: Alphabetical List, Systematic List, Elements, Sulfides, Halides, Oxides, Carbonates, Sulfates, Phosphates, Silicates, Organic Minerals, and Varieties and Synonyms. There is also a "Mineral Search" as well as "Mineral Pictures" at this site. http://un2sg4.unige.ch.athena/mineral/mineral.html

Virtual Atlas of Opaque and Ore Minerals in their Associations

"Virtual Atlas of Opaque and Ore Minerals in their Associations, a site sponsored by the Society for Mining, Metallurgy, and Exploration {SME]," is maintained by Robert A. Ixer and Paul R. Duller, Department of Geological Sciences, Birmingham University, England. This extensive and very useful website has an Introduction (Home Page, Overview, Introduction, Site Map, Authors, and Ordering), Main Menu (Associations, Countries, Locations, Minerals, Mineralogy, Plates, Properties, References, and Textures), and General (Gallery, Other Sites, and SME). The site provides 400 full-color microphotographs of the major ore-forming associations and opaque minerals in non-mineralized rocks. The atlas is also available from the authors in hardback print format or on CD-ROM. http://www.smenet.org/opaque-ore/

Metamorphic Petrology

"Metamorphic Petrology" was created and is maintained by Dave Waters at Oxford University. The site has ten categories of URL links: 1) List of Petrological links (n = 4), 2) Organizations and Institutions (n = 6), 3) Petrology Journals (n = 7), 4) Petrology Research Groups (n = 5), 5) Hard Rock Researchers' Home Pages (n = 2), 6) Petrological Topics and On-line Posters (n = 4), 7) Special Topics (thermobarometry, low grade metamorphism, microstructure, granites, and fluid inclusions – n = 19), 8) Review Papers and Reports (n = 2), 9) Images of Metamorphic Rocks and Minerals (optical petrography, microprobe and SEM imaging – n = 6), and 10) Course Materials for Metamorphic Petrology (n = 4). http://www.earth.ox.ac.uk/~davewa/metpet.html

Mineralogy and Petrology Research on the Web

"Mineralogy and Petrology Research on the Web" is maintained by Andrea Koziol, Geology Department, University of Dayton, Dayton, OH. The nine categories of URL links include: 1) Journals (n = 36), 2) Publishers (n = 6), 3) Topic-Oriented Sites (n = 15), 4) Mineralogical Databases (n = 4), 5) Professional Societies (n = 20), 6) Laboratories, Surveys, and Other Organizations (n = 13), 7) "Research Groups" (n = 27), 8) "Mineral Collecting and Commercial Sites" (n = 5), and 9) Basic Resources (n = 13). http://www.udayton.edu/~geology/resminpet.html.

Science, Technology, and Cultural Heritage

"Science, Technology, and Cultural Heritage" is a website located in the Department of Crystallography, Mineralogy, and D. M. at the University of Barcelona, Spain. English, Castellano, and Catala language versions of the site are available. Interdisciplinary research studies to characterize material culture are reported, including archaeometric investigations on Medieval Pottery of the Islamic Tradition, Study of the Reductive Processes in the Silicate Ceramics (by Trinitat Pradell) and Mineralogical Evolution and Interaction of the Ca-Rich Pastes with Pb Glazes: Archaeometric Implications (by Judit Molera). http://www.ub.es/rpat/patlong.htm

Geoscience WWW Sites

"Collection of Interesting Geoscience WWW Sites" is maintained by Petr Sulovsky. http://www.sci.muni.cz/~sulovsky/mineralogie.html

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New Publications

New Series from Springer: Natural Science in Archaeology

Age Determination of Young Rocks and Artifacts. Physical and Chemical Clocks in Quaternary Geology and Archaeology, by G.A. Wagner. 1998. xviii+466 pp., 177 figs., 9 tabs. Springer, ISBN 3-540-63436-3. $89.95 (cloth).

Archaeological Ceramic Materials: Origin and Utilization, by B. Velde and I. Druc. 1998. approx. 255 pp., 136 figs., 38 color, 6 tabs. Springer, ISBN 3-540-64469-5. DM 169 (cloth).

Tar, Pitch and Jet. Archaeometrical Analysis of Organic Pyrolysis Products, by Ruthenberg. In preparation.

Painting and Painting Materials in Ancient Egypt, by El-Goresy. In preparation.

Archaeometallurgy, by Bachmann and Pernicka. In preparation.

New Journals

Discover Archaeology, edited by J.D. Leach. SAS members are specifically invited to contribute to this new bimonthly about the latest discoveries in archaeology and archaeological science. First issue January/February 1999 website: http://www.discoverarchaeology.com; email: editor@discoverarchaeology.com

Environmental Archaeology: The Journal of Human Palaeoecology, edited by Glynis Jones. Oxbow Books. ISSN 1461-4103. website: http://www.shef.ac.uk/~ap/envarch/ See review of the first two issues on pp. 14-15.

European Journal of Archaeology, edited by J. Chapman. Sage Publications. ISSN 1461-9571. email: info@sagepub.co.uk

Meetings Calendar

Susan Mulholland, Associate Editor

* = new listings; + = new information for previous listings

1999

Jan. 5-6. Recent Advances in Quaternary Biostratigrapy. Cambridge, UK. Danielle Schreve, c/o Dept. of Palaeontology, Natural History Museum, London SW7 5BD, UK; tel: 0044-0171-938-9258; fax: 0044-0171-938-9277; email: D.Schreve@nhm.ac.uk.

Jan. 5-10. 1999 Society for Historical Archaeology conference on Historical and Underwater Archaeology. Salt Lake City, Utah, USA. Theme: Crossroads of the WEst-19th Century Transportation, Mining, and Commercial Development in the Intermountain West. Don Southworth, Program Coordinator, Sagebrush Consultants, L.L.C., 3670 Quincy Ave., Suite 203, Ogden, UT 84403, USA; tel: 801-394-0013; fax: 801-394-0032; email sageb@aol.com

* Jan. 7-14. Second International Conference on the Inspiration of Astronomical Phenomena. Malta. R.E. White, Steward Observatory, University of Arizona, USA; tel: 520-621-6528; email: rwhite@as.arizona.edu; web: ethel.as.arizona.edu/~white/insap.htm.

Jan. 10-14. World Archaeology Congress 4. Cape Town, South Africa. Theme: Global Archaeology at the Turn of the Millennium. Carolyn Ackermann, WAC4, Congress Secretariat, PO Box 44503, Claremont 7735, South Africa; tel: 27-21-762-8600; fax: 27-21-762-8606; email: was4@globalconf.co.za; web: http://www.uct.ac.za/depts/age/wac

+ Symposium on Genetics in Archaeology.

+ Symposium: Origins, Spread and Significance of Maize Agriculture in the New World

* Jan. 19-21. Applications of Remost Sensing and GIS for Disaster Management. Washington, D.C., USA. Greg Shaw, George Washington University VA Campus, 20101 Academic Way, Suite 220B, Ashburn, VA 20147-2604, USA; tel: 703-729-8271; fax: 703-729-8272; email: glshaw@gwu.edu; web: www.gwu.edu/~cms/gis/

* Jan. 24-29. 23rd Conference on Composites, Adv. Cermamics, Materials and Structures. Cocoa Beach, Florida, USA. American Ceramic Society, PO Box 6136, Westerville, OH 43086-6136, USA; email: customersrvc@acers.org; web: www.acers.org

* Feb. 13-18. Glacial-Interglacial Sea leve Changes in Four Dimensions: Quaternary Sea Leves, Climate Chang & Crustal Dynamics. Algarve, Portugal. Josip hendekovic, Europoean Sicence Foundation, 1 quai Lezay-Marnesia, 67080 Strasbourge Cedex, France; tel: 33-3-88-76-71; fax: 33-3-88-36-69-87; email euresco@esf.org; web: www.esf.org/euresco

* Feb. 18-19. 4th International Acoustic Micro Imaging Symposium (IAMIS). San Diego, California, USA. Sonoscan, 530 E. Green St., Bensenville, IL 60106, USA; email: info@sonoscan.com

* Feb. 21-26. GEOSAS-III: 1999, Third South Asia Geological Congress. Lahore, Pakistan. F.A. Shams, Institute of Geology, Punjab University, Lahore 54590, Pakistan; tel: 92-42-586-6809; email: geology1@paknet1.ptc.pk

* Mar. 1-3. 13th International Conference and Workshops on Applied Remote Sensing. Vancouver, British Columbia, Canada. ERIM Geologic Conferences, Box 134008, Ann Arbor, MI 48114-4008, USA; tel: 734-994-1200 ext. 3234; fax: 734-994-5123; email: wallman@erim-int.com; web: www.erim-int.com/CONF/conf.html

Mar. 12-13. National Council for Preservation Education 2nd National Forum. Towson, Maryland, USA. Theme: Multiple Views, Multiple Meanings. Michael Tomlan, Project Director, National Council for Preservation Education, 210 W.Sibley Hall, Cornell University, Ithaca, NY 14853, USA; tel: 607-255-7261; fax: 607-255-1971; email: mat4@cornell.edu.

* Mar. 24-28. 64th Annual Meeting of the Society for American Archaeology. Chicago, Illinois, USA. LuAnn Wandsnider, Program Chair, Dept. of Anthropology, University of Nebraska, 126 Bessey Hall, Lincoln, NE 68588-0368, USA; tel: 402-472-8873; email lwand@unlinfo.unl.edu.

* Apr. 5-9. Material Research Society Spring Meeting. San Francisco, California, USA. Materials Research Society, 506 Keystone Dr., Warrendale, PA 15086-7573, USA; tel: 412-779-3003; fax: 412-779-8313; email: info@mrs.org; web: www.mrs.org

* Apr. 20-25. 58th Annual Meeting of Society for Applied Anthropology. Tucson, Arizona, USA. "Constructing Common Ground: Human and Environmental Imperatives." Offices of the Society, P.O. Box 24083, Oklahoma City, OK 73124, USA; tel: 405-843-5113; fax: 405-843-8553; email: sfaa@telepath.com; web: www.telepath.com/sfaa.

* Apr. 25-28. 101st American Ceramic Society Annual Meeting. Indianapolis, Indiana, USA. American Ceramic Society, PO Box 6136, Westerville, OH 43086-6136, USA; email: customersrvc@acers.org; web: www.acers.org

May. 1999 International Rock Art Conference. Ripon College, Ripon, Wisconsin, USA. Deborah Morse-Kahn, Regional Research Consortium, Minneapolis MN, USA; tel: 612-925-0749; email: deborah@pclink.com; web: http://www.pclink.com/cbailey

* May 16-20. 2nds International Mammoth conference. Natuurmuseum Rotterdam, The Netherlands. Natuurmuseum Rotterdam, PO Box 23452, NL-3001 KL, Rotterdam, The Netherlands; fax: 31-10-436-43-99; email: mammoth@nmr.nl

* May 26-28. Geological Association of Canada-Mineralogical Associate of Canada Joint Annual Meeting. Sudbury, Canada. P. Copper, Dept. of Earth Sciences, Laurentian Univesity, Sudbury, Ontario P3E 2C6, Canada; tel: 705-675-1151 x2267; fax: 705-675-4898.

* June 20-24. Coastal Sediments '99: Scales of Coastal Sediment Motion and Geomorphic Change. Long Island, New York, USA. Nicholas C. Kraus, USAE Waterways Experiment Station, Coastal & Hydraulics Laboratory (CEWES-CC) 3909 Halls Ferry Road, Vicksburg, MS 39180-6199, USA; tel: 601-634-2016; web: www.coastalsediments.org

* June 21-24. Fourth International Airborne Remote Sensing Conference and Exhibition. Westin Hotel, Ottawa, Ontario, Canada. ERIM Airborne Conferences, Box 134008, Ann Arbor, MI 48113-1008, USA; tel: 734-994-1200 ext. 3234; fax: 734-994-5123; email: wallman@erim-int.com; web: www.erim-int.com/CONF/conf.html

* June 26-July 1. Clay Minerals Society 36th Annual Meeting. Purdue University, West Lafayetter, Indiana, USA. Patricia Jo Eberl, Clay Minerals Society, PO Box 4416, Boulder, CO 80306, USA; tel: 303-444-6405; fax: 303-444-2260; email: peberl@clays.org

* June 28-July 2. 9th International Symposium on Nondestructive Characterization of Materials. Sydney, Australia. D. Manley, Ctr. For Nondestructive Evaluation, 102 Maryland Hall, Johns Hopkins University, Baltimore, MD 21218, USA; email: cnde@jhu.edu; web: www.cnde.com

Aug. 3-11. XV INQUA Congress 1999. Durban, South Africa. Theme: Enviornmental Background to Hominid Evolution in Africa. Mrs. E. Aucamp, PO Box 798, Silverton, Pretoria 0001, South Africa; fax: 27-12-8411221; email: eaucamp@geoscience.org.za; web: inqua.geoscinece.org.za

+ Symposium on Global Carbon Cycle Changes, Aug. 10.

* Aug. 22-26. Annual meeting, American Chemical Society. New Orleans, Louisiana, USA. American Chemical Society, 1155 16th St. NW, Washington, D.C., USA; tel: 202-872-4600; web: www.acs.org

Aug. 23-29. 8th International Congress of the International Council for Archaeozoology. University of Victoria, Victoria, British Columbia, Canada. ICAZ '98, Conference Management, Division of Continuing Studies, University of Victoria, PO Box 3030, Victoria, BC V8W 3N6, Canada; email: ICAZ@uvcs.uvic.ca; web: http://www.uvcs.uvic.ca/conferce/archzool/.

Sept. 9-10. 9th International Conference on Luminescence and Electron Spin Resonance. Rome, Italy. PR & Co., V. le Manlio Gelsomini, 26, 00153 Roma, Italy: tel: 39-6-574260; fax: 39-6-5748203; email: b.fersini@flashnet.it

* Sept. 9-11. 3rd International Conference on Archaeological Prospection. Munich, Germany. Jorg Fassbinder, Ref. Archaeol. Prospection & Arial Archaeology, Bayer. Landsesamt fur Denkmalpflege, Postfach 10 02 03, D-80076 Munchen, Germany.

* Oct. 4-8. 13th Congreso Nacional de Arquelogia Argentina. Cabildo Municipal, Cordoba, Argentina. Casilla de Correo 1082, Correo Central 5000, Cordoba, Argentina; fax: 5451-68-0689; email: 13cnaa@ffyh.unc.edu.ar; web: www.filosifia.uncor.edu.

* Oct. 28-Nov. 1. Conference: Clovis and Beyond. Santa Fe, New Mexico, USA. Clovis and Beyond Conference; tel: 505-982-8520

* Nov. 5th European Meeting on Ancient Ceramics (EMAC' 99). Athens, Greece. See web page http://161.116.85.31/emac/athens.htm.

* Nov. 7-11. Multidisciplinary Conference on Working with Human Remains. Colonial Williamsburg, Virginia, USA. Williamsburg Institute, P.O. Box 1776, Williamsburg, VA 23187-1776, USA; tel: 800-603-0948; fax: 757-565-8630; email: dchapman@cwf.org.

2000

* July 10-14. 50th International Congress of Americanists. Warszawa, Poland. "The America's Universal Messages for the XXI Century." 50 ICA-CESLA, ul.Zurawia 4, PL-00-503 Warszawa, Poland; tel: 48-22-6253098; fax: 48-22-6253170; email: 50ica@cesla.ci.uw.edu.pl.

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