

RAW MATERIAL MANAGEMENT IN THE FIRST POTTERY PRODUCTION OF THE MEDITERRANEAN BASIN: A DEVELOPING PROJECT

Xavier Clop^{1*}, M. Rita Estrada¹ and Laure Salanova²

¹ ARCHAEO, Department of Prehistory, University Autònoma of Barcelona, Spain

² UMR 7055 Préhistoire et Technologie, CNRS, France

* Corresponding author. E-mail: xavier.clop@uab.cat

Introduction

“Pottery is the main component of many archaeological assemblages and, for over a century, it has been one of the principal tools used to define cultural identity and to characterise culture change. But the simplistic equation of ‘Pots equal people’ has rightly been challenged, and in the meantime a huge ethnohistoric literature has grown up around the question of what technical and stylistic traditions actually mean to the people who make and use pots” (Salanova and Sheridan 2013-14, 80).

These words describe a gradual shift in the objectives and ways of studying pottery, which extends the possibilities of pottery as an object of study and, more importantly uses ceramics to shed light on the real focus of our research, the human communities of the past who made and used the pottery products.

Ceramic studies allow us to investigate different aspects of the activities and working processes involving pottery if the investigation strategies are adapted to the questions. We must first consider pottery as a product (Clop 2007) which is the result of using natural elements and forces to satisfy the needs of social agents. Each product is the result of a particular work process that meets the quantitative, qualitative, objective and subjective requirements (e.g. shape, thickness, porosity, the use or not of added temper and its size and amount, treatments of the surfaces, decoration, etc.) necessary to satisfy a particular need in a particular human group. Thus each product reflects the community that produced it, because each product is the final result of specific social, economic and ideological conditions, of its environmental setting, and of contacts with other communities. Ultimately, pottery products and the

techniques used in its production must be understood as objects shaped and defined by a particular social reality.

Among the different stages of the pottery production process, we focus our research on the study of raw material management strategies for making pottery. The management of raw materials is defined in each case for the forms of selection, supply and treatment of the raw materials. It is in this phase of the production process when the raw material is treated providing the mechanical properties (resistance, strength and hardness) that make them more or less suitable for one or another application (cooking, storage of solids and liquids for short or long term, liquid transportation). Raw material management strategies depend on three basic factors: a) the nature and availability of adequate mineral resources; b) the diversity and type of needs to be met; c) the level of technological development.

Mineral resource management strategies may be recognised by identifying the ‘types’ of inclusions (plastic and non-plastic) used, ‘where’ the raw materials come from, ‘how’ the pots were made, and ‘what’ type of products the potters wanted to obtain. Only then can we explain the ‘role’ of pottery in the communities that manufactured and/or used these products.

Case studies by American and European scholars (e.g. Braun 1983; Bronitsky 1986; Convertini 1996; Juhl 1995; Maggetti 2001; Picon 1995; Rice 1982; Shepard 1965), show that studies of a set of macroscopic and microscopic features of pottery increase our understanding of the origins, the roles and the levels of specialisation of the pottery items used in human communities during Late Prehistory.

It is from this perspective that we are developing the research project “The first pottery production in the Mediterranean basin (c. 7000-4000 cal BC): an archaeometric approach”.

The aim of the project is to identify resource management strategies for pottery production over the first stages of the Neolithic in the Mediterranean Basin. The project has two main lines of work:

1. Systematic collection and evaluation of all archaeometric studies on pottery in the Mediterranean Basin from the defined period. There are many published studies, but they have never been gathered and evaluated together. The main challenge

is to find the studies published in regional or local journals. We believe that gathering all the published information will provide an overview of what is known about effective mineral resource management strategies, and identify areas and issues on which future research should be focussed.

2. To study a large number of pottery samples from different regions within the Mediterranean Basin, such as the Euphrates Valley in the Near East, the Struma Valley in Bulgaria, the Iberian Peninsula, and some North African sites. All samples (around 700) will be analysed petrographically, and subsets will be characterised by other archaeometric techniques.

This study will ultimately allow the creation of an extensive "Litho-library of pottery products from the Neolithic in the Mediterranean Basin" at the Laboratory ARCHAEO in the Universita Aut3noma de Barcelona (Spain), where they will be available to researchers interested in both thin sections and the literature related to the selected assemblages. In addition, it is intended to create a web site to allow maximum access to information by the scientific community.

Preliminary results from the north-western regions of the Mediterranean

Characterisation studies of Late Prehistoric pottery indicate a clear predominance of naturally occurring non-plastic inclusions (natural temper) (e.g. Convertini 1996; Echallier 1984; Rice 1987; Shepard 1980). In many cases in other parts of the world, however, in different periods, characterisation studies show the deliberate addition of temper to pottery (or in a part of the produced pottery) in the form of minerals/crushed rocks (e.g. talc, calcite, chert), organics (e.g. vegetable matter, bone fragments, shells) or anthropogenic materials (e.g. grog) (e.g. Clop 2012; Constantin and Kuijper 2002; Dickinson 1998; Fowler 2011; Stracizich 1998; Timofeev *et al.* 1995).

At first glance, the use of added temper is attested in different regions of the Mediterranean from the beginning of pottery production in each area. For example, data obtained from the study of 28 sites of the western Mediterranean (Clop 2005; Convertini 2010) indicate the presence of added temper in the pottery of some sites, but not in all.

The regions where added temper was identified are northern Italy, southeastern France and the east of

the Iberian Peninsula. The data from the sites with tempered pottery, where stratigraphic sequences or levels with absolute dates are available, suggest:

a) The use of added temper is a common practice from the middle of the 6th millennium BC and lasts, at least, throughout the 5th millennium BC.

b) Added temper was identified in part of the ceramic assemblage but not in all samples. At the moment, it is very difficult to determine why some pots were tempered, and not others.

c) The data available from different stratigraphic series (e.g. Arene Candide in Italy, Font-des-Pigeons in France, Can Sadurn3 in Spain) or sites with a good series of ¹⁴C dates (e.g. Cova de l'Or, Mas d'Is, Cova de la Sarsa, etc. in the Alicante region in the east of the Iberian Peninsula) suggest the hypothesis that in the western Mediterranean the first added temper was grog (Clop 2012).

d) A short time later, still during the Early Neolithic and as indicated by the stratigraphic sequences mentioned, the use of crushed calcite starts, progressively replacing grog temper.

e) The use of grog and calcite tempers was identified in the Cardial and Epicardial horizons of the Impressed Ware culture of the western Mediterranean, and no correlation between fabric and shape or stylistic motive was identified (Convertini 2010; Clop 2012; Cubas *et al.* 2012).

f) In Provence and Languedoc in France, and Catalonia in Spain, the use of grog and calcite temper is attested in pottery production since the Cardial and the Epicardial horizons in the Early Neolithic (Binder *et al.* 2010; Clop 2012; Cubas *et al.* 2012). By contrast, in this period (5800-4800 BC), the use of added temper has not been identified in well-defined regions (western Languedoc) around the Pyrenees that extend towards the south to the Llobregat river (near Barcelona) (Clop 2012; Convertini 2010).

g) The result enable us to address questions such as why some types of pottery were tempered, and not others, and why temper was used at some sites and not others, and address changes over time.

Discussion

Temper choice is often discussed in geological terms, but cultural (in terms of specific artisan traditions) and functional factors are also important to

understand its distribution (Gosselain and Livingstone Smith 2005; Vieugué 2012).

In the Near East, data obtained in the last fifteen years have shown the use of crushed calcite (Figures 1 and 2) in the first pottery products, such as the Black Series in the Euphrates valley (c. 6900-6000 B.C.) (Faura 1996); only later was pottery made with vegetal temper.



Figure 1. Added temper; crushed calcite. Macroscopic view in cut section.

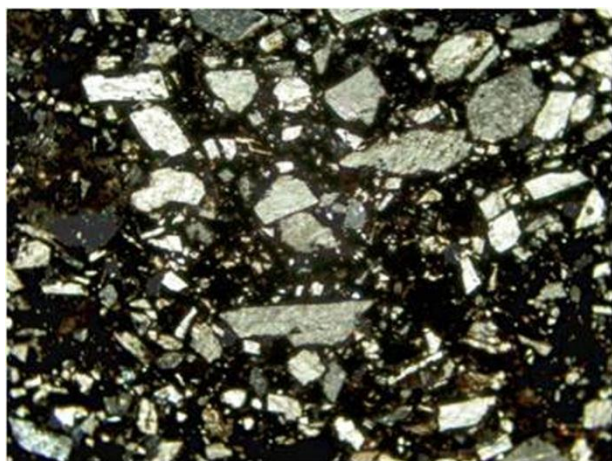


Figure 2. Added temper; crushed calcite. View in thin section.

Calcite was not the only mineral added: the use of an igneous rock, for example carbonatite, is documented at some sites (Nishiaki and Le Mière 2005).

Vegetal temper was used since the first pottery production from the Balkans, and it has been documented well by the extensive petrographic work on the Early Neolithic pottery of the Balkans in the last ten years (e.g. Spataro 2004; Szakmány and Starnini 2007). In the southwestern part of Bulgaria,

for example, vegetal temper is frequently associated with big storage vessels (Salanova 2009).

During the Early Neolithic Cardial horizon (5800-4800 BC) in the western Mediterranean, the use of added tempers such as grog (Figure 3), crushed

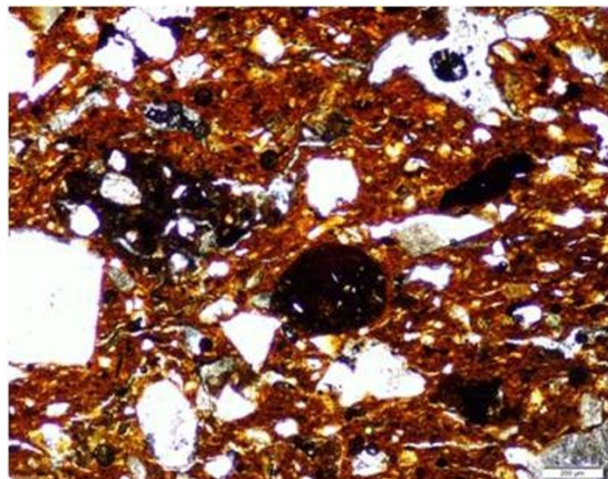


Figure 3. Added temper; grog. View in thin section.

calcite and, occasionally, bone (Figure 4) are also documented (Cloup 2012; Convertini 2010).

The verification of the geographical expansion and the temporal evolution in the use of grog and crushed calcite temper are aspects that reflect certain rules on the pottery manufacturing process that have been transmitted and, indeed, it reflects the existence of certain “ways of doing” on a broad territorial scale, at least in relation to the treatment of the raw material.

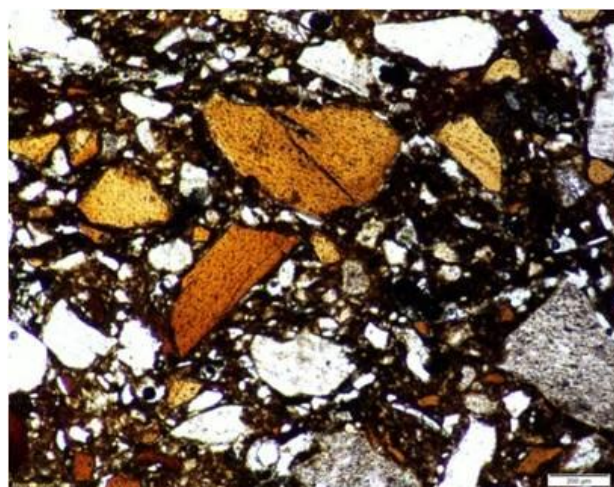


Figure 4. Added temper; bone. View in thin section.

Conclusion

We must continue with petroarchaeological characterisation studies of new pottery assemblages, and even extend the studies of the assemblages analysed previously by increasing the number of ceramic samples. Sample selection criteria are key to this research: to understand well the variability of raw materials and tempers in a ceramic assemblage, it is essential to study the best-dated assemblages, particularly from long-lived sites with multiple occupation phases, and to select samples covering the full range of decorative styles.

In general, existing data demonstrate both the diversity of the “ways of doing” pottery by the first farming communities in the Mediterranean basin and their changes over time. Further research will shed light on aspects of the management of raw material, production structures, intergroup relations and ways of knowledge transmission between the first pottery-making communities in the Mediterranean.

Acknowledgements

This paper was carried out in the project “Las primeras producciones cerámicas en la cuenca del Mediterráneo (c. 7.000-4.000 cal ANE): aproximación desde la Arqueometría” (HAR2011-23357) funded by Ministerio de Ciencia e Innovación de España.

References

- Binder, D., Clop, X., Convertini, F., Manen, C. and Sénépart, I. 2010. Les productions céramiques du Néolithique ancien entre Provence et Catalogne. In Manen, C. Convertini, F., Binder, D. and Sénépart, I. (eds.) *Premières sociétés paysannes de Méditerranée occidentale. Structure des productions céramiques*, 115-129. Société Préhistorique Française, Mémoire LI.
- Braun, D. P. 1983. Pots as tools. In Moore, J. A. and Keene, A. S. (eds.) *Archaeological hammers and theories*, 107-134. Academic Press, New York.
- Bronitsky, G. 1986. The Use of Materials Science Techniques in the Study of Pottery Construction and Use. In Schiffer, M. B. (ed.) *Advances in Archaeological Method and Theory* 9, 209-276. Academic Press, Orlando.
- Clop, X. 2005. Las primeras producciones cerámicas del nordeste de la Península Ibérica: estudios de caracterización. In Arias, P., Ontañón, R. and García-Moncó, C. (eds.) *III Congreso del Neolítico en la Península Ibérica (Santander, 2003)*, 297-303. Santander.
- Clop, X. 2007. *Materia prima, cerámica y sociedad. La gestión de los recursos minerales para manufacturas cerámicas del 3100 al 1500 ANE en el noreste de la Península Ibérica*. Archaeopress BAR International Series 1660. Oxford.
- Clop, X. 2012. Extensión, cambios y perduración en las “formas de hacer”: la producción de cerámica y el uso de desengrasantes añadidos. *International Congress Networks in the Neolithic. Exchange of raw materials, products and ideas in the Western Mediterranean (VII-III millennium BC). Rubricatum 5*, 369-374. Gavà, Spain.
- Constantin, C. and Kuijper, W. J. 2002. Utilisation de mousse comme dégraissant dans des céramiques néolithiques de France et de Belgique. *Bulletin de la Société préhistorique française*, 99-4, 775-783.
- Convertini, F. 1996. *Production et signification de la céramique campaniforme à la fin du 3ème millénaire av. J.-C. dans le Sud et le Centre-Ouest de la France et en Suisse*. Archaeopress BAR International Series 656, Oxford.
- Convertini, F. 2010. Bilan des études réalisées sur la provenance de la céramique du Néolithique ancien en Méditerranée nord-occidentale. Mise au point d'un protocole analytique. In Manen, C., Convertini, F., Binder, D., and Sénépart, I. (eds.) *Premières sociétés paysannes de Méditerranée occidentale. Structures des productions céramiques. Séance de la Société Préhistorique Française, Toulouses, 11-12 Mai 2007*, 13-27. Mémoire LI. Société Préhistorique Française, Paris.
- Cubas, M., García-Heras, M., Méndez, D., de Pedro, I., Zapata, L., Ibáñez, J.J. and González Urquijo, J.E. 2012. La tecnología cerámica de los niveles IV y III en el yacimiento de Kobaederra (Cortézubi, Bizkaia). Aprovisionamiento y modificación de las materias primas. *Trabajos de Prehistoria* 69, 51-64.

- Dickinson, W.R. 1998. Petrographic temper provinces of prehistoric pottery in Oceania. *Records of the Australian Museum* 50(3), 263–276. Sydney.
- Echallier, J.C. 1984. *Elements de technologie céramique et s'analyse des terres cuites archéologiques*. Documents d'Archéologie Méridionale, Methodes et Techniques 3, Association pour la Diffusion de l'Archéologie Méridionale. Lambesc.
- Faura, J. M. 1996. *Un conjunt ceràmic del VIII mil·lenni B.P. a la vall de l'Eufrates: les produccions de Tell Halula*. Master's thesis University Autònoma of Barcelona, Barcelona.
- Fowler, K. D. 2011. The Zulu ceramic tradition in Msinga. *South Africa. Southern African Humanities* 23, 173–202.
- Gosselain, O. P. 1992. Technology and Style: Potters and Pottery Among Bafia of Cameroon. *Man, New Series* 27(3), 559-586. Royal Anthropological Institute of Great Britain and Ireland.
- Gosselain, O.P. and Livingstone Smith, A. 2005. The source. Clay selection and processing practices in sub-Saharan Africa. In Livingstone Smith, A., Bosquet, D. and Martineau R. (eds.) *Pottery manufacturing processes: reconstruction and interpretation*, 33-48. BAR international Series, Oxford.
- Juhl, K. 1995. *The Relation between Vessel Form and Vessel Function: A Methodological Study*. AmS-Skrifter 14. Arkeologisk Museum Stavanger. Norway.
- Maggetti, M. 2001. Chemical Analyses of Ancient Ceramics: What for? *Art and Chemical Sciences. Chimia* 55-11, 923-930.
- Nishiaki, Y. and Le Mière, M. 2005. The oldest pottery Neolithic of Upper Mesopotamia: New evidence from Tell Seker al-Aheimar, the Khabur, northeast Syria. *Paléorient* 31 (2), 55-68.
- Picon, M. 1995. Pour une relecture de la céramique marocaine: caractéristiques des argiles et des produits, techniques de fabrication, facteurs économiques et sociaux. In Bazzana, A. and Delaigue, M. Ch. (eds.) *Ethnoarchéologie méditerranéenne. Finalités, démarches et résultats*, 141-158. Colección de la Casa de Velázquez. Madrid.
- Rice, P. 1982. Pottery production, classification and the role of physicochemical analyses. In Olin, J. S. and Franklin, A. D. (eds.) *Archaeological ceramics*, 47-56. Smithsonian Institution, Washington D. C.
- Rice, P. 1987. *Pottery Analysis. A sourcebook*. The University of Chicago Press. Chicago/London.
- Salanova, L. 2009. La plus ancienne céramique bulgare (Kovačevo, Bulgarie): caractérisation technique, implications socio-culturelles. In Astruc, L., Gaulon, A. and Salanova, L. (eds.) *Méthodes d'approches des premières productions céramiques: les Balkans et au Levant* 12, 21-28. Verlag Marie Leidorf, GmbH, Rahden/Westf.
- Salanova, L. and Sheridan, A. 2013-14. When the potter make the story. *The European Archaeologist* 40, 80-82.
- Shepard, A. O. 1965. Rio Grande glaze-paint pottery: A test of petrographic analysis. In Matson, F. R. (ed.) *Ceramics and Man*, 62-87. Aldine. Chicago.
- Shepard, A. O. 1980. *Ceramics for the Archaeologists*. 11th ed. Carnegie Institution of Washington, Washington.
- Spataro, M. 2004. Differences and similarities in the pottery production of the Early Neolithic Starčevo-Criş and Impressed Ware Cultures. *Rivista di Scienze Preistoriche* LIV, 321-336.
- Szákmany, G. and Starnini, E. 2007. Archaeometric research on the first pottery production in the Carpathian Basin: manufacturing traditions of the early Neolithic, Körös culture ceramics. *Archeometriai Műhely* 2007/2.
- Stracizich, N. M. 1988. Clay Sources, Pottery Production and Regional Economy in Chalchihuites, Mexico, A. D. 200-900. *Latin American Antiquity* 9(3), 259-274.
- Timofeev, V., Zajceva, G. and Possnert, G. 1995. Neolithic ceramic chronology in the South-Eastern Baltic Area in view of 14C accelerator Datings. *Forvannen, Journal of Swedish Antiquarian Research* 90(1), 19-28.

Vieugué, J. 2012. Spécialisation fonctionnelle des premières productions céramiques dans les Balkans (6100-5500 av. J.-C.). *Bulletin de la Société Préhistorique Française* 109(2), 251-265.
