ARCHAEOLOGY AND ARCHAEOMETRY OF A LOCAL PRODUCTION OF BLACK GLAZED WARE AT POMPEII

The paper focuses on a local production of Black Glazed ware attested in Pompeii between the mid-fourth and the early-third century B.C. The ceramics thereafter presented were found in a specific archaeological deposit termed as X B11, brought to light in stratigraphic excavations undertaken in the forum area in 1980/81 by P. Arthur on behalf of the local Superintendence [1]. The pottery assemblages retrieved have been the object of a research project directed by one of the authors (D. Cottica) aiming to their full study and publication [2].

Deposit X B11 is a levelling layer found to the north-west of basilica; it was characterized by the presence of abundant discarded ceramics, especially Black Glazed pottery (thereafter abbreviated as BG), “Gnathia style” BG Ware, “Gnathia (style) ware” with reserved or band-decorated external surfaces, Red Figure ware, Hellenistic band-decorated ware [3]. Several misfired pottery sherds were found within the same assemblage, together with numerous kiln-spacers. The majority of the ceramics and all kiln-spacers had a distinctive cream coloured fabric (Munsell 10YR 7/4-8/4) and the whole context could be interpreted as the output of one (or more) pottery kiln(s). From a chrono-typological point of view the kiln-spacers can be dated from the end of the V century B.C. to the beginning of the III B.C., while the morphological repertoire of BG ceramics, “Gnathia Style” BG ware [4] and Red Figure ware [5] found numerous *comparanda* in the mid IV-early III century ceramics. In addition, some BG forms belong to an earlier tradition well attested in the Campanian region at sites such as Fratte and Pontecagnano.

All the above described operations should be considered preliminary in each study, which also includes archeometric analysis.

The distinctive BG ware from X B 11 is present in several other contexts from the 1980/81 excavations at the Forum of Pompeii and is attested in various deposits from recent excavations carried out by the University of Venice in Regio VI and V [6]. In these various contexts BG ceramics with cream colour fabric are present with a morphological range dating as far as the II-I century B.C. A macroscopic comparison between the earlier BG ceramics from X B 11 and their later successors (not present in X B 11) reveals that some little differences in glazed appearance and fabric texture

exists between the two series, which we termed “BG Pompeii Forum Series A” and “Pompeii Forum Series B” respectively.

Archaeometric research was then undertaken in order to better characterized the homogeneous pottery assemblage found in X B11 and to compare the BG ceramics falling within the Series A and B. Complementary spectroscopic methods (Optical microscopy, X-ray fluorescence, Raman microscopy and microanalysis -SEM/EDS) were used to characterize ceramic body and black coating of BG pottery classified by Pompeii Forum Series A and B. In addition, clayey sediments from Salerno were sampled as a potential source for the production of these ceramics and therefore investigated with the same analytical techniques. Moreover, the kiln-spacers and BG ware related fragments (such as “Gnathia style” ware, Red figured ware and so forth, see above) from deposit X b 11 were analysed and compared.

Optical microscopy revealed a simple fabric for both sets of ceramics. In each fabric, the groundmass is brownish in colour and very fine. The non-plastic inclusions show maximum grain size of 0.15 mm for Pompeii A and Pompeii B samples. Both groups are represented by microcrystalline quartz, plagioclase, rare white mica and opaque oxides. Calcite was mainly found as fine microcrystalline grains scattered in a clay matrix or concentrated in the pores. Rare are the remains of microfossils. The samples did not show any volcanic temper. The differences between the two sets of ceramics are essentially due to temper–groundmass ratio: about 2% for the VN group and 4% for the VL group.

From the chemical point of view, calcareous clayey materials (CaO contents >10%) were employed for the ceramic productions. The chemical similarity shown by XRF analysis, in particular regarding distribution patterns of trace elements, suggests that the same clay sources were probably used for both sets of pottery. The chemical affinity such as the similarity of the trace element concentrations of the two ceramic groups may be explained by similar rock types exposed within the catchment area of the clay deposits used for ceramics production. The small differences between the major element concentrations are most probably a consequence of the different sedimentation conditions and/or alteration history of the source rocks in the catchment area of the clay deposits. It is not excluded that the technological processes have undergone changes over the centuries in the production of black-Glazed pottery. In addition, SEM analysis showed that the Pompeii A pottery is characterized by a sintered coating in which small bright crystals with high iron oxide content are wide-

spread. Magnetite, hematite and Hercynite represent the mineralogical phases recognized by Raman microscopy. The later production Pompeii B is characterized by a completely vitrified glaze containing only magnetite. The differences are due probably to the different firing practice; in particular, as regards the reducing step, that is, the values of the temperature and period of duration of this phase and the cooling rate [7].

The absence of volcanic temper and the presence of microfossils as shown by petrographic analysis attest to a non-volcanic origin of the raw materials. Probably the supplying of raw materials, suitable for the production of BG ceramics at Pompeii were available in an area not close to site; Pena and McCallum [8] suggested the use of clayey materials from the Salerno area. Two outcrops were selected 8 km (Ogliara) and 28 km (Montecorvino Rovella) away from Salerno: five samples respectively, were collected from Ogliara and Montecorvino Rovella sites. Clays were sampled at regular intervals from deposit. The analyses performed on the clayey materials collected in the Salerno area provide much evidence for compatibility in the compositions of sediments and the Black Glazed ceramics.

A petrographic comparison between a clayey test specimen fired at 900 °C and two representative ceramic samples shows that the fired specimen have a similar simple petrographic and mineralogical composition of the analysed BG ceramics illustrated above, in particular for the presence of quartz, plagioclase and micas but also of remains of microfossils. The grain size distribution of the aplastic inclusions is highly compatible. However, the higher percentage of remains of microfossils in the fired clay corroborates the possible levigation of the raw materials before the production of the ceramics. Geochemical data obtained from XRF analysis was very useful in this study allowing to make a comparison between ceramics and clays and to test the local provenance and the possible use of Salerno clays for the production of the BG pottery from Pompeii. The analysed ceramics are compositionally quite homogeneous, as are the clayey sediments sampled from the Ogliara and Montecorvino Rovella sites.

Comparisons by binary diagrams between analysed ceramics and Salerno clays, showed a great compatibility among ceramics and clays for both selected major oxides (SiO_2, Al_2O_3, Fe_2O_3) and trace elements (Ni, Cr, Zr, V). A slight difference was observed in the SiO_2 vs. CaO plot in which a higher content of CaO (average 15%) characterizes the clays than the ceramics (average 12%). This may be due to

the refinement of the raw material from impurities including fossils that would explain the indirect decrease of calcium and enrichment of silica contents in the ceramics produced [9]. This suggestion was confirmed by petrographic analysis and by trace element contents, particularly important in studies of provenance. The variations of the chemical composition of the ceramics are insignificant and not necessarily related to use of different raw materials. The Principal Component Analysis (PCA) clearly put in evidence the great similarity of the Black Glazed pottery from Pompeii and the Salerno clays analysed here, on the basis of selected major and trace elements SiO2, Na2O, TiO2, Fe2O3, K2O, MnO, Al2O3, Zr, Sr, Nb, Cr, Rb, Y and Ni [10].

Further archaeometric investigation has recently be undertaken in order to characterize the BG related wares found in deposit X B11 such as “Gnathia Style” ware, Red Figured ware and so forth. Preliminary results obtained by XRF, have shown a great compatibility between these ceramics and BG pottery Pompeii Forum series A and B for both, major and trace elements. This result allows us to indicate probably, the use of the same raw materials for these different ceramics classes. In particular on the basis of major elements and trace elements here selected, Al2O3, CaO, Ni and Cr (diagrams A), ceramics in “Gnathia Style” and related wares showed a greater similarity with the Pompeii Forum series A specimens. This allows to indicate probably a different production technology than the Series B. The results confirm that the “Gnathia Style” BG ceramics were produced with the same production technology of the Series A: indeed, they were found in the same production archaeological context (deposit X B11). Further analyses on the black coating of “Gnathia Style” ceramic sherds are in process, with the aim to emphasize the similarity with Pompeii A pottery.

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[1] Arthur 1986.
[2] For the general project and location of X B 11 cfr. Cottica 2007; Cottica – Curti 2008. An overview of preliminary advancements on ceramic study and analysis can be found in: Cottica et al. 2010; Schneider et al. 2010; Cottica et al. 2017.
[3] The most common forms are: *lekanides*, *pissidi* and *lekythoi*.
[4] Predominant forms are *kylikes* stemless, small *kylikes* stemless and cups with everted rim.
[5] Fish plates are especially attested within this group cfr. Cottica et al. 2010, Fig. 1.
[6] Coarelli et al. 2001-2002; Coarelli et al. 2003, 305-309; Cottica et al. 2006; Cottica et al. 2008; Zaccaria et al. 2006.
[7] More data can be found in Scarpelli et al. 2014.
[8] Peña – Mccallum 2009, 166–169.
[9] Kilikoglou et al. 1988.
[10] More data and discussion on clay analysis can be found in: Cottica et al. 2017.

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