

Workshop in Archeometry '93

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Workshop in Archeometry '93

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On a sunny Saturday morning last February, some 30 researchers from the United States and Canada convened at the State University of New York (SUNY) in Buffalo for the fourth annual Workshop in Archeometry (26-27 February 1993). After a leisurely coffee hour, complete with bagels and muffins, Warren Barbour (SUNY – Buffalo) welcomed everyone and thanked the organizer, Anne Saladino, and the sponsors, the Departments of Anthropology, Geography and Geology at SUNY. He also commented that we need to abolish the boundaries between theory, observation, methodology and context because we cannot distinguish between them; this applies to archeometry more than to most fields.

Jack Holland (Buffalo Museum of Science) described his extensive chert collection, which is currently impeding the traffic flow through his house. The collection, which will soon be housed in a new facility at the Museum, includes samples from some 1000 different chert sources throughout the United States and Canada which will serve as a refer-

ence collection for scholarly study. Jack's comment that a person who had extensive experience in visual chert examination could accurately identify chert with just a 10 \times lens engendered considerable debate about chert identification methods. Some people felt that although a chert expert might be 90% accurate, neophytes might be only 30% accurate. Moreover, chert identification visually does not distinguish the variability known to exist between outcrop localities, members or beds, or within beds, that can provide archeological data (*i.e.*, what quarries were popular with what cultural groups, why some sites contain only far-travelled chert when local sources occur nearby, the seasonal round of the people, or the trade networks they used). Identifying non-quarried chert can help to establish behaviour patterns, but can be problematic for areas where cherts wash out of the quarry sites or occur in gravel lags, such as the Citronelle gravels in the southeastern United States.

Robert Kell and Grace Kellner reported on a project to image ground stone and pecked stone tools from Tell El-Ifshar, Israel, using computer-assisted photography to establish wear use patterns. They combined profilometry and scanned and digital photos of both the actual tools and castings made from the tools. The photos were analyzed mathematically to establish the surface roughness and slope. The uniform colour in the castings provides better photos for the work than those from the real artifacts, since the mathematical algorithms depend on the image brightness. Now they must test their methodological reliability and improve the imagery. Discussion following the paper suggested that laser imagery might be combined with the current techniques to improve the surface mapping.

Speaking on the Sheguiandah site,

an 80-acre Paleoindian quartzite quarry on Manitoulin Island, once thought to be a pre-Clovis site, Pat Julig (Laurentian U.) reported that no artifacts occurred in tills. The units postulated to be tills by the first excavators were soil units developed in water-washed, weathered sands and silts that were probably a beach during the occupation, at approximately 9.6-9.2 ka. Post-depositional mixing by active soil processes has produced up to 70 cm of vertical movement of artifacts through as many as four stratigraphic levels. The fabric of boulders suggests that some were glacially transported while others were formed by *in situ* weathering of the bedrock. Water-worn artifacts and geomorphological features suggest that the site was flooded at approximately 9.6-9.5 ka by the early Mat-tawan flood that drained glacial Lake Agassiz and affected sites of similar age in the Superior basin. Pat speculated that the swamps may be the pits dug by the Paleoindians to exploit the quartzite.

In testing the accuracy in archeological identification of geological stratigraphy at the Haug farm mound, a High Medieval site in Arctic Norway, Kim Bartolotta (SUNY – Buffalo) found particle size analysis to be the most reliable means of distinguishing units. Increasing cultural influence over the sediment caused more variable sediment particle sizes. Interestingly, although fishing was an important source of food, and fish bones do occur in the sediment, $\delta^{13}\text{C}$ values in the sediment did not reflect a marine component. Discussion centred on possible reasons for this, including possible use of the fish remains for animal feed or the export of whole fish.

Henry Chaya (SUNY – Albany) explained his technique for separating organic residues from sediment in archeological sites. From several sites,

including Haug mound, he finds long chain fatty acids and saturated cyclic hydrocarbons. Future work should identify the compounds and possibly determine their sources. During the discussion, several complicating factors, including post-occupational diagenetic alteration, contamination by modern or post-occupational activities, contamination from soil micro-organisms, modern chemical rainout, and modern roads, were raised that may make interpretation of the significance of the findings difficult to assess.

In a stimulating paper, Geoffery Purcell (SUNY – Albany) challenged all archeometrists to take responsibility for their findings by developing a methodological and theoretical framework unique to archeometry that can provide a process to derive the archeological inferences now attempted by archeologists. Currently, archeometry borrows methodology and theory from all the contributing fields, but lacks a unifying paradigm. Archeologists are usually the experts to interpret the results in a social context, often with less-than-satisfactory outcomes because many archeologists (especially those trained in North America) lack the scientific training to fully understand the results and their assumptions. In a lively discussion, several people outlined their problems in trying to stay current with the literature in archeology, ethnology and anthropology, let alone archeometry and their "home" scientific discipline. Given the current North American publish-or-perish ideology, combined with the difficulty in obtaining research funding without four to six papers annually (never mind the quality of the papers) no one has time to explore new ideas in other disciplines or learn the necessary jargon to successfully publish in other fields. Several participants felt that because archeology tends to emphasize the humanistic, while scientific fields concentrate on rationalism, archeometric research progresses more efficiently and synergistically with collaboration. Providing both the archeologist and archeometrist listen and share, collaboration can be more productive than trying to do it yourself. Stressing the problems in communication that can occur because modern disciplines jealously guard their vocabularies that serve to isolate and validate the theories of each discipline, all agreed that we must take more responsibility for the inter-

pretations that derive from our data.

With electron spin resonance (ESR) dating using bovid teeth from Sterkfontein and Swartkrans, South Africa, Bonnie Blackwell (McMaster U.) demonstrated how several stratigraphic members in which fossil hominids had been found were actually mixed assemblages of teeth representing different time periods during the past 1.5-2.5 m.y. Active karstic dissolution and reprecipitation in the caves means that it will be impossible to date the hominids, except by directly dating them rather than the related fauna. Discussion included the difficulty in separating dentine and enamel for ESR analysis, especially from human teeth.

A delightful cold buffet with the requisite hot Buffalo wings and beer stimulated scientific discussions well into the wee hours. Luckily, the morning sessions started at a civilized hour, accompanied by ample supplies of coffee and breakfast.

In a cogent explanation of smelting engineering, Ned Rehder (U. of Toronto) convincingly argued that the pre-Columbian Indians never developed iron smelting because they had never developed the bellows, which is needed to increase the furnace temperature above 1200-1250°C. This is the hottest fire that can be obtained using human breath to force air into the furnace; although it is adequate to smelt copper, it is not hot enough to smelt iron. In moving from pottery to quick lime to glass to metal smelting, more knowledge and increasingly complex social structures were required to support the technology. In Egypt, the bellows and the ability to smelt iron appear at about the same time as the Hittites invaded.

After thanking Anne Saladino, the organizer, on behalf of the participants, Ron Hancock (U. of Toronto) described the neutron activation analysis (NAA) projects in which the U. of Toronto Slowpoke reactor has recently been involved, including tracing clays used for brick making, distinguishing between aboriginal and European copper and brass, and testing the trace elements in bone and local clays used for pottery. Recently, they have begun to test European copper and brass for country of origin. They are also attempting to develop a trade bead seriation based on trace element geochemistry. In the discussion, it was decided that archeologists hoping to locate pottery clay

sources need to sample whole sections to be able to successfully identify the sources. X-ray fluorescence analysis should be coupled with NAA to ensure best results.

Although attendance this year was low, this conference was undoubtedly still a valuable exercise. Each year, the organizers manage to find new experts to explain their techniques and results. The papers are all long enough and informal enough to encourage active participation and discussion without making it daunting to present papers. Because SUNY manages to get grants to provide plentiful, excellent food and reasonable accommodation, it causes no strain on the limited research budgets enjoyed by most archeometrists to attend the conference. If you are interested in attending next year's workshop, write to: Archaeometry Research Group, Department of Anthropology, SUNY – Buffalo, Buffalo, N.Y. 14261; FAX (716) 645-3808.