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A CLOSER LOOK AT RED POLISHED PHILIA FABRICS. INQUIRING INTO CERAMIC UNIFORMITY IN CYPRUS, CA. 2500-2300 B.C.

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The beginning of the Bronze Age period in Cyprus (ca. 2500-2300 BC) is typified by a long series of changes in every aspect of the island's material culture, the introduction of new technologies and the intensification of interaction within the island, and between Cyprus and other neighbouring lands (Knapp 2008; Bolger 2007; Peltenburg 2007; Webb and Frankel 2007; Webb *et al.* 2006; Frankel 2005; Frankel 2000; Webb and Frankel 1999; Frankel, Webb and Eslick 1996). Especially within the island's setting, the strong interactive schemata are first and foremost substantiated by a homogeneous culture across the island, without any significant regional variants.

During the Philia period, minor differences in style recorded in site assemblages are blunted by a strong ceramic tradition, which is evident across Cyprus from north to south. Red Polished Philia ware (hereafter RPP) is the predominant type of pottery during the Philia period; a very distinct type of pottery, easily distinguished by reference to shape, fabric, and surface treatment. In particular, the typological, stylistic and fabric distinctiveness of RPP (Fig. 1), primarily seen in the highly lustrous red surfaces, the regular presence of burnishing marks, the restricted number of shapes (for full account of RPP shapes see Webb and Frankel 1999, 15-16; Frankel and Webb 2006, 92-98), and fabrics of soft grade in hardness, characterised by the distinct presence of grey and brown inclusions and small voids.

This island-wide homogeneity of the RPP assemblage prompted Manning to ascribe the ware to "specialised production associated with the emergent elite" (Manning 1993, 48). According to the scholar, "the marked uniformity of fabric [...] reflects the rise of one dominant specialist production centre exporting all over the island or the spread of a specialist type and technology across the island as a valued prestige assemblage" (Manning 1993, 48; also Manning and Swiny 1994, 166).

However, unpublished petrographic data⁽¹⁾ from Kissonerga *Mosphilia* (Robertson 1989), electron microprobe analysis on samples from Marki *Alonia* (Summerhayes *et al.* 1996), and petrographic and INAA (Stephen 1998a, 141-144) on samples coming from various sites dated to the Philia period indicated a chemical differentiation between samples from different sites, and suggested local manufacture or a multi-centric production of RPP pottery (Stephen 1998a; 1998b).

These earlier petrographic and chemical studies explored issues related to the provenance of the Philia fabrics, but failed to address issues of equal importance, related to the technology of their production and the degree of variability within individual site traditions. There is a total lack of information regarding the technology used in the production of Philia pottery with explicit references to fabric. Therefore, this project was designed to address the Philia pottery's morphological uniformity (or variability) on strictly technological terms and define the exact technological similarities or differences within and between site assemblages. This technological assessment is an essential prerequisite in validating, explaining and justifying the degree of uniformity of the Philia pottery.

In their 1999 publication *Characterizing the Philia facies*, Jennifer Webb and David Frankel provided a gazetteer of Philia sites, recording all sites where Philia material has been found. Using this gazetteer as a guide, eight Philia sites were selected for the collection of eighty-eight RPP samples, representing the main regions of the island where Philia material has been recorded (Fig. 2). It should be highlighted that the samples included in this study exclusively belong to the RPP class of pottery as defined by Frankel and Webb (1999; 2006) and

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which corresponds to the standard Red Polished (Philia) ware as defined by Peltenburg *et al.* (1986, 37). Both open and closed shapes were included in the sample, as well as small and large vessels.

Petrography, ED-XRF and SEM-EDS were used for a combined physicochemical study of the RPP samples. An overview of this physicochemical study has indicated that there are at least four different fabrics comprising the analysed RPP sample, and even so, the recording of outliers suggests that Philia fabric variability must have been even greater. From the four fabrics identified using petrographic analysis, three fabrics are distinguished by their calcareous clays, probably natural blends procured from alluvial deposits by riverbeds. Calcareous fabrics dominate also among the outlier samples (Fig. 3).

A common recipe is used for the production of these fabrics, which includes the use of fine clays, vegetal temper, and low firing temperatures, which did not exceed 750-800°C. There are neither indications for mineral or rock tempering, nor any detailed refinement procedures. On the other hand, the clays used for the production of the ceramic slips are non-calcareous, iron-rich, and well-refined. These observations apply for all samples from all sites, and made with different fabrics. Nonetheless, the mineralogical and chemical analyses have shown that there is one fabric, namely fabric I, for which the scale of distribution is evidently greater than that of any other fabric.

The mineralogical identification of fabric I is one of the most significant outcomes of this research project. This is the broadest fabric group identified, accounting for 75% of the RPP samples under study, from all sites, from Vasilia in the north, Marki and *Ayia Paraskevi* at the centre, to Kissonerga in the south. Fabric I is a calcareous fabric, for the production of which the established RPP recipe is followed, but which is however differentiated from the other identified fabrics due to the prominent presence of metamorphic rocks and the very restricted presence of igneous inclusions, indications that the location of raw material resources was not in the vicinity of the Troodos pillow lavas. Most importantly, fabric I is characterised by a distinct presence of chert and other quartzitic inclusions, which are not found in any of the remaining fabrics (Fig. 4).

In addition, fabric I seems more homogeneous than the other fabrics. The vessels made with fabric I are not only mineralogically easily distinguished from all the other samples in thin section, but the population of samples made with fabric I presents low standard deviation values when its elemental composition is evaluated. The mineralogical and chemical uniformity of the RPP samples made of fabric I suggests that the corresponding vessels were either made by a single production centre, or by a number of production centres exploiting the same raw material resources.

The rest of the recorded fabrics share a common characteristic: as indicated by petrography, they all present igneous components in their composition, mainly in the form of basalts. The presence of igneous components in the composition of these fabrics suggests that the raw materials for the production of all these fabrics, and corresponding vessels, were collected from the vicinity of the Troodos pillow lavas, where basalts are the most common rocks. All samples composing fabric groups II, III and IV come from Marki, with the exception of one sample which comes from *Ayia Paraskevi*. Considering the mineralogical characteristics of these vessels in association with their place of recovery, it is possible to argue that these were produced and distributed within the regional context of the south-central zone (*cf.* Webb and Frankel 2008). The inclusion of a sample from *Ayia Paraskevi* in fabric group IV is especially interesting, as it strengthens the regional character of this fabric.

Philia ceramic uniformity is likely to have been the outcome of two specific factors; the employment of a common recipe for the production of almost identical pottery across the island, and the existence of a large-scale distribution network directed by a specific centre or cluster of centres across the island. Both presuppose a regular flow of interaction between different parts of Cyprus, and a uniform Philia culture across much of the island. The spread of the Philia culture into dispersed and topographically separated regions and, most significantly, the maintenance of cultural uniformity are remarkable.

The selective preference of calcareous clays, rich in carbonates, may be perceived as a conscious technological choice, a part of a *habitus* (Frankel 2005), acquired through experience, supporting primarily the functionality of the final products. This technological uniformity, coupled with the restricted stylistic and typological repertoire, could also be considered as a form of communication and social marking, which may have facilitated the exchange of information and fostered a sense of social and cultural identity between the widespread Philia communities (see also Webb and Frankel 2008; Frankel and Webb 2006; Webb and Frankel 1999).

It is certainly difficult to elucidate the routes of interaction between the north and south parts of Cyprus, separated by the Troodos massif. Nonetheless, it seems that geography and distance did not act as impediments in this attempt to preserve cultural unity. Established inter-group relations, encouraged by the introduction of donkeys, structured a firm network of interaction, which may explain the widespread and unprecedented cultural uniformity which characterises these Philia settlements. It is in this context of regular relations

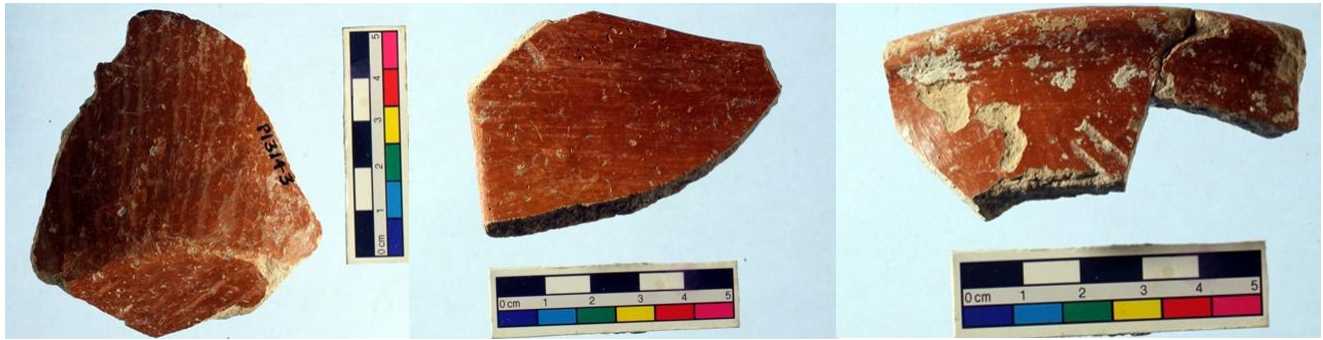


Figure 1. Red Polished Philia ware (RPP) samples from Marki Alonia.

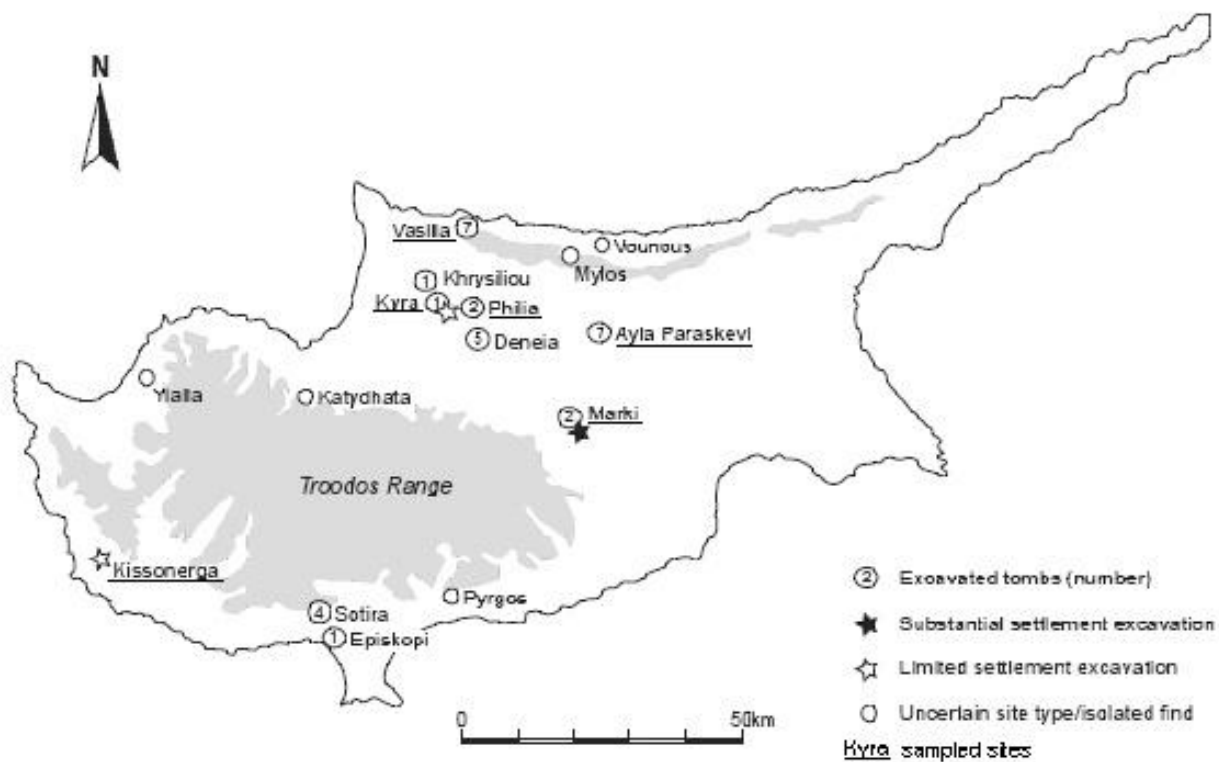


Figure 2. Map of Cyprus showing the location of sampled and other contemporary Philia sites (original map by Frankel and Webb 2006a, fig. 11.1, 306).

that the wide distribution of RPP vessels of fabric I should be understood. The existence of fabric I at all these different sites reinforces the argument for the existence of active interaction networks, literally surmounting physical barriers and contributing to the intra-island uniformity of the Philia material culture.

It is worth considering the mode of organisation of ceramic production that could have sustained this complex network of social contacts and pottery

distribution locally, regionally and inter-regionally. The sheer quantities of recorded pottery made with fabric I, recovered at sites across Cyprus, eliminate any arguments for household production during the Philia facies. At this stage, it cannot be argued with certainty where this centre or centres of RPP production were, due to our inability to sample the geo-environment of the northern part of the island. However, given the known cluster of Philia sites in the Ovgos valley, the material wealth of the Vasilia

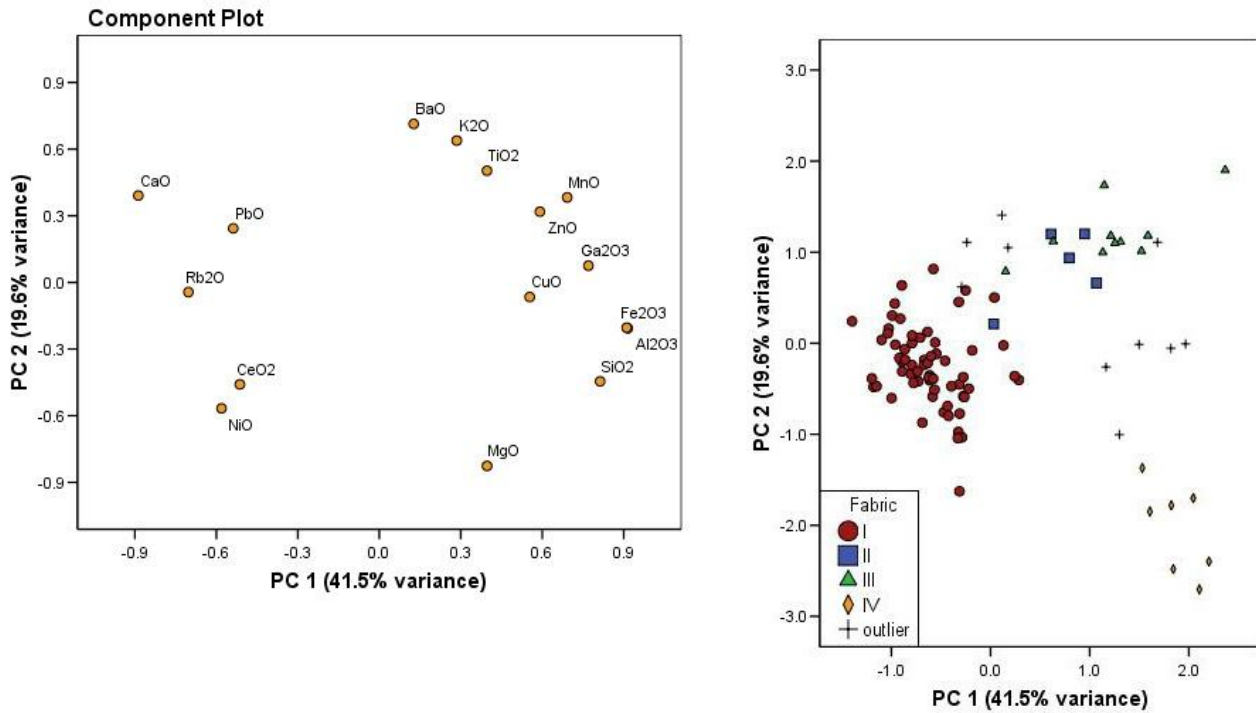


Figure 3. PCA based on the chemical analysis of the RPP sample by ED-XRF. The samples are marked according to the fabric group to which they were allocated by petrography.

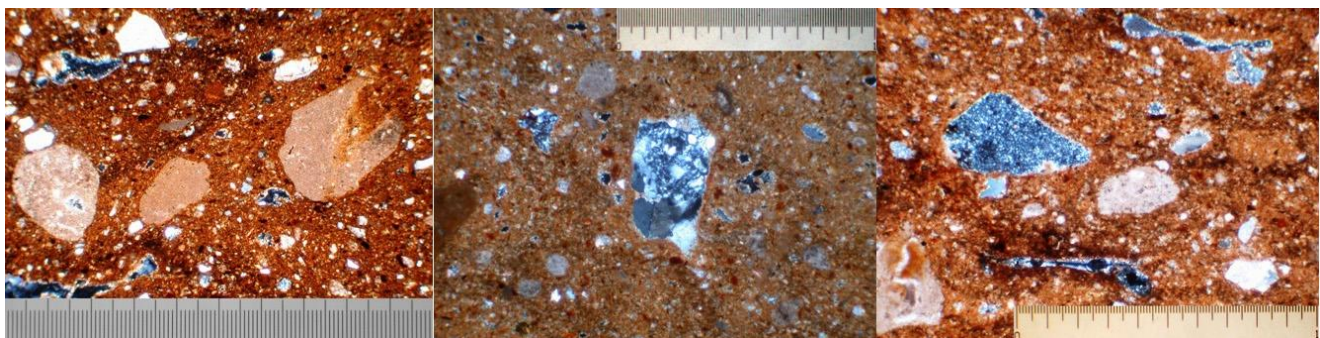


Figure 4. RPP fabric I (XP, full scale 1mm).

tombs in comparison with all the other excavated Philia sites, and taking into consideration that all samples from these sites are made with fabric I, it is possible to suggest that this production centre, or cluster of production centres, were located either in the Ovgos valley or on the north coast.

What is more noteworthy is the scale of production and distribution of RPP at this centre, or cluster of centres. Unfortunately, questions related to the organisation of ceramic production during the Philia phase, and in particular with regard to the existence of one large production centre or a cluster of centres, and the degree of specialisation cannot be answered at present. The macroscopic and physicochemical studies of the objects themselves do not allow us to

address issues related to the organisation and constitution of production units. Essential to this kind of discussion would be information collected from debris generated from production activities, as well as information related to the physical contexts from which the objects and the debris were recovered, information which is currently unavailable.

Nonetheless, we cannot underestimate the technological, typological, and to a large extent stylistic, uniformity that characterises the Philia pottery across the island. The Philia phase must have been a very dynamic period of Cypriot prehistory, during which larger settlements had in their disposal the required means (both natural and human

resources) for long distance contacts, supported by a very interactive internal network, sharing common cultural trends. While smaller settlements, such as Marki, produced their own products, they also acquired supplementary vessels from the larger settlements within the network. One centre or cluster of centres in the northern part of Cyprus, may have supplied much of the pottery for this homogeneous, unified system. Cyprus was not, however, able to sustain this degree of cultural homogeneity for long and it soon gave way, circa 2300 BC, to the pronounced regionalism which characterises the next phase of the Cypriot Bronze Age.

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1. By courtesy of Prof. A.H.F Robertson, School of Geosciences, University of Edinburgh and the Lemba Archaeological Project, Paphos, Cyprus.

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EXPERIMENTAL RESEARCH INTO POTTERY MAKING

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Issue definition

A common aspect of the study of ancient pottery technology is the investigation of the different properties of natural clays (especially the chemical composition and the proportion of natural non-plastic micro-inclusions) and the identification of deliberately added or natural occurring inclusions. This can be achieved using chemical, mineralogical and elemental analyses. These techniques were primarily developed in the natural sciences, and thus the transfer of these methods and results to the study and interpretation of ancient ceramics technology and material must be considered carefully.

At the same time, experimental research into actual ancient manufacturing techniques attracts very little attention, because this part of pottery technology is almost inaccessible to natural sciences. During the last few decades, applications of methods such as nuclear magnetic resonance NMR-spectrography and computer tomography have not demonstrated clear development and that is why they are not yet regarded as significant in archaeology, for many reasons (including their high cost). In general, the application of techniques originally used for natural sciences to the study of ancient pottery-making technology require a thorough, regular and all-round research.

The same situation is typical of Russian archaeological science as well. But the scholars – followers of “*Historical-and-Cultural*” (Tsetlin 1999, 6) approach – emphasise purposeful research of pottery cultural traditions through all the steps of pottery technology, including the different phases of pottery manufacturing. Alexander A. Bobrinsky (1978)

elaborated a special system of experimental construction methods for the study of pottery-manufacturing through evidence in the cores of broken sherds and on the surfaces of vessels using a simple binocular microscope. Nevertheless, this task remains relatively difficult. The reliability of the reconstruction of pottery manufacturing processes depends entirely on the mastering of investigative techniques, on the scholar's training and personal experience.

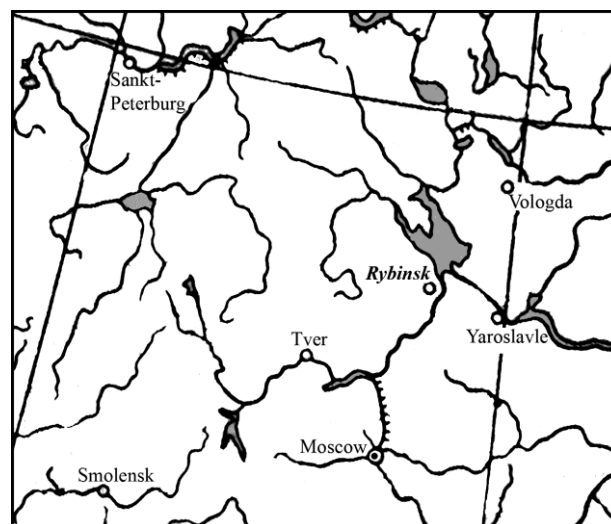


Fig. 1. Map of European Russia with the place of Rybinsk-city.

Goal and tasks of research

This work was carried out at the special experimental centre for the study of ancient pottery production which has been run by the author since 2004 within the Rybinsk archaeological expedition, directed by Alexander and Irina Rukunov, in the Yaroslavlskaya district of the Russian Federation (Fig. 1).

A wide experimental programme was developed to create the standard small vessels with the “traces” which remain in their cores as the result of various pottery-making techniques. The aims were to define a) where the joint lines between various pieces of clay were placed, and b) which form these lines take in the cores of vessels. In addition, I wanted to determine whether any change in these traces was caused by the potter's efforts to alter the clay.

In brief, the research programme includes:

- 1) making small clay vessels out of various structural elements such as a) patches, b) coils, and c) bands;
- 2) beginning manufacturing vessels according to four methods: a) “Base-only” construction, b) “Base-and-Wall” construction, c) “Wall-and-Base” construction, and d) only “Wall” methods of building vessels

construction. During the manufacture of the experimental vessels, the various structural elements were connected with each other by a) simple smoothing, b) smoothing and additional pressing by finger-pressure, and c) smoothing and additional beating with flat paddle. As a result of these processes, the base and wall of the vessels were subjected to a) weak, b) average, and c) strong deformation respectively. The *weak* deformation is a result of simple smoothing of structural elements, the *average* one is characterized by the 1/3 thinning of the original walls during pressing or beating, and the *strong* deformation appeared after making the walls thinner by 2/3 of the original thickness.

To have a clearer picture, the structural elements (patches, coils, and bands) were made alternately of white and black clays. The experimental vessels were only dried and were not fired, as the black and white clays shrink at different rates when fired, and the vessels would not have remained intact. Dried vessels were then sliced vertically (through the central axis) and horizontally (1 cm below the edge of the rim) using a cutting machine with a diamond-coated disk.

As a result, we see two perpendicular projections of joints between structural elements in the base and wall of vessels (Fig. 2).

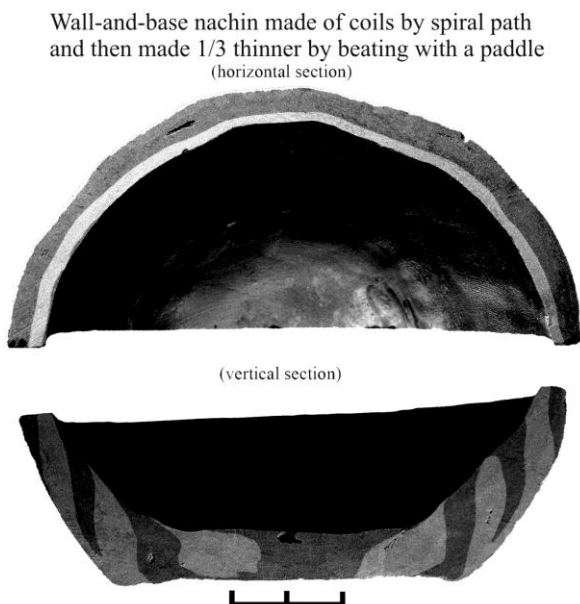


Fig. 2. Two perpendicular projections of an experimental vessel.

Description of the summer 2008 experiments

During the summer of 2008, we could not realize the full programme of experimental work, due to wet weather. Only six types and 22 variants of construction modes were tested. We tried to study the patch mode which is the most ancient, and consequently very difficult to identify by visual observation of archaeological ceramics. The experimental vessels were made on a convex hemispherical solid mould, covered with fabric to prevent clay from sticking to the mould (Fig. 3).



Fig. 3. A convex hemispherical solid mould covered with fabric and used for construction of experimental vessels.

Small vessels were made according to two methods: Base-and-Wall and Wall-and-Base. In the first case, pieces of clay were added from base to wall, and in the second one, from wall to base. They were made of unformed clay patches (when pieces of clay are torn off from a large clay pyramid), of short cylindrical patches (2 cm in diameter and 4 cm long), and of flat clay pellets (4 cm in diameter and 1 cm thick). During the process of pottery-making, clay patches were joined to each other by smoothing with minimum deformation by fingers, or smoothing and pressing with fingers or beating with a paddle with deformation of 1/3 or 2/3 of the original thickness.

Experimental results

A few examples are described here to illustrate the results of this work. The simplest mode consists of making clay vessels of unformed patches according to Base-and-Wall and Wall-and-Base methods on the convex mould.

Base-and-Wall (B&W) method (vessels are made of clay patches placed in a circle starting at the centre and working towards the edge of the convex mould):

Variant 1. The patches are joined and smoothed with minimum deformation. The picture of joints in horizontal and vertical projections is showed on *Fig. 4a*.

Wall-and-Base (W&B) program (vessels are made of clay patches placed in a circle from the edge to the centre of the convex mould):

Variant 1. The patches are joined and smoothed with minimum deformation (*Fig. 4b*).

Variant 2. The patches are joined by smoothing and finger-pressure, reducing the original wall thickness by $1/3$ (*Fig. 4c*).

Variant 3. The patches are joined by smoothing and finger-pressure, but reducing the original wall thickness by $2/3$ (*Fig. 4d*).

Variant 4. The patches are joined by smoothing and beating with a paddle, reducing the original wall thickness by $1/3$ (*Fig. 4e*).

Variant 5. The patches are joined by smoothing and beating with a paddle, reducing the original wall thickness by $2/3$ (*Fig. 4f*).

The numbers on all figures show the order of addition of clay patches during the construction of experimental vessels.

Let us consider the horizontal and vertical sections of vessels made according to Base-and-Wall and Wall-and-Base methods (*Fig. 4a, b*). In both cases, the vessels were only smoothed, without any additional treatment. The direction of joint lines between patches, as seen from inside the vessel, is from right to left under the Base-and-Wall method (*Fig. 4a*) and from left to right under the Wall-and-Base method (*Fig. 4b*). This contrast does not depend on the mode of construction, but is the result of clockwise addition of patches (in the first case) and of anti-clockwise addition of patches (in the second one). Such differences can reflect cultural traditions of pottery making, or whether the potter is right-handed or left-handed.

More important results are obtained by the analysis of vertical sections of experimental vessels made according these two *methods*. Under the Base-and-Wall method (*Fig. 4a*), the first patch was placed near the central part of the Base, and following patches were placed more distant from the centre, partly covering the previous ones. Under the Wall-and-Base method (*Fig. 4b*), the first patches were placed on the rim and the patches closer to the Base partly cover them. Consequently, the determination of the direction of joint lines in vertical sections of vessels permits the definition of these two kinds of nachin

methods in archaeological ceramics.

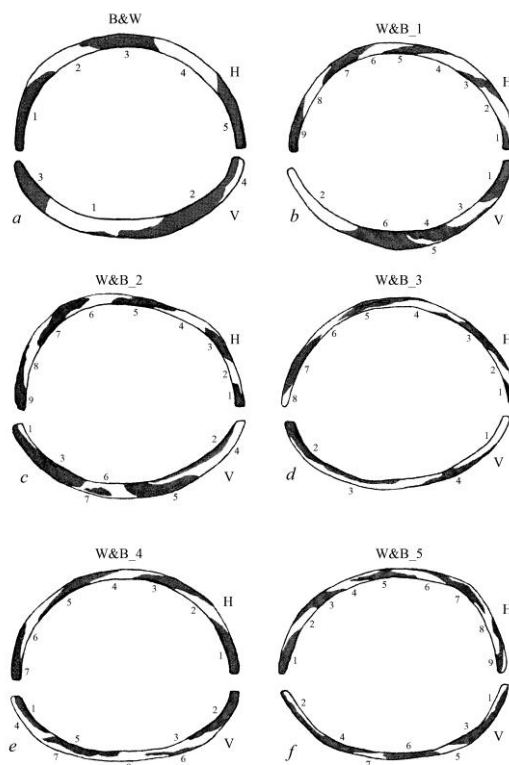


Fig. 4. Horizontal and vertical sections of experimental clay vessels.

Using the example of Wall-and-Base experimental vessels, I would like to consider the peculiarities of the outline of the patches in vertical section in the cases of various degrees of additional deformation of walls by pressing with fingers and by beating with a flat paddle (*Fig. 4, c-f*). Firstly we can see here the elongation of patches and joint lines, but this effect becomes clear only when the vertical section passes through the central part of a patch, not through the edge of one.

Therefore to determine the degree of additional deformation I propose a quantitative method including the determination of 1) the average area of a few large patches seen in vertical section, 2) the nominal diameter of a circular patch with this area, 3) the average thickness of a few large patches in the same section. Now to test the degree of deformation we need to calculate the ratio between the average thickness of a patch and the nominal diameter of an ideal round patch before any kind of deformation.

Generalization of experimental data suggests a scale for the estimation of the degree of clay deformation under patched modes of construction (the question of applicability of this scale for estimation of the other modes of construction remains open). It has

been established that when the patches are joined and smoothed (without additional deformation), the ratio of T (thickness) to D (nominal diameter) is about 45-50%, with deformation of 1/3 of initial wall thickness – about 35-40%, and with deformation of 2/3 of initial wall thickness – about 25-30%.

The experimental data received during the investigation of vessels made of short cylindrical patches and round clay pellets confirm these results. During the next summer the experimental works will be continued.

Yuri B. Tsetlin

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BIBLIOGRAPHICAL REFERENCES FOR RECENT WORK ON CERAMICS STUDIES

At the last CPG meeting it was decided from this issue to add recent bibliographical notes on analytical studies of pottery. Patrick Quinn sent the list below. If our readers would like to add bibliographical references to this for further issues, please do send them to the Hon. Editor.

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ANNUAL GENERAL MEETING

The Ceramic Petrology Group held their Annual Meeting at the University of Nottingham on the 17th of May 2010. Six papers were submitted for the day conference; unfortunately Daniel Sahlén could not make a presentation, but his abstract is below.

Expedient Pots: Petrographic Evidence from Late Neolithic Wadi Ziqlab, Jordan

Kevin Gibbs, The University of Manchester

In the southern Levant (including modern Jordan, Israel and Palestine) pottery appeared for the first time around 6500 cal BC. The earliest pottery is attributed to the Yarmoukian culture and is characterized by a calcareous paste and diagnostic incised herringbone decoration. This pottery was likely produced by non-specialists and may have had a predominantly symbolic

or non-utilitarian role. It has been suggested that during the subsequent 6th millennium BC, pottery became more standardized and perhaps more utilitarian. Attributed to the Wadi Rabah culture, the pottery of this period includes well-made black burnished pots that may have been produced in kilns by specialist potters. However, alongside this new tradition there was a continuation of pottery production by non-specialists at the household level. Petrographic analysis of 6th millennium BC pottery from the site of al-Basatîn in Wadi Ziqlab, northern Jordan, suggests that some of this material may be viewed as an expedient technology, produced quickly with easily available raw materials. Pottery from the site includes simple vessels that were made with little preparation of the clay. In this paper I will discuss the pottery from the recent excavations at al-Basatîn in the context of the ceramic petrography of the region and in the context of other Late Neolithic expedient technologies. I will also offer some preliminary thoughts on the significance of expedient pottery. In particular, the evidence from al-Basatîn contradicts the unilineal model of the development of pottery technology that has prevailed in the region.

Pots and crucibles in the microscope: Investigation of technology and traditions in prehistoric Scotland

Daniel Sablén, University of Glasgow/National Museums Scotland

Research on prehistoric pottery has in the last years looked at the technological process as a social mechanism, exploring issues of individual choices and social practice. Ceramic petrography is an indispensable method for the study of ceramic technology and has successfully been used in theoretical studies of pottery. The study of metalworking ceramics, such as moulds and crucibles used in the casting of copper alloys can have extensive use of methods and theories developed in pottery studies, but there are few studies which combine method and theory.

I will in this presentation look at how we can use ceramic petrography to investigate ceramic technology and manufacture of crucibles and pottery in late prehistoric Scotland. I want to investigate the technological and material relation between crucibles and pots. This work is based on my PhD research at University of Glasgow and National Museums Scotland, where I have combined the theoretical notion of technology with microscopic analyses of metalworking ceramics and pottery.

The Anglo-Saxon Cremation Cemeteries of North Lincolnshire

Gareth Perry, University of Sheffield

The dispersed and prominent locations of early Anglo-Saxon cremation cemeteries has led scholars to suggest that they acted as centralised burial sites for discreet

tribal territories. It is becoming apparent, however, that this interpretation masks the full complexity of the burial pattern; indeed, the discovery of many smaller inhumation and mixed rite cemeteries in the putative territories of these large cremation cemeteries suggests that people would not, by default, bury their dead in a centralised burial ground. A new way of assessing the 'catchment areas' of particular cremation cemeteries is through comparison of the one form of material culture common to both cremation cemeteries and settlements – ceramic vessels. At cemeteries these are the urns, whilst at settlements they are the domestic cooking and storage pots. Comparative analysis of this common material culture forms the basis of my PhD research.

The project compares pottery recovered from two cremation cemeteries in North Lincolnshire, Elsham and Cleatham, with that retrieved by field walking and excavation of settlement sites. Initially cemetery and settlement fabric-types will be identified within the framework of macroscopic typologies developed by Jane Young and Alan Vince in the East Midlands Anglo-Saxon Pottery Project; subsequently a select programme of thin section petrographic analysis will compare settlement and cemetery material. It is hoped that through the analysis of these two types of assemblage the relationship between settlement sites and choice of burial ground and the production of both domestic and funerary pottery will be better understood.

An On-Line Database for Archaeological Petrography

Patrick Quinn, University of Sheffield

Petrographic data on artefacts is normally under-represented in the archaeological literature, with published analyses generally supported by a few black-and-white micrographs at the most, and fabric descriptions rarely included. This situation severely hinders the comparison of petrographic data between different studies, sites, analysts and laboratories.

In response to this problem, a project is in progress at the University of Sheffield Departments of Archaeology and Computer Science to design and build the first on-line petrographic database. This tool will provide an efficient means of storing, accessing and disseminating archaeological petrographic data, including colour micrographs, petrographic descriptions and associated information about artefacts.

The prototype database, expected in summer 2010, will be populated initially with data from ceramic analyses at University of Sheffield, Department of Archaeology, but will be made available to other analysts thereafter. Users will be able to browse and search petrographic data on ceramics and other artefacts using a user-friendly web interface, as well as uploading their own projects. Central to the system will be large, high-resolution polarizing light micrographs of individual

thin sections for direct comparison during microscope work.

The inevitable transfer of petrographic information into databases such as that being developed here will greatly assist the curation of extensive thin section collections that exist in the UK and elsewhere, ensuring their survival for future generations. Given that most petrographers are never very far from a computer, the presentation and manipulation of extremely large amounts of data and reference material through this medium also has obvious benefits for research productivity.

Eastern Mediterranean connections: mortaria production in the Archaic and Classical period

Michela Spataro and Alexandra Villing, The British Museum

In the Archaic and Classical period, mortaria (grinding bowls) were common and widespread in the eastern Mediterranean world. In the last decade, neutron activation analyses showed that these vessels were traded over long distances and seemed to have specialised production centres (Mommsen et al. 2006).

Optical microscopy was carried out on 52 samples from Naukratis, Al Mina, Lachish, Miletos and Xanthos, in order to identify manufacturing processes and provenance of the artefacts. Thin section analysis shows that in many cases very fine clays, possibly levigated, were selected to produce the mortaria, which were then fired at high temperatures. However, the fabrics of these vessels do not contain rare minerals that are diagnostic of provenance, only common minerals, found in most geological settings.

Representative samples from the main fabric groups identified in thin section were studied by scanning electron microscopy in combination with energy dispersive spectrometry (SEM-EDX), in order to analyse the elemental composition of the ceramic bodies. SEM-EDX results suggest an interesting pattern of trade, where mortaria, despite their everyday and coarse aspect, were traded from Cyprus throughout the Eastern Mediterranean.

Mommsen, H., Fletcher, P., Hook, D., Schlotzhauer, U., Villing, A., Weber, S. and Williams, D., 2006. Neutron activation analysis of pottery from Naukratis and other related vessels'. In A. Villing and U. Schlotzhauer (ed.) *Naukratis: Greek diversity in Egypt*: 69-76. British Museum Press, London.

Investigating 'Torpedo jars' – their composition and source

Roberta Tomber, Rob Carter and Seth Priestman, The British Museum

Torpedo jars comprise a category of transport amphorae produced between the late Parthian and

Early Islamic periods, characterised by a torpedo-shaped body, bead rim and short, solid spike. Lined with a black layer of bitumen, the jars are thought to have been used to transport liquid foodstuffs. Although a source in southern Mesopotamia has long been assumed, no kilns are known. Given the extensive timeframe of their production, and typological variants seen within the group, production can be seen to be the result of more than one workshop. Their distribution is wide, stretching beyond Mesopotamia to the Persian Gulf, where they are well represented, to South Arabia and India. This talk will describe work that has formed a pilot study of the ware. It has included mainly torpedo samples from Iran (particularly along the coast between Jask and Bushire), Sir Bani Yas (U.A.E.) and India, and was funded by the Society for Arabian Studies, the British Institute of Persian Studies and the Emirates Natural History Group. Thus far it has been possible to divide the samples into two main "fabric families" suggestive of two separate sources. The raw materials for both fabrics would be available within Mesopotamia, although further work is needed to rule out additional source regions for this widely distributed type, particularly in southwest Iran.

WEBSITES

Ceramic Petrology Group

<http://www.ceramicpetrology.uklinux.net/>

Prehistoric Ceramics Research Group

<http://www.prehistoric-ceramics.org.uk>

CONFERENCE DIARY

Ceramics, Cuisine and Culture: the Archaeology and Science of Kitchen Pottery

The British Museum, 16th-17th December 2010

This conference is dedicated to the cross-disciplinary interpretation of ancient "kitchen pottery", i.e. utilitarian wares used as food containers or for food processing in a broad sense. By bringing together established scholars and young researchers from a wide range of academic backgrounds, including archaeologists, material scientists, historians, and ethnoarchaeologists. Ceramics, Cuisine and Culture will stimulate an international and interdisciplinary exchange of ideas and approaches.

More information about the conference can be found at:

http://www.tracingnetworks.ac.uk/kitchen_pottery/index.htm

The programme is available at:

http://www.tracingnetworks.ac.uk/kitchen_pottery/program.htm

EMAC 2011, 11th European Meeting on Ancient Ceramics

Natural History Museum Vienna, Austria, 29th September - 1st October, 2011

The main focus of EMAC is interdisciplinary studies and the archaeological interpretation of ancient Ceramics. The conference is directed to studies beyond the traditional archaeological analyses; it is concerned with technological characteristics and analytical research of vessels and of other archaeological ceramic artefacts.

EMAC shall bring together established scholars and young researchers from a wide range of academic backgrounds, including not only archaeologists and art historians, but chemists, geologists, petrologists, material scientists, and colleagues from other related disciplines.

More information about the conference can be found at:

<http://emac2011.univie.ac.at/>

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