

Original Study

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Monte Finocchito and Heloros Pottery Production: New Evidence through Technological Studies and Material Analysis

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Abstract: This paper discusses the use of non-destructive portable X-ray fluorescence (pXRF) to distinguish sources of variation in 8th Century BC Greek and Sicilian ceramics. The project comprises an element of my PhD study through La Trobe University, concerning Hellenic colonies established from the eighth century BC in the south of Italy, and on Sicily in particular. This specific case study looks at the relationships established between the indigenous site of Monte Finocchito and the Greek settlement of Heloros, both located in south-eastern Sicily. The results demonstrate the usefulness of the pXRF technique for detecting material variations which are not readily apparent using traditional visual analysis during fieldwork.

Keywords: Archaeology Science, Mediterranean Archaeology, Archaeometry, pXRF, Museum Studies, Archaeology of Colonialism

1 Introduction and Study Aim

During the eighth century BC the east coastline of Sicily was involved in a process of culture transformation as we see in the adoption of some or all of the imported Greek wares, local manufacture of copies of imports, the development of new more sophisticated models that might vary in quality and quantity and the hybridization of different styles, and the invention of new ones. It was in this phase that the early encounters between indigenous people and colonists took place. Traditionally, early encounters were considered as a preparatory phase before Greek colonization (Albanese Procelli, 2003; Antonaccio, 2003; BhaBha, 1990; Delgado-Ferrer, 2007; De Vido, 1997; Hodos, 2006; Hosborne, 1998; Linton, 1940; Malkin, 1998; Tonkin, McDonald & Chapman, 1989; Van Dommelen, 2006; White, 2010), however in accordance with the anthropological and archaeological studies of modern colonialism such encounters of this early period are a different phenomenon and principally they represent a crucial moment that link the indigenous inhabitants and colonists (Dietler, 2010, p. 23). In this regard, discussions of colonization reveal how colonists and the indigenous people are involved in a process of culture transformation. One of the ways to identify the development and trajectory of social change and shifting cultural boundaries is through the study of the production and distribution of ceramic materials. The distribution across different sites, of goods with a specific value, or of particular origins, represents, in an archaeological context, models to interpret possible social systems (Maniatis, 2009; Tite, 1999), identities and political relations (Dietler 2010, p. 215; Sinopoli, 1991).

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In this study, I focus on the change in material culture within the indigenous site of Monte Finocchito at the end of the eighth century BC, and its relationship with Heloros, the Syracusan sub-colony, settled at a short distance at the end of the same century (Figure 1). From this moment onwards, Greek ceramic, in particular Proto-corinthian pottery, circulated at Finocchito. To better understand this culture phenomenon of social interactions, that is recognisable with the increased occurrence of Greek goods into an indigenous context, a multi-disciplinary approach, as previous studies suggest (Dietler, 2005, 2010; Dietler & López-Ruiz, 2009), was undertaken. Therefore, beside archaeological and anthropological methodologies, archaeometric analyses were carried out, using a portable XRF, to fill this gap in knowledge, and to gain detailed information regarding the chemical components of the vessels' fabrics and techniques used. The significance of this research resides in being the first scientific study based on archaeometric analyses of Monte Finocchito and Heloros pottery. This study contributes to the creation and, in some cases, to amplify the database for archaeometric information concerning indigenous ceramic production of sites in south-eastern Sicily (Tanasi et al., 2016). Even though the results reported in this study are still preliminary, the main target was to answer two fundamental questions: is it possible to distinguish sources of variation in Monte Finocchito ceramics? And is it possible to detect potential networks of contact and exchange in relation to the Greek settlement of Heloros?



Figure 1. Map of Sicily.

2 The Study Site: Monte Finocchito and the Greek Settlement of Heloros

Monte Finocchito located to the south-eastern Sicily, lies on the Hyblean Plateau Domain overlooking the Tellaro River (Rigo & Barbieri, 1959; Restuccia et al., 2012; Raudino, 2016, pp. 317–328). Archaeological excavations have revealed that Monte Finocchito was surrounded by indigenous sites located short distances away: Giummarito, Murmuro and Noto Antica. Meanwhile, a Greek outpost, Heloros, was settled along the coastline at the end of the eighth century. Monte Finocchito, and in particular its necropolis,

investigated for the first time in 1892 (Orsi, 1894, p. 157; Orsi, 1896, p. 242; Orsi, 1897, 1899) and later on in the twentieth century (Frasca, 1977, pp. 116–118; 1981), counts around 570 tombs. The necropolis is characterised by rock-cut tombs with a rectangular or semi-elliptical chamber often featuring a short *dromos*. Usually, the entrance was closed by a stone door-slab locked with a wooden bar. In proximity to the entrance was a low ledge on which the head of the dead was lying. The body of the dead person's was generally stretched out on their backs. A few examples of supine positions are also recorded. Normally, the dead were oriented towards the north and were wearing ornaments for clothing, such as bronze and iron fibulae, rings of different dimensions and shape (rectangular or convex), bronze foils and little chains. Vessels had been placed close to the feet, around the body or were deposited in corners. Paolo Orsi, recognising the Finocchito culture as one of the most representative of the third Sicul period, believed that the indigenous sites was populated from the beginning of the ninth century until the latest phase in the seventh century. In the 1980s, Frasca and Steures revisited the archaeological material from Monte Finocchito, proposing a general chronology based on goods typology. Frasca confers three main phases for Finocchito (Frasca, 1979; Frasca, 1980; Frasca, 1981): the first runs from 850/800 to 735/730 BC; the second phase is sub-divided into two main periods (making three phases overall), Phase IIA (735/730 BC to 700 BC) and Phase IIB, dated between 700 and 665 BC. This chronology also accords with the final phase proposed by Bernabó Brea for the Sicilian Iron Age (Brea, 1957), dated between 730 and 650 BC. In contrast, Steures (1988) proposes a different chronology: here, the earliest phase runs from 750 to 730 BC, while a transitional phase is dated between 730 and 715 BC, with a final period between 715 and 690 BC. Scholars often connect the abandonment of Monte Finocchito with the foundation of Heloros (Copani, 2005, 2010), considered the first Syracusan sub-colony even though ancient sources were not referring to its foundation, but were only describing it as a Syracusan *phrourion* (Aelian, Hist. An., XII, 30). The Greek settlement, located, as well as the indigenous site, along the coastline of the Hyblaean Plateau, 400 metres north of the Tellaro River, was probably already founded at the beginning of the eighth century BC, and more relevant for this research, the archaeological excavation shows how an indigenous sites probably preceded the Greek Syracusan sub-colony, with the discovery of ceramic, mainly proto-Corinthian pottery as well known at Monte Finocchito (Militello & Piscione, 1965; Voza, 1968–1969, pp. 360–362; Voza, 1970; Voza, 1973a, pp. 189–192; Voza, 1973b, pp. 117–126; Voza, 1976; Voza, 1980; Voza, 1980–1981, pp. 685–688; Voza, 1989, pp. 159–163; Voza & Lanza, 1994; Voza, 1997; Voza, 1999, pp. 113–120). Therefore, the discovery of an apparent indigenous site populated before the Greek settlement is vital for understanding the connection between the indigenous populations of south-eastern Sicily and the first Greek colonists.

3 Methodology (pXRF)

Portable X-ray fluorescence (pXRF) was employed to distinguish sources of variation in Monte Finocchito ceramics and detect potential networks of contact and exchange with Heloros. In this specific case study the pXRF technique was useful for detecting material variations, which are not readily observed using traditional visual analysis. To be more specific, this method indicates the raw materials used during the manufacturing process, it also verifies or refutes the presence of outliers and distinguishing imitations from imports. pXRF spectrometry is a handheld instrument capable of non-destructive, high-resolution analysis. The instrument used during the fieldwork was a handheld Bruker III-SD, capable of determining the bulk chemical composition of the analysed specimen. This technology uses the interaction of X-rays with a specific sample to determine its elemental composition. A filter, designed for this specific material (ceramic ware) was used to increase the precision of the results. A total of 200 ceramic samples were selected and analysed for the purpose of this study. The portable X-ray was set up to trace six chemical elements, in particular barium (Ba), rubidium (Rb), strontium (Sr), yttrium (Y), zirconium (Zr) and niobium (Nb) which researchers have used with success in determining sources and derivatives for ancient ceramic potsherds (Speakman et al., 2011; Tykot, 2002; Tykot, 2012, pp. 274–279; Tanasi et al., 2016). The data obtained was subjected to a principal component analysis (PCA) in order to calculate the variation between the ceramic samples selected. The X-ray beam interacts with the sample atom by displacing electrons that occur when

the X-ray beam energy (photon) is higher than the energy of the electrons with which it interacts. Indeed, the intensity of the primary X-rays has to be high enough for producing quantitative results (Tykot, 2016). The electrons are always fixed at a specific energy into an atom and this determines their orbits. Hence, when an electron is ejected from an atom, consequently a photon (X-ray beam) is ejected. Therefore, each element produces specific fluorescent X-rays, a kind of fingerprint, that are unique for that specific component (Liritzis & Zacharias, 2011). The pXRF spectrometry is characterised by an external vacuum generator that enables identification of elements through surface analysis and avoids destructive analyses. Since the pXRF usually penetrates only 1mm (Tykot, 2012) the surface of the sample has to be flat and clean to provide a sufficient area for analysis because if the surface is irregular it is not possible to obtain reliable results as the low-energy X-rays are sensitive to interference (Forster et al., 2011, Tykot, 2016, p. 70). In particular, a flat surface allows multiple assays on each sample. Before proceeding with the analyses, the surface of each sample has to be cleaned to avoid any possible contamination. In this specific case study, analyses were taken on flat surfaces and each sample was examined twice, both on the inner and outer surface. All of the ceramic samples were larger than 5x7mm and thicker than 2mm (Tykot, 2016, p. 44; Shackley, 2011), since previous studies suggest that to have a decent level of accuracy the sample size cannot be smaller than 10mm in dimension or thinner than 2mm (Shackley, 2011). For the purpose of this research 200 samples of potsherds were chosen, the majority from the Finocchito tombs, while a smaller group of 33 samples was selected from Heloros. The selection criteria for ceramic samples was based on their stylistic attributions, morphological characteristics, and also the provenance of each single vessel, which was documented based on the Paolo Orsi notes. However, as observed by Steures (1980; 1988), often Orsi attributed the same number to more than one tomb, creating confusion. To avoid such an issue, only the artefacts recorded correctly are included in this study. This was also the methodology of Steures. As mentioned before, to avoid any alteration in the data assessment, potsherds which were glazed or which were painted ceramic were excluded from the sample of artefacts to be analysed. For this reason the majority of vessels selected for this project are unpainted, while in the rare instances when painted vessels were included, analyses were conducted on the surface areas free from paint. For a better result, each sample was cleaned before the analysis to eradicate any contamination from soil or dust remains since both the inner and outer surfaces were analysed to obtain the general chemical composition. Additionally, more than one spot was analysed to be sure that the instrument was able to analyse the surface correctly. If one of the test locations selected was not cleaned properly or it was irregular, the instrument was able to use the data collected from the other two. This method is always used to avoid delays with the analyses. The potsherds analysed include all of the pottery types known from the archaeological grave goods and from the all periods of Monte Finocchito. The types tested included hand-made and wheel-made medium and large bowls that represent the most common vessel in the funeral sphere. Other shapes include amphorae, jugs, *askoi*, pots, trefoil *oinochoai* and later types, influenced by Greek manufacture, such as *kyathoi*, *kotylai*, Thapsos cups, *kylixes* and also large carinated bowls with two or three handles and incised decoration (Frasca, 2011, pp. 83–276; Albanese Procelli, 2009, pp. 327–340). Meanwhile, Heloros potsherds (33 samples) comprised of Thapsos cups dated ca. 750–690; closed vessels generically dated to the seventh century; *kotylai* dated to between the end of the eighth century and 550; cups related to the seventh century and an Argive krater dated at the beginning of that century. The selection reflects the availability of the archaeological material at the Paolo Orsi museum.

4 Results

This first preliminary analysis of 200 ceramic samples shows how Monte Finocchito and Heloros potsherds are different clustered groups. The scatterplot created in order to view different clustered groups and based on the PCA answered to one of the main question of this preliminary study. Significantly, the results display how Monte Finocchito is characterised by a large and compact cluster which are distinct from the Heloros potsherds that instead are gathered into two different main groups (Figure 2). As the scatterplot shows, the Monte Finocchito vessels correspond to the group with black dots, while the red dots, clustered in two different groups (Eloro 1 and Eloro 2), correspond to the potsherds from Heloros. The analysis

results suggest that the clay used for the Finocchito potsherds came from different sources and it was used indifferently for all of types of vessels and for the whole period. In addition, the data set shows that only four imports and three outliers are present amongst the 200 samples analysed from Finocchito. Meanwhile the Heloros clusters are characterised by potsherds using specific clay for each group. In this case, the correlation between style and chemical elements is quite strong and it suggests that a specific clay, instead of a mixture clay, was used for these vessels groups.

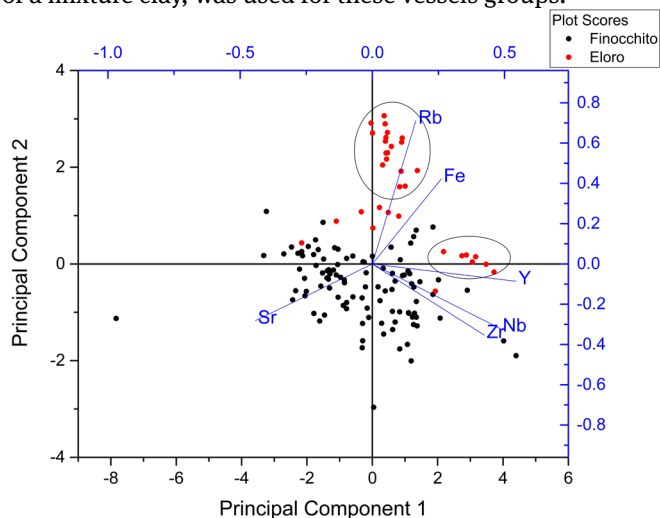


Figure 2. Scatterplot showing the ceramic groups from Monte Finocchito and Heloros.

In regard to the possibility of detecting potential networks between Finocchito and Heloros, the PCA also pointed out that two Proto-corinthian cups E21 (Inv. VI/40) and E213 (Inv. S.n.)¹ from Heloros, named “Eloro 4” in the scatterplot (Figure 3), have a similar trace element signature to the potsherds of the main cluster of Monte Finocchito. Since both Proto-corinthian cups (Figure 4) had already been identified amongst the most ancient potsherds from the Greek site and dated at the end of the eighth century, the archaeometric analysis supports the theory that an indigenous site preceded Heloros. Moreover, the scatterplot shows how the archaeometric analysis detected the presence of three outliers and four imports amongst the potsherds from Finocchito.

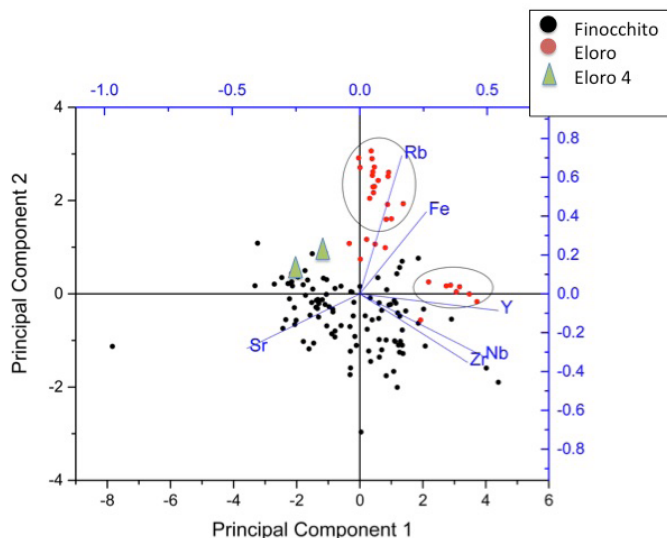


Figure 3. Scatterplot with Eloro 4.

¹ The Proto-corinthian cups are exhibited at the Paolo Orsi Museum.



Figure 4. Proto-corinthian cups E21 and E213.

5 Conclusions

In the belief that archaeometric analysis are a valid support for understanding the process of culture transformation in the field of archaeology of colonialism, the primary focus of this paper was to identify, utilizing pXRF spectrometry, the chemical characterisation of the Monte Finocchito ceramics, but also to determine if differences in material culture occur between Monte Finocchito and Heloros. As previously described, the main scatterplot shows that all of the types from Monte Finocchito are clustered within a same large group suggesting that different fonts of raw clay were equally employed for any type of vessel and that the clay was probably collected within a close and easily accessible distance from the site. Even though we can imagine that local exchange activities by indigenous populations were possible, the results suggest that the indigenous inhabitants of Finocchito did not interact much, if we look at the exchange in material culture, with the neighbour groups, probably because of a strong identity or as the consequence of geographical and economic condition. Even though new vessel types were introduced to the indigenous funeral sphere, influenced by the Greek culture, the manufacture was local and the imitation vessel's are low in number. Therefore, the data set suggests that for the whole period the indigenous ceramists manufacturing vessels at Monte Finocchito employed the same kind of clay mixture without modifying the fabric or technique over, and using it for a range of different types of vessels. The outcomes suggest how the indigenous society maintained its own identity in ceramic production. These new data provide not only a greater understanding of the level of ancient ceramic technology but also the social, economic and cultural implications. In regard to the ceramic samples imitating Greek artistic products, there are three main aspects that I wish to highlight; while the style of the vessels was Greek, the manufacture was indigenous but at the same time the sophistication of several vessels implies a major specialisation. At Monte Finocchito there were no samples of original Greek vessels to imitate, indeed all of the proto-corinthian types circulating were locally made. Hence, I believe that it was not an exchange of pottery through commercial relationships but rather that, in this archaeological context, these early contacts were based on the exchange of skilled labour. Probably, considering the quality of the vessels, these workers were itinerant Greek pottery-makers or young apprentices collaborating with local ceramists (Papadopoulos, 1996, pp. 450–461; Williams, 1986, pp. 295–304). In addition, the possibility that an indigenous site preceded Heloros and that the ceramic production is alike to Finocchito's allows a re-interpretation of the indigenous layout of these groups. Even though the results here presented are only preliminary and part of a wider research project, they give us the opportunity to interpret such variety of relationships and connections during this fundamental phase.

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