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Pottery from Sant'Imbenia (Sardinia, Italy): functions vs decorations

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***Abstract* – The Nuragic site of Sant'Imbenia in Alghero (north-western Sardinia, Italy) was inhabited approximately between the 14th and the 7th century BC. During the last centuries of its life, Sant'Imbenia lived a population of locals and foreigners, i.e. Levantines and, probably, Greeks. It is obvious that as well as goods and raw materials. At Sant'Imbenia by these exchanges and contacts it was developed a new local pottery production: in it converged local taste and "foreign" knowledge. After nine years of research and analysis we have realize a new classification of the pottery produced in the site from the beginning of the IA (10th-8th centuries BC). In this paper preliminary data on production technology of local wares will be presented: they were obtained by archaeometric analysis (MOP, IA, XRD, XRF) on pottery and raw materials sampled in a large area around the site. This part of the work is, in our opinion, fundamental in order to realize an archaeometric and technological classification of material that has to support the pottery typology.**

Keywords: archaeometry; Iron Age; local production; Nuragic; pottery technologies; Sardinia.

I. INTRODUCTION

The excavation of the Nuragic site of Sant'Imbenia has begun again in 2008 together with an archaeometric and technological analysis on pottery. The first aim was the individuation of particular technological aspects of the site which, jointed with the identification of the raw local clay, allows the analysis of a local production. It was also important to understand how deep was the link between social, cultural and economic transformations and changes in the technologies and the production of local pottery. We think that between the Late Bronze and the Early Iron Ages critical transformations happen in connection with the arrival in this area of foreign merchants who brings with them craftsmen: they have spent some time in the site bringing their culture, technologies and knowledge [1]. Its transmission is one of the most important features of this phase. From contact and exchange of ideas, technologies and abilities new pottery shapes are created: they are not part of the older set of Nuragic tradition but are the result of the development reached through shared technological skill and a different taste for new shapes and decorations.
For this reason a Sant'Imbenia during the Early Iron Age we can observe both foreign shapes and typologies realized with a Nuragic touch or pottery of Nuragic inspiration realized with non-Nuragic technologies [2].
To develop this process it was important
To do that the artisans should know and select raw materials in relation to their creations, considering the countless variables in the producing process: great importance is given to the potter's ability on the control and presence in the pottery production process in order to conform shapes and decorations. The differences observed among different groups of pottery sherds can be brought back both at the mineral composition of the pottery and to different processes of moulding and baking. A form of specialization in the production can be connected to a deeper knowledge and wider experiences which are not the result of experiments on single pots but that are can be seen as the result of a conscious technological path by a group of specialized craftsmen. The individuation of the clay caves, their distance from the site, the analysis of the decantation of them, the selection of additives, let us to suppose that there were craftsmen dedicated to the ceramic production, with definite skills, far from the familiar pattern known until the Late Bronze Age.

II. GEOLOGICAL SETTING

The geology of the area consists mainly of Mesozoic layers, which rest on quaternary deposits related to alluvial fans and/or flat braided channels, and wind dune fields of Würm age. The Triassic consists mainly of dolostones, dolomitic marls, chalk marls and clay with foraminifers. Only a couple of miles north of the site of Nuraghe Sant'Imbenia the Triassic is characterized by continental facies, consisting of the typical red Buntsandstein sandstone. In particular, in the outskirts of the settlement, Triassic dolostones and sandstones outcrop with carbonatic cement. The Jurassic and the Cretaceous deposits consist of platform carbonates: mainly dolostones, limestones and marl. On the top, volcano-sedimentary successions and lacustrine deposits

of the early Oligocene-Miocene outcrop [3].

III. MATERIALS AND METHODS

The sample collected at Sant'Imbenia on pottery of the Early Iron Age were divided into groups following their technological features which were macroscopically recognizable and on their functions (kitchen, table and preservation wares; transport amphorae) being conscious that similar pots may have had more than one function. We have created some technological set which include typological and morphologic differences given by Campus & Leonelli: they will be widened analysing the pottery found in each area. The technological process, a distinctive and innovative criterion in different phases, was studied in a backwards route in all its phases, from the finished pot to the quarrying of the raw clay. We have operate a distinction among technological and functional options: the raw material to use, the washing of the clays, the reduction of the thickness of the vases, the options given by the fashion; options given by taste or fashion as the creation of new shapes, their decoration. On all these options we have asked ourselves if the vase were realized randomly or by a distinctive will.

The pottery analysed during these nine years are numerous: we have sampled 350 of them for their peculiar clays or surfaces visible to the naked eye: these samples were analysed at the stereomicroscopy, with a portable colour analysis, and with the Munsell tables, XRD and XRF, thin sectioning analysis with a polarized optic microscopy, and imaging analysis.

IV. RESULTS AND DISCUSSION

The creation of different types of shapes and productions, in our opinion, must be found in a conscious selection of different and specific technological ways connected with the function of the vase. The kitchen, table and preservation wares were divided into three classes and received an acronym to be recognized: *Co.Sa.* (Comune Sarda= Sardinian Common ware), *Ne.Sa.*(Nera Sarda = Sardinian Black ware), *Ros.Sa.* (Rossa Sarda =Sardinian Red ware).

Co.Sa: this class is represented and make a group of many shapes which have different functions (Fig. 1). Belong to this group cooking wares, as jars, saucepans and milk-boilers, table ware as cups, bowls and dishes, transport amphorae [5], and storage vessels. In this class can be counted the 30% on the whole amount of the table ware, the 60% of the cooking one, and the 56% of the storage vessels. This pottery can be recognized for the absence of any specialized surface treatment, but show smoothed and polished surfaces without any coating.

Jars can be divided into two groups: one is characterised by smoothed surfaces with many additions, thinly scattered and high porosity; the impressions of the smoothing action are deep, random direction and horizontal modulation; the other has polished surfaces with a more refined treatment, extended and low porosity; the impressions of polishing are not deep, parallel direction and with horizontal or vertical modulation. The internal surfaces received a better treatment, with very low porosity or absent. All the jars analysed show smoking traces on the walls and at the base, where they are heavier: it means that these shapes were user to cook or warm food and the internal impermeability satisfied these functions.

For the external surfaces, the different choice of treatment does not mean any technological significance, but it seems to be connected to fashion or a decision take by the craftsman. The jars, following a Nuragic tradition, were hand-made, using possibly some little clay slabs joined; handles were fitted later through some holes in the walls, visible to the naked eye, and the rime added at the very end.

When the vase vas realized the work continued with perfecting the shape, the smoothing and polishing on the surfaces. The additions and the wider pores has usually the same direction, perpendicular to the pressure made on the clay while the vase was moulded [4].

Saucepans show an internal surface polished, poorly porous, while the external one was smoothed or coarse, often with straw or boxes traces used during the moulding. The treatment of the internal surfaces was imposed by the functional need, like that of no penetration of food or not sticking on the walls. All the vases were hand made.

The milk boilers of Co.Sa. are very few; surfaces are smoothed and polished and poorly porous. The treatment is extendet to the whole of surfaces and there are parallel traces and vertical course. These vases were hand made with the "colombino" technique, easy recognizable to the naked eye and to the touch.

Among the table wares, cups, bowls and dishes has all intenal surfaces polished, smooth and waterproof; the external ones may be both smoothed or polished. The last ones the treatment is homogeneous on the whole surface; we can frequently observe the traces left by rubbing probably made with hard tools, like pebbles, with a parallel course and horizontal direction.

A group of samples were realized with the "colombino" technique, as suggested both by the orientation of pores and additions, horizontal, and by the observation of the walls which on the internal surface present the lines of the "colombino". The process was ended by the smoothing, using perhaps a slow wheel [5] which has contributed to the alignment of pores and addictions.

The use of a slow wheel is an innovation in the San'Imbenia pottery production introduced by the end of the Final Bronze Age [6]. The other samples were probably made with the slab technique; the pores and the addiction are perpendicular to the pressure made during the moulding. Samples of this group show frequently

irregularity in the thickness of the walls, thicker in the central part. The handles, as well as with the jars, were added later [2]. Storage vessels have poorly smoothed surfaces, with additions of big dimension emerging by the walls. They were hand made and are of big dimension.

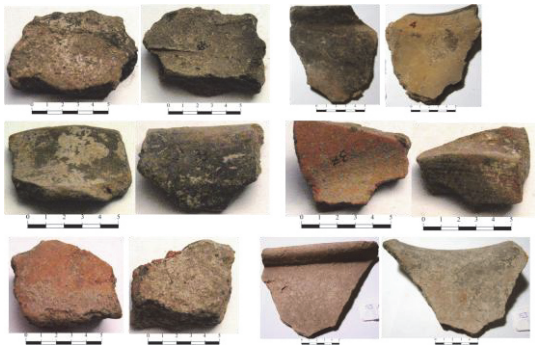

Fig. 1: Sherds of *Co.Sa.* In the first two pictures a saucepan (SI39) and a jar (SI4); the external surfaces of both vases are smooth, even if on the jar the treatment was more accurate and the surface is more smooth and regular, with traces of smoke. The internal surfaces are polished. The third (SI33) and fourth pictures (SI38) are of a cup and a bowl: the first one shows both the surfaces smoothed and polished; the second one has the external smoothed and the internal polished. The last two pictures show a storage vessel (SI77) and a S. Imbenia amphora (SI18) with both the surfaces smoothed.

Ne.Sa.: this class is very well represented and is the nearest to the Nuragic production. As the name of the class tells, the main feature is the black colour of the walls and clays, which cover the grey gamma. This is the result of mineralogical and petrographic characters of the clay, together with the firing temperatures and the kiln atmosphere. Belong to this class both table wares, cups, bowls, askoid jugs, cooking wares represented only by jars, being absent saucepan and milk boilers (Fig. 2). In this class can be counted the 27% on the whole amount of the table ware, the 40% of the cooking one.
The surfaces are burnished on one or both side; when the internal one is burnished, the external is polished.
In comparison with the shapes attested in the Co.Sa., we have seen that the moulding and the treatment of the surfaces are made more accurately.
The walls are thinner and the thickness is more regular; ware are more cleaned and sherds are harder and more resistant. A higher number of sherds was realized with the slow wheel.

Fig. 2: pictures of some samples of *Ne.Sa.* In the first two pictures an open shape, a cup or dish (S16): the external surface is smoothed, the internal is burnished; on the latter it was carried a porosity analysis looking for the time of absorption of a drop of water left on the surface: after three minutes the drop of water did not loose its round shape, being the waterproof total. The fourth picture shows a bowl (SI65) very well known at Sant'Imbenia; the fifth (SI62) and the sixth (SI63) pictures are sherds of askoid jugs.

Ros.Sa.: this class is a new entry in the ceramic production of Sant'Imbenia during the Iron Age and it has a wide diffusion; This class counts the 43% on the whole amount of the table ware, and the 44% of the storage vessels. From the exchange of technologies and ideas with foreign craftsmen, a new fashion was created with vases characterised by red surfaces.
This is not an imitation of the Levantine red slip, which is distinguishable by the local production for a different tonality of red and for the thickness of the slip: it is a re-elaboration made at Sant'Imbenia with its own original and peculiar features typical of this production.
There are mainly table ware, little jars cups, dishes, bowls askoid jugs and storage vessels (Fig.3).
The surfaces shows always a red coating, both an engobe or a partially vitrified slip. The steps of the technological route were realized with a great attention and the result are the very thin walls, very clean clays, coatings perfectly adherent to the walls which were waterproof. Externally the treatment covers the whole surface, while internally we have to make a distinction between close and open shapes. On the close ones the engobe or slip covers only the internal rim or at the beginning of the shoulder of the vase; on the open ones instead we have both a complete cover all over the internal surface or a localized treatment on the upper part of the vase while the rest vas polished and impermeabilized.
Quite frequently some fault can be seen, the straining of the coating, in the internal surface of the close shape usually less refined: these data shows that the coating was applied in for of a liquid clay, *barbotine*, when the vase was dry, hard as leather, but not fired.

Fig.3: picture of some sherds of *Ros.Sa.* In both cases we have open shapes with the internal surface polished and waterproofed, and the external one with an engobe in the first sample (SI44), slipped in the second one (SI43). We can appreciate the good quality of the coating (even if the engobe shows a darker stain created during the firing) homogenously extended and perfectly adherent on the surface.

V. CONCLUSIONS

This paper represents a starting point for an experimental classification of the Sant'Imbenia pottery locally produced during the Iron Age both typological and technological. It is important to underline that, even if in this preliminary phase, clear features are emerged: they allow to recognize peculiar features of the technological process and to identify these classes as typical productions of Sant'Imbenia. In the future new excavations and analysis will make possible a better characterization of the pottery produced during the Iron Age, in order to fix in a better way the pottery classes we have recognized.

Co.Sa. (Sardinian Common ware): this class is well represented and presents many shapes with different functions: pottery used in the kitchen (jars, saucepans, milk boilers), on the table (cups, bowls, plates), transport amphorae, preservation vases as dolia. The 30% of the table wares, the 60% of the kitchen wares and the 56% of the preservation wares are part of this class. These vases can be distinguished for the absence on a specialized surface treatment even if they are smooth or polished without coating.

Ne.Sa. (Sardinian Black Ware): also this class is well represented and it is probably the nearest to the Nuragig productions. The main characteristic is the black colour of the surfaces and of the whole clay: this is given by the mineralogical and petrographic characteristics of the raw clay in relation with the baking temperature and to the kiln atmosphere. Table (cups, bowls, plates, askoid jugs) and kitchen wares (only jars, missing the saucepans and milk boilers) belong to this class. In this class there is the 27% of the table wares and the 40% of kitchen ones. One ot both the surfaces are burnished: when the internal is burnished the external is polished.

Ros.Sa. (Sardinian Red Ware): in contrast with the other two classes, the *Ros.Sa.* is a newcomer in the Sant'Imbenia pottery production during the Iron Age and has a wide diffusion. The 43% of the table and the 44% of the preservation pottery are part of this class. Among the table wares there are little jugs, cups, plates, bowls, askoid jugs and preservation vases. The surfaces shows always a red coating, both burnished or partially glazed slipped.

We have then crossed the technological data with those coming from the archaeometry and we have observed that there is not an exclusive use of one clay for a single class. Anyway is clear the selection of the added minerals and of clays that were better used for different functions: we can understand the high percentage of impasto n.2 among kitchen wares (both *Co.Sa.* or *Ne.Sa.*), with the volcanic minerals added: they let the clay more suitable to its continuous use on the fire.

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