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Compendiario

An Assemblage of Notes and News

THE GENETIC INFORMATION PRESERVED IN CERAMICS — A NEW TOOL FOR ARCHAEOLOGICAL STUDIES

Archaeological studies have led to the assembly of vast collections of ceramics, including complete pieces and many fragments, often dated (see e.g. Wahlöö 1976; Gaimster 1987). Both fragments and complete pieces sometimes carry distinct marks of the fingerprints of individuals involved in producing these artifacts, but to date, their potential for revealing information about the population has been largely overlooked.

The fingerprints on stoneware and some other medieval ceramics are especially noticeable on both sides of the handle, where the handle was added to the main body of the vessel by pressing it firmly with the fingers. On the lower part of jugs in which the base was finished by pressing it with successive finger marks, giving it an undulated form, the prints may be particularly distinct. There are fingerprints of both adults and children (as attested by their size and form). Combining archaeological data with the extensive knowledge from genetic studies on fingerprints may have much to contribute.

There are references in the literature to studies of fingerprints in ceramics. For example, in medieval Japan, the fingerprint was used as the 'signature' of the potter (Cummins and Midlo 1943). In the 1930s Tretyakov noted the presence of fingerprints in Russian prehistoric vessels (Trigger 1989). No detailed studies have yet been published of the types and frequencies of fingerprints. (An unpublished report on Dutch pottery proposed that interridge distances can be used to distinguish between female and male potters, and to suggest the involvement of adolescents: Baart 1994; fn.1, p.26). More quantitative information is now available and computer techniques allow the assembly and analysis of more data.

The inheritance of fingerprint patterns has been studied since the end of the last century. An extensive analysis of this phenomenon took place in Scandinavia, Britain and other countries (see e.g. Chakraborty 1979; Katzenmaier 1979). The following genetic findings are of significance for archaeology:

1) Fingerprints are divided into several types that are well defined. The three main patterns are arch, loop and whorl. All human populations share the same range of patterns in differing frequencies.

2) The patterns can be measured, and as a result expressed quantitatively, by counting on a fingerprint the number of ridges from a specific centre.

3) The fingerprint patterns are genetically determined.

4) Few genes are involved in determining the configuration.

5) The eventual pattern is determined by the fourth month of foetal life. From this time until death there will be no morphological change in ridge pattern.

6) Counts of fingerprint ridges in any individual are correlated with those of their relatives. Parents and their children have a high correlation factor which is still higher in identical twins. However, this factor is very low in non-related individuals.

7) Chromosome abnormalities (e.g. associated with severe conditions, such as mental retardation and sexual abnormalities) lead to the formation of characteristic fingerprint patterns that are different from the normal range of configurations. The frequency of chromosome abnormalities in humans is not as low as often thought. Extensive studies on the occurrence of translocations, extra autosomes and sex chromosome anomalies, show that the frequencies range from 1 in 500 to 1 in 10000 individuals in European populations. When the different types of chromosome anomalies are added together, the frequency rises to about 1 in 300 individuals (Connor and Ferguson-Smith 1991).

Genetic information may open a new avenue of research in archaeology. A study of fingerprints in dated specimens of medieval ceramics may become a source of information on:

1) the establishment of the family relationships between adults and children involved in the production process

2) the identification of types of abnormalities and conditions carried by both adults and children

3) the types of accidents that occurred during the work of pottery-making, since these can deform the fingerprint patterns in visible ways.

It must be emphasised that this combination of archaeology and genetics can only be of scientific value if a pilot study is carried out not on single pieces, but on the products from workshops. Only a carefully planned and large-scale investigation can be expected to yield significant results. The research team must include a criminologist, to ensure that only fingerprints that are reliable are used (Thorwald 1965), and a geneticist who is a specialist on fingerprints (Robertson and Vignaux 1995).

Recent advances in molecular biology allow us, by making a direct analysis of their DNA, to distinguish genetically between individuals. The methods of biotechnology permit reliable information on the genetic constitution of individuals to be obtained by analysing the DNA extracted from single cells (Allen *et al.* 1990; Lima-de-Faria 1991; Bottema and Sommer 1993; Scherthan *et al.* 1994; Epplen *et al.* 1994; Newman *et al.* 1996). Skin cells may remain enclosed by the clay of the vessels. If cells from skin or blood become incorporated into the clay, the analysis of their DNA may furnish information on the genetic traits of pottery workers.

The fact that the ceramic material has been heated to very high temperatures will have affected the DNA. An experimental programme could be devised to test the extent of this effect directly. However, discarded materials found in workshops may contain cells that have not been submitted to these high temperatures. DNA has been successfully extracted from Egyptian mummies that are several thousand years old, and has been used to determine family relationships (Pääbo 1985). The DNA of insects preserved in amber for over 40 million years has been studied with success (Poinar 1993). These are unusual conditions for preservation in archaeological terms; DNA which is only a few centuries old is by comparison quite recent.

For this type of study, the collaboration of an experienced molecular biologist would be vital. Strict procedures to avoid contamination must be followed in both the collection and the analysis of samples. The pieces of ceramics in which one would search for cells would have to be from newly-fractured surfaces to reduce the risk of environmental contamination.

Recent archaeological studies have stressed the wide range of problems arising from laboratory contamination, to which must be added the problems of contamination from subsequent users of the pottery, from deposition, post-deposition (archaeological recovery), and handling in the museum or excavation environment. In recent decades, the most fruitful and novel areas of research have emerged from the combination of the knowledge derived from different scientific disciplines. Fingerprint studies and DNA analysis may one day furnish new insights into the social organisation of communities that produced ceramics.

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CONFERENCE REPORT

Le VIe Congrès International sur la céramique Médiévale en Méditerrannée took place between November 13 and 18, 1995 at Aix-en-Provence, under the auspices of the *Laboratoire d'Archéologie Médiévale Méditerrannée,* (Medieval Mediterranean Archaeology Laboratory), the *Laboratoire de Céramologie de Lyon* (Lyon Ceramic Studies Laboratory) and the *Association Internationale pour l'Etude des Céramiques Méditerrannéenes (AIECM2* — the International Association for the Study of Mediterranean Ceramics). This event, which included nearly 250 delegates, followed the format of the previous reunions at Valbonne (1978), Toledo (1981), Siena (1984) and Rabat (1991). Together with the earlier conferences, this congress had as its aims the promotion of synthetic communications on the two favoured themes: **change and transferral** (of technology, knowledge and power, as well as manufactured goods), in particular during the High Middle Ages, between the 10th-13th centuries, and in the Early Modern period; and also **architectural ceramics**, studied over the long-term. Several recent discoveries were also described individually.

Over 65 communications and 37 posters were the subject of debate, discussion and exchanges during the period of the conference. The first day was more particularly dedicated to the changes marking the transition between the Ancient World and more properly medieval creations, both in the East and West. The accent placed upon researches and imports from the Near East, Greece or the Islamic world was the reason for the very conception of this congress, embracing a theme which was to be pursued and amplified in the later sessions. The following days, centred conversely on Western mediterranean countries, described the progress accomplished during recent years in the study of production and exchange, in particular regarding the full Medieval period. Together with this synthetic approach, specific studies highlighted the different access between urban and rural communities, with the study then moving by means of cross-referenced sources (textual and archaeological sources) to the dawn of the modern period. Technological change and the study of manufacturing tools were also the subject of several communications, centred on kilns, glazes, and pigments (e.g. cobalt). The final section dealt with problems regarding architectural ceramics in Africa, in several regions of Spain from Andalusia to Catalonia and in southern France from the medieval to the modern periods. In this last case, the data was complemented by information from the exhibition of paving tiles and wall revetments, organised simultaneously at Avignon at the *Palais des Papes.*

Six exhibitions, including several itinerant, were opened on the occasion of the Aix congress. All were accompanied by catalogues, which series now forms a precise documentary base for the southern data, sometimes placed into a very wide context, such as at Marseilles. The thematic exhibition presented in this city, where the oldest faience workshop yet known in France was discovered, was in effect the occasion to gather an important series of over 300 examples with green and brown decoration produced throughout the Mediterranean, through international cooperation which is also reflected in the texts assembled for the catalogue.