EXARC Journal 2018/1
20 Articles | Open Access

Reviewed Article:

Some Remarks on Technological Process of Tartessian Pottery

Persistent Identifier: https://exarc.net/ark:/88735/10331

EXARC Journal Issue 2018/1 | **Publication Date:** 2018-02-25

Author(s): Michał Krueger [1] ✉, Marta Krueger [2], Karol Jakubowski 2

[1] Wydział Archeologii, Uniwersytet im. Adama Mickiewicza w Poznaniu, ul. Uniwersytetu Poznańskiego 7, 61-614 Poznań, Poland.
[2] Independent researcher, address withheld by the editors (GDPR), Poland.

The main aim of this research is to recognise some aspects of the technological process of pottery production including: raw materials acquisition, preparation of clay paste, forming and firing of Tartessian vessels in the Early Iron Age. The land of Tartessos, now the Lower Guadalquivir region in western Andalusia, was deeply influenced by the newcomers from the

Eastern Mediterranean (Celestino and López-Ruiz, 2016). For scholars who specialise in the archaeology of the Tartessian region, it is common to deal with ceramic vessels which were made by two different techniques: hand-made and wheel-thrown. One of the key sites of that land is Setefilla (See Fig. 1) excavated by George Edward Bonsor in the 1920's (Bonsor and Thouvenot, 1928) and by María Eugenia Aubet, who carried out several archaeological campaigns in the 1970's (e.g. Aubet 1975; 1978). This paper makes an attempt to examine the Tartessian ceramics not from a traditional typological posture seeking the chronological sequences, but from an uncommon approach, where experiment plays an important role. The goal is to shed light on these still relatively weakly recognised aspects of the study of the pottery from the South-western part of Iberian Peninsula. At the beginning of the Iron Age there was a marked advance in technological knowledge, a process which is particularly visible in the pottery production.

> “Until now, no correlation between the specific form of Tartessian vessel and clay paste was established and no specific details of the technological process were presented. Thanks to reexamined materials from Setefilla, some general observations can be drawn.

State of the art

The main idea of undertaking experimental studies on the technology of Tartessian pottery is a consequence of a lack of similar research. There are several works on typology (Ruiz Mata, 1995; Morgenroth, 2004), spectrometric (Krueger and Brandherm, in press), and petrographic analysis (Bartkowiak and Krueger, 2015) of the Tartessian vessels, although published experimental studies are absent. Previous petrographic analysis undertaken by our group was based on 38 selected sherds from Setefilla, fragments of typical forms of Tartessian pottery. Among the analyzed ceramic assemblage, it was possible to identify only a few forms of vessels such as eight à chardon pots, two bowls, four biconic urns, one globular vase and two plate fragments. As a result of petrographic analysis, it was possible to discern eight fabric groups. These groups were subsequently collated into broader categories: classes 1-3, which might be generally characterized as ferruginous clay containing numerous iron oxide concretions, igneous and ferruginous rock fragments; calcareous clay rich in grains of limestone and calcite, and ferruginous sandy clay with numerous grains of quartz and feldspar. The three pottery classes seem to represent three different clay sources. Thus, it was important to undertake field trips in order to acquire samples of clay and raw material from the neighborhood of Setefilla.

Methods

Various technological attributes of Tartessian pots can be recognized by applied petrographic analysis and experimental studies. The first part of the examination includes fabric analysis of the original Tartessian potsherds which were performed according to the analytical protocol proposed by Leiden Laboratory for Ceramic Studies. This analysis is based on systematic microscopic examination of tempering materials, clay matrix, sorting and pore structure of each ceramic fragment (van As, 1984; 2004). Additionally, special attention was paid to the recognition of forming practices used by Tartessian potters which was achieved by macro- and microscopic observations. The experimental part of the research was twoefold and encompassed:

1. analysis of raw materials and clay samples;
2. estimation of the firing condition of original Tartessian pottery.

The assembled raw materials were first recognized and determined as potentially used as tempering materials added to clay paste. Then, each kind of temper was crushed by mortar and hammer, mixed with “pure” modern, light, clay body for better visibility and prepared for firing (See Fig. 2).

The clay samples themselves were levigated twice in order to remove the main contaminants (Shepard, 1956, p.82). Subsequently, the powders were dried and after adding water the plasticity and workability were checked by forming and bending coils (see also van As, 2010, p.33). The clay mass which showed positive results were consequently formed into briquettes. Then the clay fragments were fired in an oxidizing atmosphere together with other samples in the CEM Phoenix Microwave Furnace. Finally, the samples were juxtaposed with the Tartessian sherds. The examined modern clay samples showed some similarities to the clay paste from the archaeological sherds (mostly in the composition), however the exact clay sources cannot be determined with certainty. Additionally, the classic shrinkage test was carried out for the clay samples (Rice, 2005, p.71; Rye, 1981, p.119).

The course of firing for the Tartessian pots was investigated simply by re-firing the archaeological sherds (Daszkiewicz and Maritan, 2017, pp.496-500). First, however, each fragment of pot was broken into few pieces and one was left as an indicator of the original colour. Other pieces were refired at several temperatures increasing gradually starting from 600ºC and ending at 800ºC. The physicochemical properties and colour of samples were measured after raising the temperature each 50ºC and compared with the original fragments (cf. Rye, 1981, p.119). This method, however, only enables very general estimations and should be later verified by using other methods e.g. electron paramagnetic resonance, EDS or SEM (Rasmussen, et al., 2012).

As an additional method, a spectrometric analysis has been carried out. A handheld spectrometer Bruker Tracer III-SD has been used in order to determine the chemical composition of the sherds before and after the re-firing process. This device is able to detect approximately 15 elements while working in the ‘Major Mud Rock’ mode, designed for clays.

Results of experiments

The experiments had been preceded by field trips to acquire samples of clay and raw material from the closest neighborhood of Setefilla. Among collected rock fragments and mineral basalt, two types of limestone, quartz, quartzite and micaceous schist were identified. Almost all of the raw materials were also recorded in clay paste of Early Iron Age sherds in a significant quantity (Bartkowiak and Krueger, 2015, pp.40-42).

The experiments of re-firing sherds from this site indicated that the hand-made vessels made from reddish ferruginous clays (circa 650-700°C) and ferruginous sandy clays (circa 650°C) were fired in lower temperature than these wheel-thrown ceramic made from calcareous clays (750-800°C), (See Table 1 and Fig. 3). Most of the pots were fired in an oxidizing condition, rarely in a neutral one. The information concerning the process of firing enables analysis of other properties of potsherds and manufacturing practices.

Sample no	Estimated temperature of firing (°C)	Colour before re-firing	Colour after re-firing
SET 26	650	7.5 YR 7/4	7.5 YR 4/1
SET 19	650	5 YR 4/4	2.5 YR 4/8
SET 5	700	7.5 YR 4/4	2.5 YR 4/4
SET 31	750	7.5 YR7/3	5 YR 7/4
SET 3	800	10 YR 5/1	5 YR 7/4
SET 2	800	10 YR 8/4	7.5 YR 8/4

TABLE 1. THE CHANGES IN COLOUR OF ANALYSED SAMPLES.

The spectrometric investigation showed that there are no significant differences in chemical composition of samples from Setefilla before and after the process of re-firing. The firing at a lower temperature and usage of poorly sorted, much differentiated non-plastic inclusions also impacted properties of those pots. The hand-made pots were more fragile, and their texture was softer and less compact than those made of calcareous clays fired at a higher temperature. Their strength and thermal shock resistance were also lower, and it was possible to observe some cracks and traces of abrasion on their surface.

Results of technological observations

The relationship between the forming practice and preparing a clay paste is particularly visible in the case of hand-made ceramic. Those pots were made from unlevigated clay, and the pastes seem to be weakly kneaded. The added tempering material occurred in a relatively high quantity (from 15 to even 45 percent) and the size of particular grains varies from 0.1 to even 3 millimetres (See Fig. 4). On the other hand, wheel-thrown vessels were made from better-prepared clays, often levigated. The total quantity of both mineral and organic temper materials is considered low and does not exceed 5-10 %. Sorting was good, and some standardization in the size of added fractions was observed.

Until now, no correlation between the specific form of Tartessian vessel and clay paste was established and no specific details of the technological process were presented. Thanks to reexamined materials from Setefilla, some general observations can be drawn. The majority of à chardón vessels were made from ferruginous clays, and only two fragments from calcareous clay paste. Interestingly, almost half of à chardón vessels were thrown on the wheel, despite the fact that the hand-making seems to be a more commonly used technique for producing all type of ceramic containers in Setefilla. The ferruginous clays were also used for all the bowls and biconic forms. While one bowl was wheel-thrown, the rest of the mentioned assemblage was hand-made. In terms of the relation between the type of clays used and technique, there are some preferences to choose calcareous clays for thrown pots, but in case of the mentioned bowl, ferruginous clay was used. In case of the plates, commonly attributed as Phoenician, the calcareous clay was preferred. However, there is no technological consistency in their manufacturing. One of the plates was hand-made, while the second one was thrown.

Unfortunately, due to the small size of analyzed potsherds, the detailed process of forming cannot be traced. The length of the sherds mostly do not exceed few centimeters. The size of samples is particularly important in the case of the Tartessian pots due the fact that sporadically different parts of the same vessel were produced in different technology – e.g. upper part was wheel-thrown, while lower was handmade. Presumably, most of the pots were built by simply coiling (which was attested on few fragments), however, the usage of molding is also highly probable. Hand-making is commonly associated with the local Tartessian production, and the repertoire of vessels formed in this technique is well anchored in the older Late Bronze tradition. On the contrary, the wheel-thrown vessels are conventionally perceived as imports of Phoenician origin or indicators of intensive contacts and exchange between local groups and Phoenicians. However, this know-how together with usage of a new type of kiln was probably also quickly absorbed by these indigenous groups.

Discussion

In the opinion of the researchers, the studied assemblage from Setefilla shows clearly that the process of cultural hybridization occurred in the field of pottery production and it had much more complex character than previously indicated. It is impossible at the moment to state a clear relation between clays, applied manufacturing techniques, and form of vessels. We would carefully suggest that there has not been any obvious preference in this matter, which would be directly related to technological and/or morphological attributes of pots. It was only possible to detect some very general trends and preferences, and not strict rules, which might differ between the sites and particular local communities. The technology applied to obtain pottery cannot be used simply as an indicator of local or foreign origin of production in the case of Setefilla. From the technological point of view, including firing conditions, the wheel-thrown pottery from this site is not very much advanced from known hand-made. The observed differences between those two groups seem to rather result from the effort which was made to produce these pots, rather than a matter of skill or technological capabilities. Moreover, the minerals and rock fragments detected in clay paste might have been easily acquired, as they are found in close vicinity of the site. Thus, the assignation of calcareous clays as Phoenician may be too simplistic a conclusion.

Conclusions

In the analysis of the raw materials, the samples of clay indicated that the local sources might be easily exploited by local communities. What was conventionally linked to Phoenician, might be in fact a local product created under the influences of this culture. Moreover, the estimation of firing temperature enabled a new classification of potsherds and their complex technological analysis. Therefore, the use of combined methods of pottery analysis encompassing morphological, technological, spectrometric and petrographic analysis enriched by experimental studies seems to be very effective and promising approach in laboratory ceramic studies.

Acknowledgements

The authors would like to express their gratitude to Prof. María Eugenia Aubet and to the Archaeological Museum in Seville for the opportunity to analyse the materials from Setefilla. Acquisition of the CEM Phoenix Microwave Furnace was supported by a grant from the National Science Centre – Poland (2014/15/B/HS3/02279). We are thankful to Prof. Andrzej Michałowski and to Prof. Przemysław Niedzielski for the possibility of using this device. We thank the editor and anonymous reviewers for their constructive comments.

Keywords ceramics

Country Spain

Bibliography

AS, A. van, 1984. Reconstructing the potter's craft. In: S. E. van der Leeuw and A. C. Pritchard, eds. *The dimensions of pottery*. Amsterdam: University of Amsterdam, pp.131-164.

AS, A. van, 2004. Leiden studies in pottery technology. *Leiden Journal of Pottery Studies*, 20, pp.7-22.

AS, A. van, 2010. 'How and Why?' The Neolithic Pottery from Teleor 003, Teleor 008 and Măgura-Bran Teleorman River Valley, Southern Romania. *Buletinul Muzeului Judeţean Teleorman*, 2, pp.29-43.

AUBET, M.E., 1975. *La necrópolis de Setefilla en Lora del Río, Sevilla.* Barcelona: CSIC – University of Barcelona.

AUBET, M.E., 1978. *La necrópolis de Setefilla en Lora del Río, Sevilla (Túmulo B).* Barcelona: CSIC – University of Barcelona.

BARTKOWIAK, M. and KRUEGER, M., 2015. Wstępne rezultaty analizy petrograficznej ceramiki ze stanowiska Setefilla (Hiszpania). *Wielkopolskie Sprawozdania Archeologiczne*, 16, pp.37-45.

BONSOR, G.E. and THOUVENOT, R., 1928. *Nécropole ibérique de Setefilla, Lora del Río (Sevilla).* Bordeaux: Féret et fils.

CELESTINO, S. and LÓPEZ-RUIZ, C., 2016. *Tartessos and the Phoenicians in Iberia*. Oxford: Oxford University Press.

DASZKIEWICZ, M. and MARITAN, L., 2017. Experimental firing and re-firing. In: A.M.W. Hunt, ed. *The Oxford Handbook of Archaeological Ceramic Analysis.* Oxford: Oxford University Press. pp. 487-508.

KRUEGER, M. and BRANDHERM, D., (in press) Chemical characterization via pXRF of Early Iron Age pottery from SW Iberia. In: B. Török, ed. *Latest Results and Examination Methodologies of Pre- and Protohistoric Metals and Other Inorganic Materials. 1st International Scientific Conference of the UISPP Commission on Archaeometry of Pre- and Protohistoric Inorganic Artifacts, Materials and Technologies.* Miskloc, Hungary, 14 October 2016. Miskolc: University of Miskolc.

MORGENROTH, U., 2004. *Southern Iberia in the Early Iron Age*. BAR International Series, 1330. Oxford: Archaeopress.

RASMUSSEN, K.L., De LA FUENTE, G.A., BOND, A.D., MATHIESEN, K.K. and VERA, S.D., 2012. Pottery firing temperatures: a new method for determining the firing temperature of ceramics and burnt clay. *Journal of Archaeological Science*, 39(6), pp.1705-1716.

RICE, P.M., 2005. *Pottery analysis: a sourcebook*. Chicago and London: The University of Chicago Press.

RYE, O., 1981. *Pottery technology: principles and reconstruction*. Washington, D.C.: Taraxacum.

RUIZ MATA, D., 1995. Las cerámicas del Bronce Final, un soporte tipológico para delimitar el tiempo y el espacio tartésico. In: *Tartessos 25 años después. Actas del Congreso Conmemorativo del V Symposium Internacional de Prehistoria Peninsular*. Jerez de la Frontera: Ayuntamiento de la Frontera. pp.265-313.

SHEPARD, A.O., 1956. *Ceramics for the Archaeologist*. Washington, DC: Carnegie Institution of Washington.

Share This Page

Corresponding Author

Michał Krueger
Wydział Archeologii
Uniwersytet im. Adama Mickiewicza w Poznaniu
ul. Uniwersytetu Poznańskiego 7
61-614 Poznań
Poland
E-mail Contact

Gallery Image

FIG 1. LOCALIZATION OF SETEFILLA (SOURCE - GOOGLE EARTH)

FIG 2. SAMPLES OF MODERN CLAY (TWO UPPER ROWS) AND CLAY FROM THE SURROUNDINGS OF SETEFILLA.

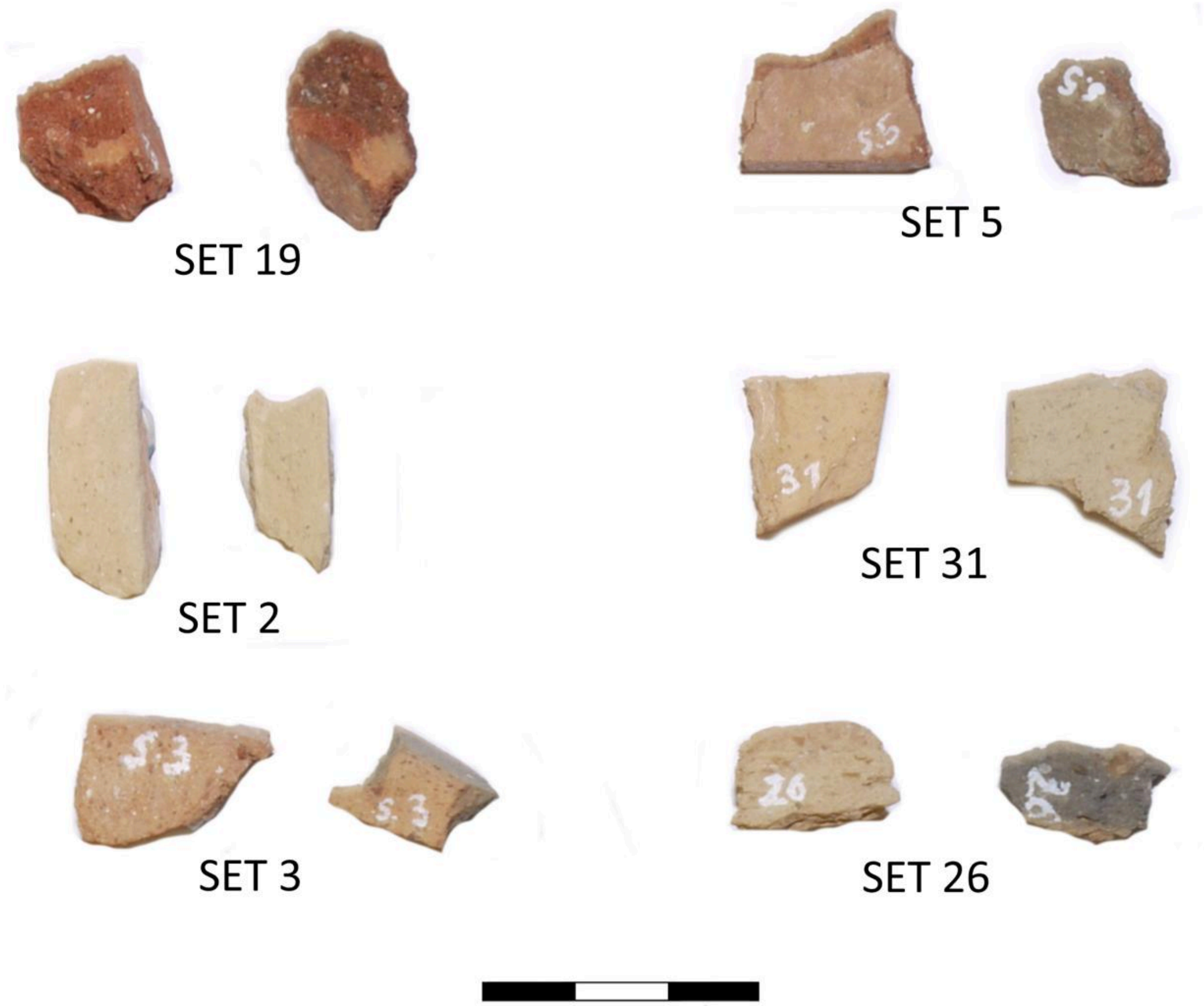

FIG 3. SAMPLES OF POTTERY FROM SETEFILLA BEFORE THE PROCESS OF RE-FIRING (ON THE LEFT) AND AFTER (ON THE RIGHT).

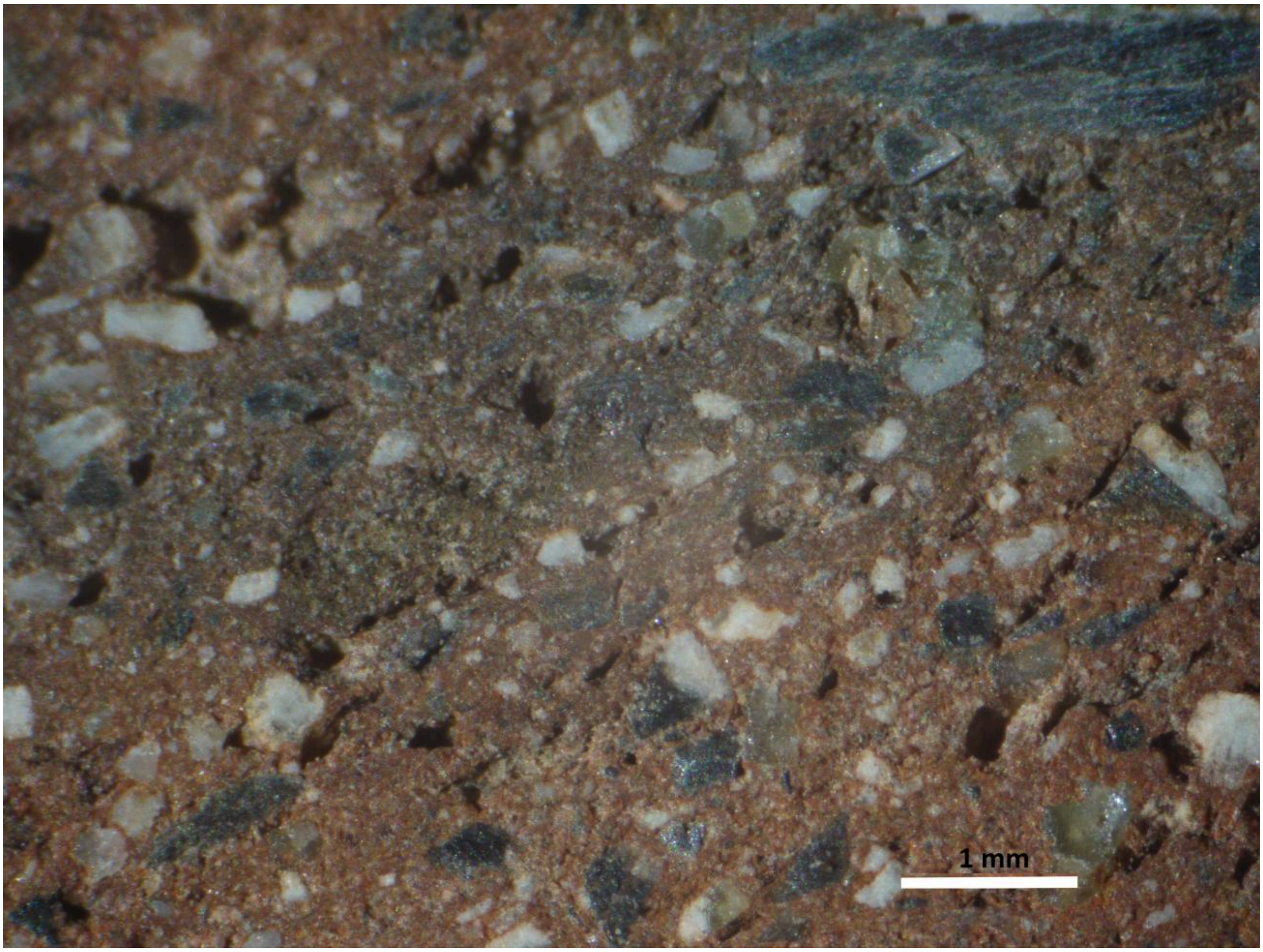

FIG 4. EXAMPLE OF FABRIC WITH PARTICULARY BIG FRAGMENT OF A TEMPER.