



The role of pottery in Middle Neolithic societies of western Mediterranean (Sardinia, Italy, 4500–4000 cal BC) revealed through an integrated morphometric, use-wear, biomolecular and isotopic approach

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ABSTRACT

The use of pottery in the Early Neolithic communities of Western Mediterranean has begun to be addressed by recent studies concerning the residues of dietary commodities in potsherds. In order to contribute to a broader perspective on the issue of pottery function, we investigate pottery assemblages through an integrated methodology, combining the study of vessel morphology and morphometry, use-wear analysis, biomolecular and compound-specific carbon isotopic analysis of residues. We focus on the use of pottery containers by advanced Middle Neolithic societies of Sardinia (Italy, 4500–4000 cal BC), protagonists of significant technical, economic and cultural changes in the completion of Neolithisation in this island. The aims are to elucidate the role of whole pottery assemblages in technical and socio-economic systems of Middle Neolithic communities and to provide data on the exploitation of animal and plant resources during this phase.

Based on the integrated combination of data, six categories of vessel use are identified. The results reveal a differential integration of vessels in activities related to the exploitation of distinct kinds of resources (ruminant adipose/dairy fats and plant foods vs. non-ruminant and aquatic products) and highlight specific behaviours of Middle Neolithic societies in selecting pottery morphotypes for different uses, notably in processing products with heating.

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1. Introduction

In the last twenty years, research on the use of pottery by Neolithic societies has been strongly based on the chemical analysis of visible “foodcrusts” and/or absorbed residues, in order to address crucial issues: the origin and diffusion of dairying (Dudd and Evershed, 1998; Evershed et al., 2008; Salque et al., 2013), the relationships between the introduction of pottery and culinary innovations during the spread of the Neolithisation

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process, the dietary changes or continuity across the Mesolithic/Neolithic transition (Craig et al., 2007a, 2011; Cramp et al., 2014a–b; Debono Spiteri et al., 2016; Heron et al., 2015; Isaksson and Hallgren, 2012; Oras et al., 2016), the use of specific resources and products, such as beeswax or birch bark tar (Regert et al., 2000; Roffet-Salque et al., 2015). In Europe, research about residues of commodities preserved in Neolithic pottery has been conducted mainly in central and northern regions (Copley et al., 2005a–b; Craig et al., 2005a–b, 2007a–b, 2011; Cramp et al., 2014a–b; Heron et al., 2015; Isaksson and Hallgren, 2012; Matlova et al., 2017; Mirabaud et al., 2007; Regert et al., 1999; Salque et al., 2012, 2013), and only recently extended to some western Mediterranean regions (Debono Spiteri et al., 2016;

Salque et al., 2012; Šoberl et al., 2008, 2014). Nonetheless, the relationship between residues and typological/morpho-dimensional features of vessels has been rarely investigated in an integrated approach so far (Copley et al., 2005a; Debono Spiteri et al., 2016; Heron et al., 2015; Matlova et al., 2017; Nieuwenhuys et al., 2015; Salque et al., 2012, 2013; Šoberl et al., 2014). Indeed, the potential of the functional analysis, as a means to develop a broader perspective on the role of whole pottery assemblages made and used in technical systems by Neolithic societies, remains poorly exploited. Particularly, the systematic recording of all range of use-wear alteration (Skibo, 1992, 2013), providing direct evidence of use and pottery functioning (Regert, 2011; Regert and Mirabaud, 2014; Vieugué et al., 2008; Vieugué, 2014), is still underestimated or neglected.

In this context, we focus our attention on the uses of pottery during Middle Neolithic B (MNB - *San Ciriaco* culture, 4500–4000 cal BC) in Sardinia, Italy (Fig. 1,a–b). This island is mainly known for housing one of the four obsidian sources in central-western Mediterranean, the Monte Arci (Lugliè et al., 2006;

Tykot, 1992). Specifically, the MNB-*San Ciriaco* phase is of great interest, due to the role of these societies in developing technical, economic and cultural changes during the second half of 5th millennium BC. *San Ciriaco* culture was first identified on the basis of pottery morpho-typology as a subsequent phase of the original all-embracing Middle Neolithic *Bonu Ighinu* culture (Lugliè, 2003; Santoni, 1982a–b; Santoni et al., 1997; Ugas, 1990), which actually constitutes the first phase of Middle Neolithic in Sardinia (MNA: 4800–4500 cal BC, Fig. 1,b; Sebis et al., 2012). MNB phase corresponds to the full development of Neolithic economy in the island, with an increased number of open-air settlements, possibly linked to farming expansion (Usai, 2009). Faunal remains include ruminant (ovicaprids, *i.e.* sheep or goat, cattle) and non-ruminant (wild boar/pig) species, less frequently aquatic (mollusc shells, fish) resources (Boschian et al., 2001; Lugliè et al., forthcoming; Santoni et al., 1997). Botanical analyses revealed the exploitation of free threshing wheat, naked and hulled barley, legumes and wild fruits (Ucchesu et al., 2017). Interestingly, crucial transformations appear in technical and

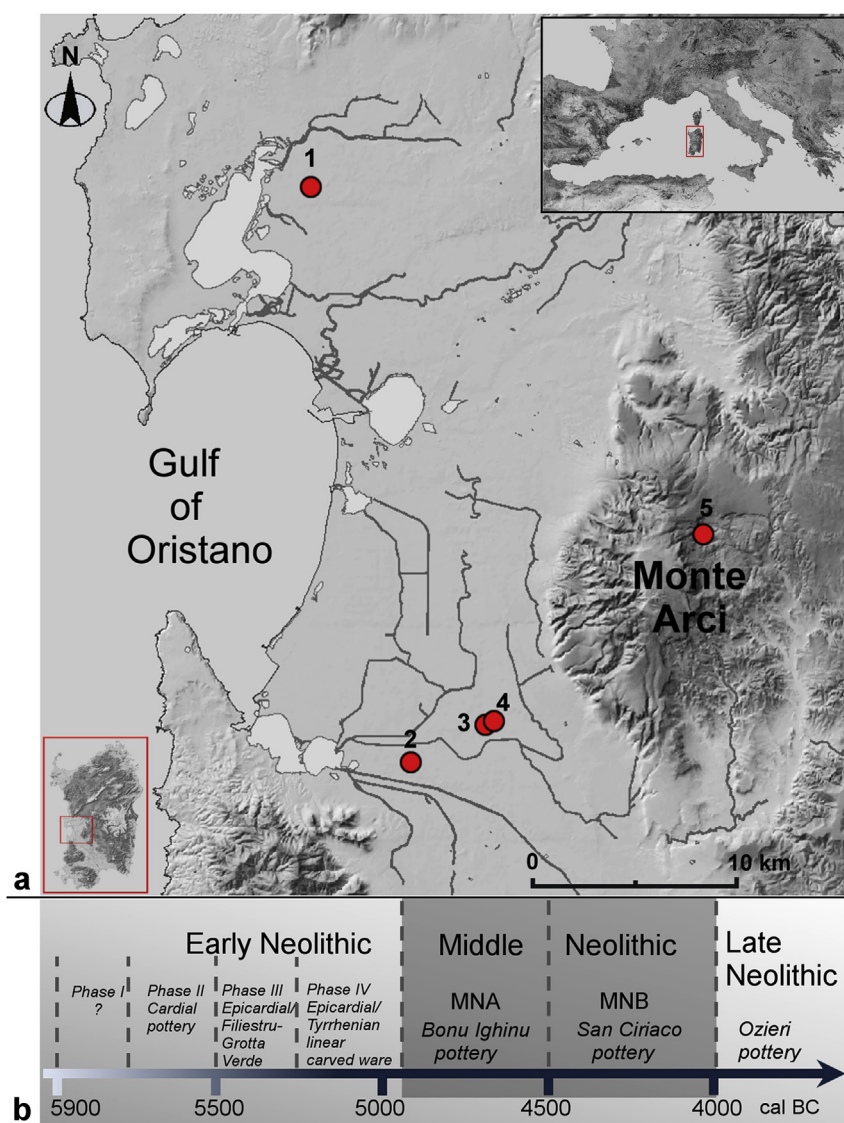


Fig. 1. Geographical and chronological overview on the context of this study: a, location of Middle Neolithic B sites in central-western Sardinia, in relation with Monte Arci obsidian source: 1, Gribaia-Nurachi (OR); 2, Bau Angius-Terralba (OR); 3, San Ciriaco-Terralba (OR), eponym site of the MNB pottery; 4, Su Mulinu Mannu-Terralba (OR); 5, Su Forru de is Sinzurreddus-Pau (OR); b, chronology of Sardinian Neolithic (Fanti et al., 2017; Lugliè, 2012, 2014, in press; Sebis et al., 2012).

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