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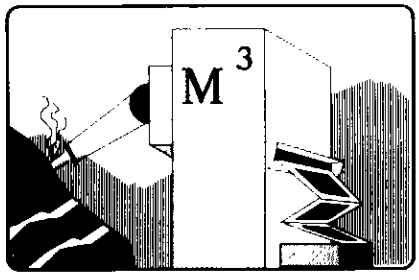
Conference Reports



Workshops in Archeometry

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On February 23 and 24, 1991, more than 35 archeometrists from the northeastern United States and south-central Canada, including Canadian scientists from the University of Toronto, Royal Ontario Museum, and McMaster and Laurentian universities, attended the second annual Workshops in Archeometry, which were hosted by the Anthropology Department at State University of New York (SUNY) at Buffalo.

Although a very informal meeting, this workshop is intended to bring together researchers in archeometry from diverse disciplines, such as physics, chemistry, geology, anthropology, metallurgy and engineering, to discuss common concerns and share advances in archeometric research. The organizers set four loosely defined areas to focus discussions, but each participant was free to get up and explain to the others what research they had in progress, rather than presenting a formal paper. Questions could be asked at any time in the presentation, but usually were held until the end. Presentations ran from 5 to 30 minutes per topic, depending on the interest of the group and the information being disseminated.

The conference kicked off with breakfast *cum* coffee break, at which most people met the other participants and enjoyed the food. Ezra Zubrow (SUNY, Buffalo) opened the sessions by thanking the sponsors, which included SUNY and the Canadian/American Trade Centre. Lorraine Oak welcomed us on behalf of the Provost and explained how their "graduate groups" cross disciplinary boundaries to promote research initiatives.

In the dating session, Dean Snow (SUNY, Albany) explained his problems with using ^{14}C dating. Because he wants to study Indian population dynamics, he needs very fine-scale dating, preferably a decade or two, to see trends in the pre- and post-contact era. Due to the variation in ^{14}C atmospheric levels and the stable isotope problem in the northeastern United States, the standard errors for the dates exceed two to three decades. Furthermore, trying to relate the bits of charcoal, which usually lack most of the outer (or younger) tree-rings, to the site in which they are found makes dating wood difficult. Dean is trying to use corn instead, and also plans to relate his dates with archeomagnetic analyses of hearths to build a local secular variation curve. Christina Reith (SUNY, Albany) is trying to construct a dendrochronological curve for the northeastern United States, using white pine and oak from historic barns and woodlots. Bob Casagraund (SUNY, Albany) plans to use thermoluminescence (TL)-dated pot sherds to calibrate the ^{14}C curve for the historic period. The problems of variable mineralogy and water content are expected to hamper the method.

Henry Schwarcz (McMaster) gave an excellent introduction to the principles and problems of electron spin resonance (ESR) dating, complete with "squeeky electron" sound effects to simulate the various energy outputs by trapped electrons as they return to ground states. Naomi Porat (McMaster) detailed her work using samples of tusk, flint and quartz hearth sands for ESR dating. The flint can also be used to show the paleotemperature history for the artefact. She demonstrated that pebbles from the Kalambo Falls site in central Africa had not been used as cooking stones, as originally suspected. Hearth sands may present a severe sampling problem, while tusk fossilizes too rapidly for dating. ESR analysis can determine the degree of fossilization, which may be useful in selecting samples for other forms of analysis, including ^{14}C. Bonnie Blackwell (McMaster) showed ESR results from Yarimburgaz in Turkey, and from La Chaise and Bau de l'Aubesier in France. For the first two sites, ESR dates are too young compared with $^{230}Th/^{234}U$ dates, possibly due to the problems in modelling the sediment dose rates for blocky calcareous *éboulis*. The ESR dates for Yarimburgaz match the $^{230}Th/^{234}U$ dates, but do not agree with faunal ages estimated from the presence of the early cave bear, *Ursus deningeri*.

In the afternoon session on sourcing analysis, George "Rip" Rapp (Minnesota) discussed copper sourcing, using neutron activation analysis (NAA). For North American copper, many elements, including Ag, Fe, Hg, In, Mo, Zn, Co, As, Au, Cr, Cd and Sc, can be used to discriminate source areas. Ron Hancock (Toronto) explained how NAA analyses are done at the University of Toronto. For Ontario copper, As and Au discriminate sources well. Hancock has also been examining locally made and "European-looking" historic artefacts to determine if the copper derived from local or European sources. Most artefacts were indeed locally produced. Hank Kammerer (Toronto) tests copper artefacts for authenticity. He is also exploring whether the effects of smelting can be distinguished from less advanced metal working techniques. The lively discussion following this paper explored societal constraints and the problems in reducing or reamalgamating bits of copper. Ron Farquhar (Toronto) has been examining "European-looking" lead artefacts to compare the source regions, but using $^{207}Pb/^{204}Pb$ *versus* $^{206}Pb/^{204}Pb$ plots. He will be expanding this research into other materials, including pottery, iron and tin artefacts.

Patrick Julig (Laurentian) uses NAA elemental analysis to fingerprint chert sources and artefacts. For the chert in sites near Thunder Bay, he finds that ternary plots of [U + Dy] *versus* [Al + Si] *versus* [Ag + Cl] discriminate the sources. Many flints that had been thought to be from the classic Knife River locality in the western US were, in fact,

locally derived. Geoff Percell (SUNY, Albany) detailed his XRF study of Yugoslavian pottery from the Roman occupation. He can distinguish localized clay beds. Matrix variations in the pottery, particularly in iron content, can cause problems. Henry Chaya (SUNY, Albany) used XRF to determine that Bear Gulch, near Yellowstone, was the source area for several Hopewell artefacts that had not been previously identified. Ba and Sr were the best discriminants for the sample suite.

The evening's discussion took place amid totem poles, reconstructed pots and the original survey map of Teotihuacan in the Archeology Museum, and was fuelled by lots of Buffalo-style wings, munchies, wine, beer and decadent desserts. This informal gathering allowed everyone a chance to talk to everyone else in stimulating surroundings.

On Sunday morning, Henry Schwarcz (McMaster) summarized his group's recent studies into stable isotopes in bones and pot residues. Bone isotopes show that maize was introduced to southern Ontario gradually, beginning at about 500 AD, but the isotopes from cooking residues in pots suggest that the maize was not used as a major component in stews. In Alaska, some local native groups did not exploit marine species, but used local terrestrial plants and freshwater animals. Isotopes of bones from North Africa indicate a dramatic shift in diet away from seafood to significantly more terrestrial plants at the Mesolithic-Neolithic boundary. Analyses of bones from Nubia show that children were weaned when about 3-6 years old, while analyses of hair indicate that more people died in the summer when food supplies were restricted. Hilary Stuart-Williams (McMaster) described his experiments to improve the analytical technique for measuring oxygen isotopes in bone. Diagenetic alteration destroys the ^{18}O signal.

The conference concluded with a discussion of the future for archeometry. Ezra Zubrow (SUNY, Buffalo) noted that, in 5 major US university libraries, some 3500 archeological books existed, compared to less than 20 archeometry texts. He felt that archeometry was not a "field", since it lacked a coherent theory and had no problems unique to archeometry. Discussion pointed out that most archeometry results are published as adjuncts to archeology reports. Where published alone, archeometry results occur in diverse and often obscure journals. The Library of Congress cataloguing system does not lend itself to easily finding archeometry references, nor does the split in journals between disciplines. Due to the lack of data bases for the social sciences (*i.e.*, data bases like GEOREF), getting access to information is exceedingly difficult. Meredith Aronson (Smithsonian Institute) commented on the poor "join between archeometry and archeology" in their common understanding of each other's problems and methods. For example, few archeologists attend archeometry conferences. Discussion suggested that the problem partially arose from the current American system for training archeologists within anthropology departments, thereby emphasizing social theory rather than scientific method. The newness of the field and the general low funding level available were cited as reasons for the lack of theory and adherents. Ron Hancock (Toronto) pointed out that archeology seeks to answer the "big questions", whereas archeometry often focuses on the "small problems". Rip Rapp (Minnesota) cautioned that archeology and archeometry must not grow apart. He added that we need to create archeology departments to train archeologists. Much of geology's recent success has been from applying the latest technical developments in the physical sciences to geological problems. Archeology and archeometry could emulate that also. Dean Snow (SUNY, Albany) commented that as an archeologist in a department dominated by social anthropologists, he feels as if he is having an academic mid-life identity crisis. Discussion also explored the differences between field-oriented archeologists and lab-oriented archeometrists. Certainly, some consensus was reached in the need for "transparent data bases" with easily understood key words. A major gap in the participants occurred between those who felt archeometry needed a theory to hold it together (predictably, mostly those trained in the social sciences) and those who wondered why the "problem" was even raised (generally, those trained as scientists). The discussion continued long and loud during lunch. An interesting personal view (Alvarez, 1991) regarding interdisciplinary research can be found in *GSA Today*.

The graduate students who organized the workshop should be congratulated. I think it proved valuable for all who attended. Certainly, the easy informal format fostered discussions, particularly spontaneous ones, which held people's interest. Future workshops may occur at other venues. People interested in attending next year's workshop or with ideas for future discussion topics are asked to contact Ezra Zubrow at the Department of Anthropology, SUNY, Buffalo, or at apyezra@UBvms.

REFERENCE

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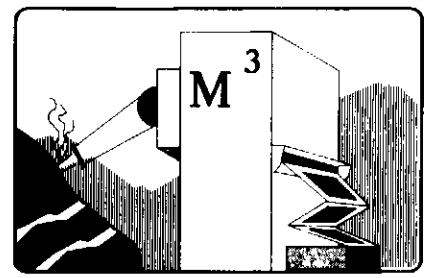

Accelerator Mass Spectrometry Workshop

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On April 15-16, 1991, more than 75 scientists from Canada and around the world attended the Accelerator Mass Spectrometry (AMS) Workshop hosted by the Canada Centre for Inland Waters, Burlington, Ontario. Its purpose was to review the state of AMS research in Canada, with a view to developing a plan for improving existing facilities and possibly developing new ones. Among the many reasons for such a workshop was the increasing difficulty in obtaining research funding in Canada for more expensive projects, such as new AMS facilities. Interestingly, the National Sciences and Engineering Research Council (NSERC) contributed significant support to bring in several international AMS experts to offer their advice.

The conference began by overviewing AMS facilities and capabilities worldwide. In reviewing the status of AMS research in the USA, David Elmore (Purdue University) quickly summarized the method and potential applications. The nine operating or planned machines in the USA have capacities ranging from 100 to 1000 samples per year, depending on the isotopes being analysed and the precision needed. Only three, however, do regular service work, although most will do samples in collaboration. Each of the various accelerators, which range from 3 to 9 MV, can analyse some or all of ^{14}C, ^{26}Al, ^{10}Be, ^{129}I, ^{3}H, ^{36}Cl, ^{41}Ca and several stable isotopes. W. Mook (Groningen University) noted that in Europe, ten laboratories were fully or almost operational, with capacities ranging from 300 to 2500 samples per year, mainly concentrating on ^{14}C and ^{10}Be, with some ^{26}Al and ^{36}Cl. Ken Purser (High Voltage Engineering Europa) de-