Review Archaeology and Natural Science vol 1

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Recently a new scientific journal of Scandinavian origin has come to light, specialized in archaeometry and called *Archaeology and Natural Science*. The first volume contains the proceedings of the first Scandinavian Archaeometry Centre (SAC) symposium "Modern Tools in Archaeometry" held in Göteborg, Sweden, May 23-25, 1991.

This first volume covers a wide range of topics. The 15 contributions vary between prospection methods (archaeomagnetic investigations, georadar surveying, electric resistivity, electric distance measurements and surveying with the topometer), artifact characterization (optical emission spectography and secondary ion mass spectrometry), dating methods (^{14}C dating of ancient rock paintings) and miscellaneous topics (ancient units of length). Most of the authors come from Scandinavia (Denmark and Sweden) but there are also contributions from Austria, Germany, Switzerland and the USA.

Also the type of the contributions vary: some are review articles (Archaeomagnetic Investigations in Denmark), some are about work in progress (The Use of Image Processing in Forensic Odontology), and some present specific results (DNA from a Human Bone from the Rössberga Megalith). I will review three of the more spectacular articles.

The DNA research from a human bone from the Rössberga Megalith can ideally prove the hypothesis that passage graves were similar to family graves. The DNA from bones could be used to ascertain kingship relations between the individuals buried. The first step would be to learn wether DNA was preserved in the bones and to prove that this DNA is from human origin, and not from organisms that lived on the body after the death of the human. The author, P. Persson from the University of Göteborg in Sweden, demonstrates the presence of human DNA by the hybridization method. This method involves the separation of the double-stranded DNA molecule into two single-stranded ones, and afterwards the re-association as the original double-stranded one. Using salmon DNA as negative control, the DNA extracted from human bone from the megalith hybridizes at least 100 times better with modern human DNA than with salmon DNA.

There are still some uncertainties as how the DNA has been preserved for about 4000 to 5000 years. The durability of DNA in solutions is limited to some thousand years. A possibility is that DNA is bound to the hydroxyapatite crystals of the bone and thereby protected. It looks like this kind of research is very promising, and the author thinks that the investigation of ancient DNA may lead to a revolution in our knowledge of history.

A second example is an article that reports on a new technique for C^{14} dating of prehistoric rock paintings. Until recently pictographs could only be dated indirectly, on the basis of style or by dating deposits that cover the paintings. Since, in most cases, organic material was incorporated into the paint, the organic carbon permits radiocarbon dating. This dating method has, for instance, proven that the paintings from the last year discovered cave Chauvet near Vallon-Pont-d'Arc in France are the oldest rock paintings in the world. The surprising date is 30,000 years B.P., twice as old as the famous paintings of Lascaux and Altamira.

The new method, developed by an American team, can deal with the problem of contamination if the paintings are on a limestone wall. The inorganic carbon from the limestone ($CaCo_3$) substrate is the major source of contamination. They use a low-temperature oxygen plasma coupled with high vacuum techniques to selectively remove carbon-containing material in the paint. According to the authors this method has two advantages: it does not depend on the presence of a particular organic substance in the paint and it is independent of the rock upon which the painting is applied. The method can help archaeologists to solve chronological questions like for instance the contemporaneity of prehistoric rock paintings in, and between, caves.

A very intriguing article describes the research to the possibility that vases can speak, or to be more precise, the possibility of recording and playing back sounds by using clay as a recording medium. This possibility was first tested by an American electrical engineer, Richard G. Woodbridge III in 1969. His best results however were not with vases but with paintings on canvas. He was able to detect short snatches of music as a wooden needle of a crystal cartridge was gently stroked in the paint of a specially prepared painting.

The research on the vases is based on the assumption that speech, noise or music will be recorded in the wet clay when the vase is decorated with a chisel-like instrument as a bird feather. The chisel-like instrument will produce a modulated groove. The detection of these sounds may be done both by hearing and by measurement with optical or mechanical means. Experiments by Swedish scholars with a cylinder made of clay showed that it was possible to record a sound track and that, during play back with a pickup, the signal could be heard through the noise. The authors end their article with the remark that "further experiments and a more exact analysis should be of interest".

It is a good thing that there is a new journal to publish results of archaeometric research, but the disadvantage of journals like this is, however, that it often tends to isolate archaeometric results from their archaeological background by publishing it separately.

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