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TECHNOLOGICAL APPROACH TO CERAMIC MANUFACTURE IN THE PRE HALAF IN TELL HALULA (SYRIA)

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El objetivo principal de este artículo es el de realizar una primera aproximación a las soluciones tecnológicas asociadas a las primeras producciones cerámicas del período Pre-Halaf (VII milenio cal BC) en el yacimiento de Tell Halula (Siria). Se analiza el conjunto desde una nueva perspectiva metodológica, priorizando los aspectos vinculados al proceso de modelaje de los recipientes cerámicos.

Tell Halula, Primeras producciones cerámicas, Cadena operativa, Caracterización tecnológica, Modelaje.

The main objective of this paper is to approach for the first time the technological solutions associated with the first ceramic production from the Pre-Halaf culture (VII millennium cal BC) in the Tell Halula settlement (Syria). The set is analysed from a new methodological perspective, prioritizing the aspects related with the manufacturing processes of the pottery vessels.

Tell Halula, first ceramic production, operational chain, technological characterization, manufacture.

INTRODUCTION

It is well known that the tradition of pottery studies as a principal element for the determination of the chronological or cultural groups has been, and it is still now, very important. However, it is also true that the need for a global analysis of pottery products is increasingly being recognized.

In this investigation, we observe the existing information gaps in the chronological time for the Pre-Halaf site of Tell Halula. It is well known that, for this period, there is an important gap regarding pottery analysis addressing the issues of manufacturing techniques from perspectives that go beyond the typological, morphological and raw material analysis.

Therefore, with the will to address this problem and the opportunity to work with unpublished data, a documental and analytic work essential for the knowledge of pottery material has been started. These collections and data transformations are completed with establishing and analysing a number of variables, which allow us to make different contributions to the set.

TELL HALULA, MIDDLE EUPHRATES VALLEY (SYRIA)

The transition from the pre-pottery to the pottery Neolithic has been documented in several sectors of the site (Sector 1 and Sector 7) (Fig. 1). New layers from this horizon in the Sector 2/4 have been recently identified. All the stratigraphically sequence and the radiocarbon dates associated indicate continuous occupations both in the spatial and the chronological level (Molist ed. 1996; Molist *et al.* 2008, Molist ed. 2013).

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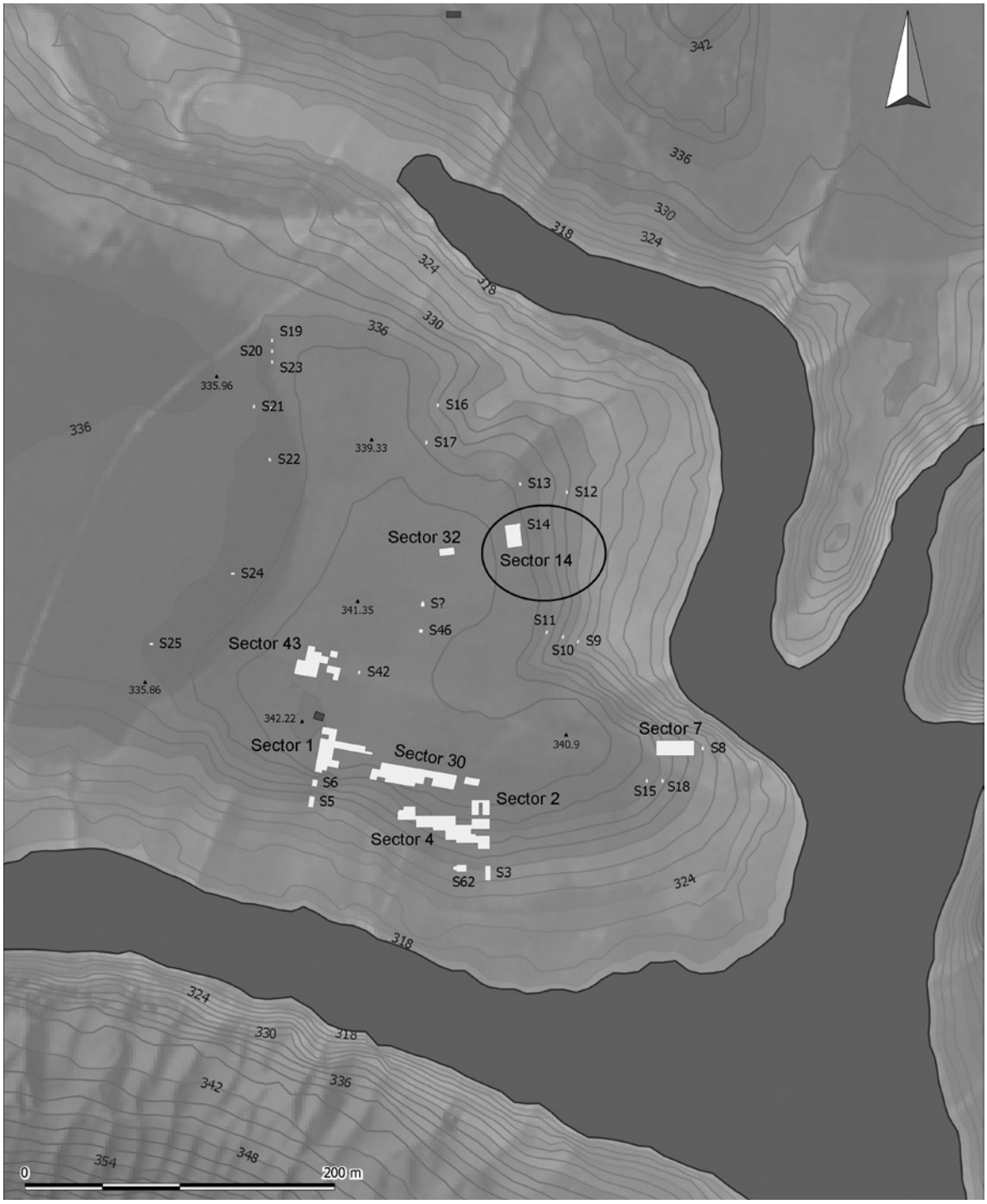

Figure 1. Distribution of sectors from Tell Halula (SAPPO, UAB)

New data recovered in Sector 34 and Sector 2/4 (squares 2E/F and 2G-2I) allow us to characterize these elder occupations from the Pre-Halaf period, relating to the first pottery productions.

We have established in square 2G a sequence of five successive levels from the pre-pottery Neolithic (four levels) to the pottery Neolithic (the upper level). This ceramic occupation was characterized by an open area with excavated structures interpreted as pit-fires. This space has provided a very rich material assemblage, with archaeozoologic and chipped stone remains, and also some fragments of pottery (Black Series and White Ware). Similar open areas had been previously documented in the squares 2E and 2F through the levels associated with the first pottery productions.

The analysis of the ceramic assemblages has allowed stablishing the succession of the sets in three differentiated phases that begun towards the 7000 cal BC:

Phase I (old Pre-Halaf), the earliest one, is characterised by a specific group of ceramics defined as the black series, with black or brown fabrics and polished surfaces with calcite inclusions. This group represents 44% of the total amount of potsherds. Other categories are vegetal tempered wares as well as polished fine wares.

In Phase II (middle Pre-Halaf), which is dated around 6600 – 6300 cal BC., simple chaff tempered wares are dominant, but appliques, early painted wares and fine series are also found. Husking tray pottery, grey-black wares, pattern burnished-wares and incisions/impressions are also presented along with a survival of the early black series.

In Phase III (recent Pre-Halaf), 6300 – 6050 cal BC. aprox., a quite different ceramic assemblage is found: simple chaff tempered wares make up about 75% of the total amount with burnished red slip wares, as well as new series of incised/impressed wares. Some Dark-Faced Burnish wares sherds can also be found in small quantities and black series sherds, grey-black wares, red slips and early painted sherds in minor amounts. (Faura 1996; Cruells 1996; Cruells 2001; Cruells 2005; Molist ed. 1996, 2013; Faura 2016; Cruells *et al.* 2017).

SECTOR S14

We only studied Sector 14. Its location is in the eastern part of the Tell. In that area, gentle slopes allow an excavation in extension which facilitates the discovery of remains of complementary structures located in other parts of the Tell's (SS7) domestic habitat. The operation was performed in an area of 150m^2, and only the upper level (1.20 meters deep) was excavated.

The excavation and posterior study allowed distinguishing three juxtaposed levels. The oldest (SS14-III), with an extension of 75m^2, is characterized by a big exterior area with earthen floors (E6) and an occupation layer with a combustion structure. One part of the adobe construction was in the North-eastern angle of excavated zone. The recognized surface indicated two rooms with earthen floors. The next level (SS14 – II) was located above. In this one, an occupation with 100m^2 of extension was documented. It was configured by a big exterior area with two constructed structures. The first was a big adobe wall with a north- south orientation, and the second had a circular plant construction that despite the poor state of preservation could be interpreted as a *tholoi.*

The most recent occupation (SS14 – I), had 150m^2 of extension and provided a more complete view of the structure of the space. It contained three domestic structures with rectangular multicellular plans irregularly arranged and separated by wide outdoor spaces associated with a large outdoor clay soil. The interior floors, despite its poor preservation, were also made with clay and with higher quality.

In summary, the three levels present a homogeneity both in its constitutions and stratigraphic settings. Stratigraphically, it should be highlighted that the large external surfaces allowed the reconstruction of the real layers of occupation, which are often difficult to locate in the interior areas of structures (Molist/ Vicente 2013).

METHODOLOGY AND VARIABLES FOR THE POTTERY STUDY

To perform the study of the pottery products from Sector 14, we decided to choose a type of method formulated to solve the need for identifying the different steps of the operative chain (Échallier 1984). This proposal's aim is to focus on the manufacture process of pottery vessels, giving priority to those aspects that are linked to the modelling processes of the vessels. Therefore, manufacture traces, which can contribute to an approximation of technological solutions and technological gestures adopted by artisans (Semenov 1982), will be identified.

The identification of the manufacture processes is highly complex and an undeveloped field of study. Our criteria focuses in the determination of these procedures with different variables. With this goal, this work has, as a documentary source, a complex database in which we have considered the following variables (to define these variables, quantitative and qualitative parameters were used following Bernabeu *et al.* 2011; Skibo 1992; Schiffer 1976, 1987; Schiffer/Skibo 1997; Dedet/Py 1975):

Identification: sector number, level and inventory number.

Raw materials: texture, petrographic groups (Faura 1996, 2016), size and quantity.

Vessel manufacture, divided in:

Morphology: indicates the forms of the vessels grouped in big categories (Balfet *et al.* 1989): open vessels, closed vessels, simple forms, and complex forms.

Part of the vessel: indicates the identifiable forms of the vessel and wherein the pottery sherd is located: lips,

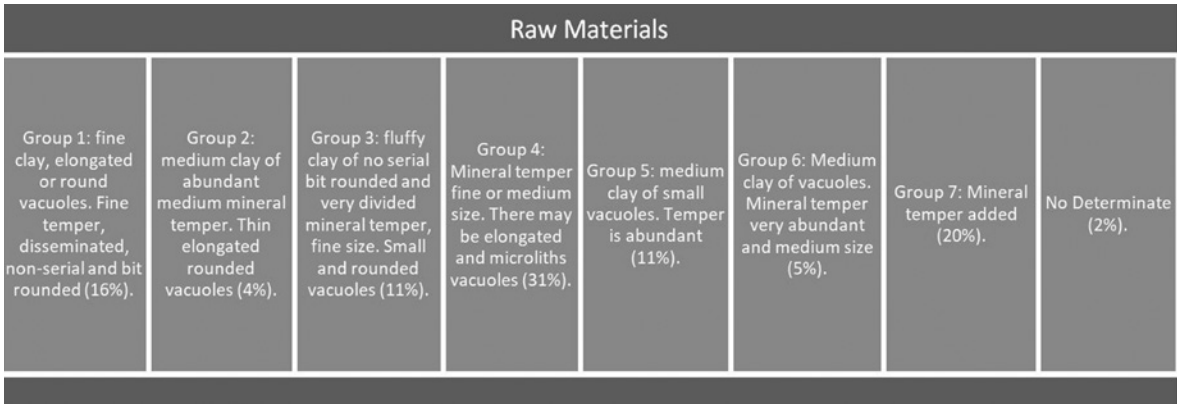

Figure 2. Petrographic composition of different groups.

non-form, inflection point, base, handle, ½ profile[1], complete profile[2] and complete vessel[3].

Volume, thickness, and diameter: indicated in millimetres, taking into account both the diameters of the lip, the base, and the wall thickness, wherever possible.

Manufacture technique: in the cases where it is identifiable, we note the modelling technique that could have been used to elaborate the vessel. We use, as reference, the different techniques documented by other authors in archaeology and ethnography. These techniques are: coils, moulding, pinch, plaques, paddle and anvil technique and mixed techniques. For the lips and the handles, we indicate the typology and manufacture technique. Furthermore, for lips we use a typological table by Dedet and Py (Dedet/Py1975); and for the handle elements we describe the type and the form.

Type of traces: indicate where the traces are located. The different possibilities are: visible, in the surface of the vessel, variations on the wall thickness, fractures and fissures, traces that affect the management of inclusions, or in the form of the vessel.

Observable traces: describes the traces that can be observed to indicate if they consist of fractures, fissures, surface marks, etc.

Surface treatment: considered as a treatment that both exterior and interior surfaces receive to eliminate the manufacture process traces. We register the exterior and interior treatments and the traces left during the treatment: burnished, polished, smoothing etc. In this characterisation, we include the decoration, in which the motif, technique and traces will be documented.

Firing: Indicates the type of atmosphere in which the vessel has been made depending on whether it is: an oxidising atmosphere, a reducing atmosphere, or a mixed atmosphere.

From the pottery material recovered in its stratigraphically context we proceeded to its classification applying the aforementioned technological, morphological and typological criteria (Rice 1987; Orton et al 1988; Py 1999; Calvo et al 2004; García/Calvo 2013).

RESULTS OF THE SET

Sector 14 consists of a total of five squares, from which the pottery set from four squares from thirteen levels has been studied. These are: Square T levels A3 and A3a; Square V levels A2, A2a, A2b, A3, A3a; Square Y levels A2a, A3a, A3b, A3c, A6a; and Square Z level A6(y). The total set is formed by 348 sherds which form a total number of 315 individuals.

RAW MATERIALS

In this part, we observe both aspects of its texture, size and quantity as well as the petrographic group belonging to every sherd. This refers to its aspect, touch and structure, which can be observed both in the cross section of the fracture and the surface.

The first element we observe is porous clay. Many vacuoles are present which may have originated in the use of either vegetable inclusions or by bad modelling processes. Other samples might present compact clays, indicating a high firing temperature or a good clay preparation. For sector 14 in Tell Halula, the analysis

1. The cases in we found with a one identifiable part to form with two parts describe previously: lip + handle, inflection point + base, etc.
2. When presents the complete form (from the lip to base).
3. When the storage is equal to or greater tan 50% of the vessel.

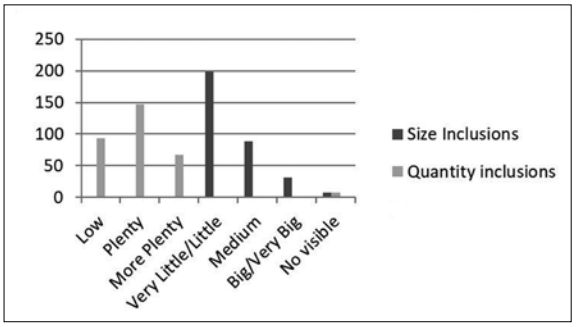

Figure 3. Presence of size and quantity inclusions.

detected a homogeneous presence of porous clays and compact clays. (Fig. 2)

If we observe the different petrographic groups documented by Faura (1996), seven were the groups documented by them.

The abundance of the different groups is very homogeneous in the set. The presence of group 4 (31%) as the most frequent group in this sector, and group 7 with a 20%, should be highlighted. In similar proportion, we documented group 1 with a frequency of 16% and group 3 and group 5 both with 11%. The group 2 has a minor presence, with 4%, and group 6 with 5%. The remaining 2% refers to sherds in which we could not determinate the petrographic groups or the size and quantity are smaller and, therefore, not definable by a macroscopic analysis (Fig. 3).

Finally, we have considered the size of inclusions with the following categories: very little (≤1mm), little (≥1mm a ≤3mm), middle (≥4mm a ≤6mm), big (≥7mm a ≤9mm), very big (≥10mm), and indeterminate. We can observe that the majority of sherds from the set have little inclusions (57%) or medium inclusions (28%), while other documented sizes were more homogeneous.

Moreover, we observed the quantity with these criteria: low (1-10%), plenty (10 – 25%) and more plenty (≥25%). Results documented that many of the sherds had plenty of inclusions, but with very homogeneous percentages .

MODELLING THE VESSEL

MORPHOLOGY AND TYPOLOGY

For this set, we have tryied to define the principal characteristics by locating each sherd in its part of the vessel. From them we define the morphology and the typology.

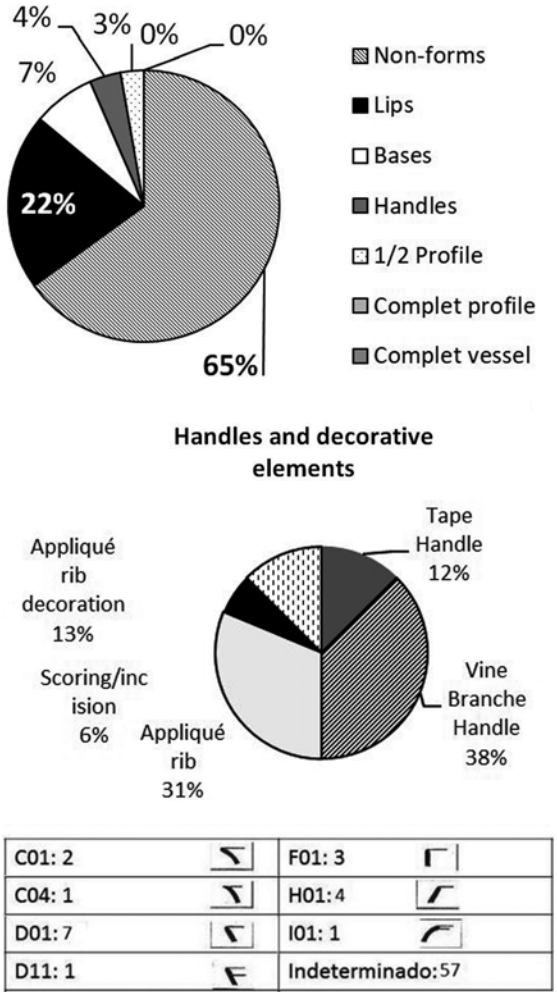

Figure 4. Percentages of morphology and typology sherds.

In this case, we observe that 65% of individuals are non-forms while 22% are lips, 7% are bases, also 7% are handles and the ½ profiles are 3%. Other categories haven't been documented. When morphologies are studied, we try to documented the typology of each element. The ½ profiles are definited as: simple forms, complex forms, open forms or closed forms (Fig. 4) (Balfet et al 1989)[4].

About the bases, two types were documented: bases on high (Faura 1996) or discontinuous bases (Balfet et al 1989); and flat bases (Faura 1996) or continuous bases (Balfet et al 1989). A first typological analysis has documented seventeen individuals and, in the second, ten individuals. Moreover, in sixty individuals preservation was not sufficient to allow a typological and morphological study.

4. Simple form: when the principal form can be describing in reference with a geometrical volume; Complex form: when the form cannot be described in reference with a geometrical volume.

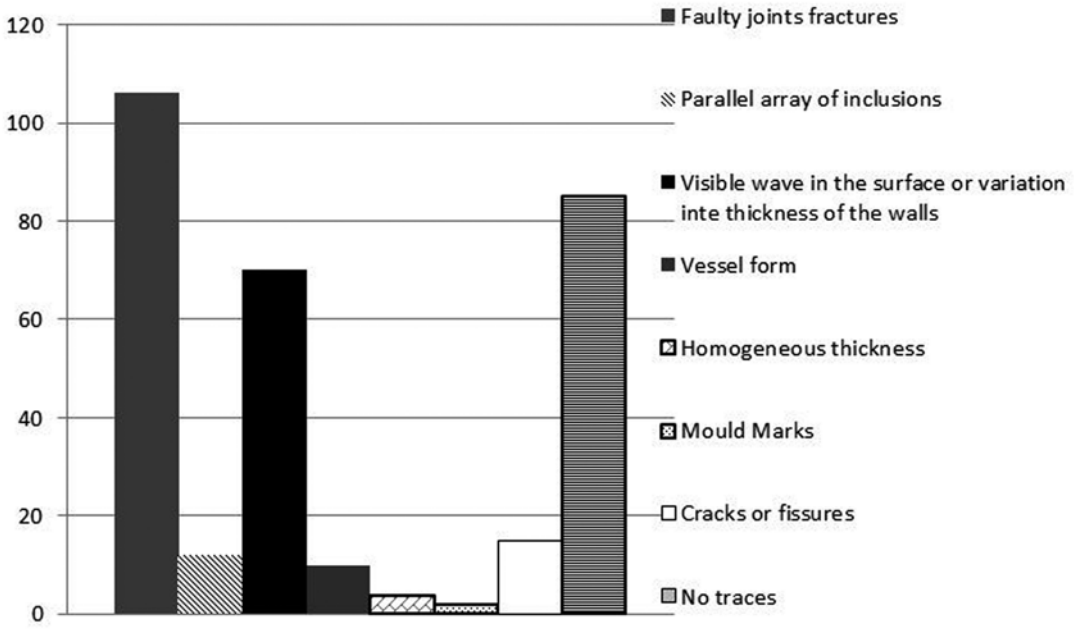

Figure 5. Proportions of macro traces.

If we speak typologically, the lips are defined with the typological table published by Dedet and Py in 1975. Therefore, out of the sixty-eight documented lips, with the lips from ½ profiles, we observe nine different types.

In handles, we observe three different typologies: tape handles, vine branched handles and appliqué ribs. This last type, the appliqué rib, is variable and it can appear as a decorative element too. Moreover, we can observe the quantity of preserved handles and their typology (2 tape handles, 6 vine branches handles and 5 appliqué ribs).

About decorative elements, only three e individuals presented them: two are appliqué ribs and one is a simple scoring/incision. This last appears with an appliqué rib (Fig. 4).

MANUFACTURE TECHNIQUES

The identification of manufacture techniques has been attempted on all sherds. Nevertheless, not all sherds presented sufficient surface to evidence macro traces left by the modelling process.

For this set, three different techniques were documented. The principal method used is coils. This technique is characterized by assembling strips of clay which overlap and create the main shape of the vessel. Sometimes, they can be risen in spiral or by different strips of clay with variable thicknesses. The second method is the use of a mold. The clay is introduced in it and, by digital pressures, adhered to the surface of the mold, thus acquiring its shape. The third method is the use of mixed techniques. It is chracaterizedby the use of two different methods in one vessel and, probably, in two different times. In the cases where the technique was not documented we considerated the variable to be indeterminate (Fig. 5).

We observe a middle proportion of the inviduals was produced with coils; in 41% of the individuals the technique could not be documented. The use of molds has a frequency of 8% and the mixed techniques are present only in 1% of the proportion.

When focusing the attention to the sherds with the best surface preservaton and an approximation to vessels morphology is attempted, three different typologies have been detected: bowls (12 MNI), pots (4 MNI), and plates (3 MNI). For the bowls, the majority have been manufactured by coils, although three individuals present a different technique: two have been manufactured by mould and one has been manufactured by a mixed technique. For the pots, we only documented the technique in two individuals and both had been manufactured by coils. Finally, for the plates, two different techniques were documented. Two individuals had been manufactured by coils, and one individual had been manufactured by mould.

Regarding the orientation of the modelling we have focused on two types of bases. In general, all vessels have been manufactured from the base to the lip, as shown in the arrangement of the coils. Furthermore, these coils' joints have been performed in the internal part of the vessel. This is the easiest technique from the artisan point of view to elaborate both continuous and discontinuous bases.

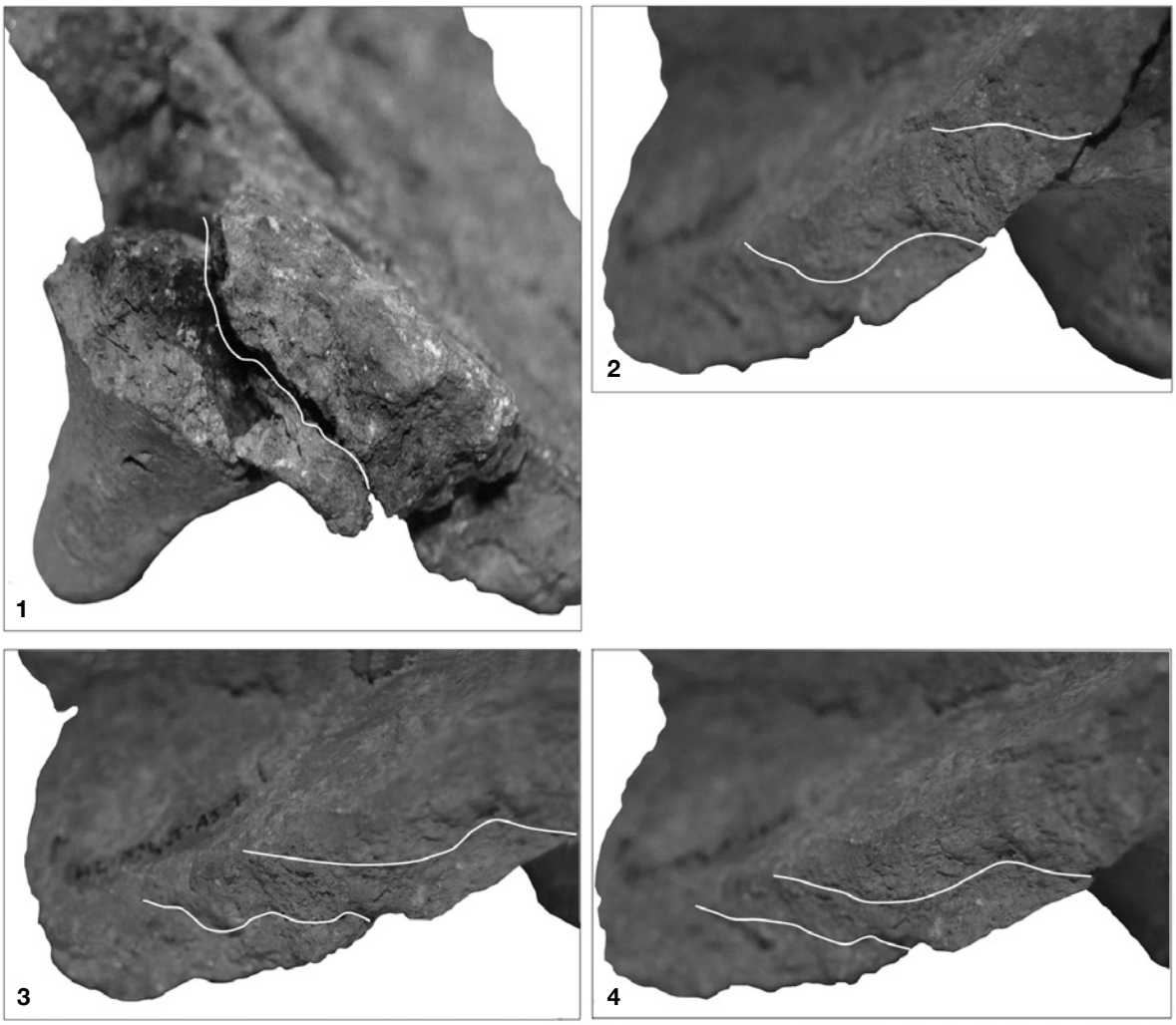

Figure 6. 1-Apply handle; 2-3-4-Parallel array of inclusions.

Continuous bases could be modelled in spiral by working with a long enough coil through the inflection and leading into to the vessel wall. In batch bases, we observe that they are made using a clay disk which rises until the inception of the wall, and therefore, adhere to the vessel body, where the coils start.

Regarding the lips, two types of modelling were documented. The first method is the application of a final coil. The second method is to perform a small pinch in the clay to achieve the desired form. If we observe the open or closed forms, we will see that there is no relation or preference according to the typologies.

In terms of handles, we have located 13 MNI. The major technique used to manufacture them is a previously shaped coil. It is common to find these elements dislocated from the vessel. We talk about seven individuals manufactured with this technique, especially tape handles and appliqué ribs. For the documented vine branched handles, the manufacturing technique would have been the use of clay balls (6 individuals) (Fig. 6-1).

In this part, it is important to talk about decorative elements. The appliqué rib has been manufactured by coils. With this technique, we can detect the inner flange grooves located at the junction of the body with the decorative element. This shows a compacted bond, probably because they would have used some kind of tool when the clay was in a plastic or leather state (García 2007: 52 – 56).

DOCUMENTED MACRO TRACES

For the studied vessels, five different traces had been documented; but in general, we observed a homogeneous tendency. The vessels manufactured by coils presented one type of traces in relation with the fracture of the sherds: faulty joint fractures (Fig.7-2 and 3). But these traces are not unique for this technique. For the coils, we documented the following traces: visible

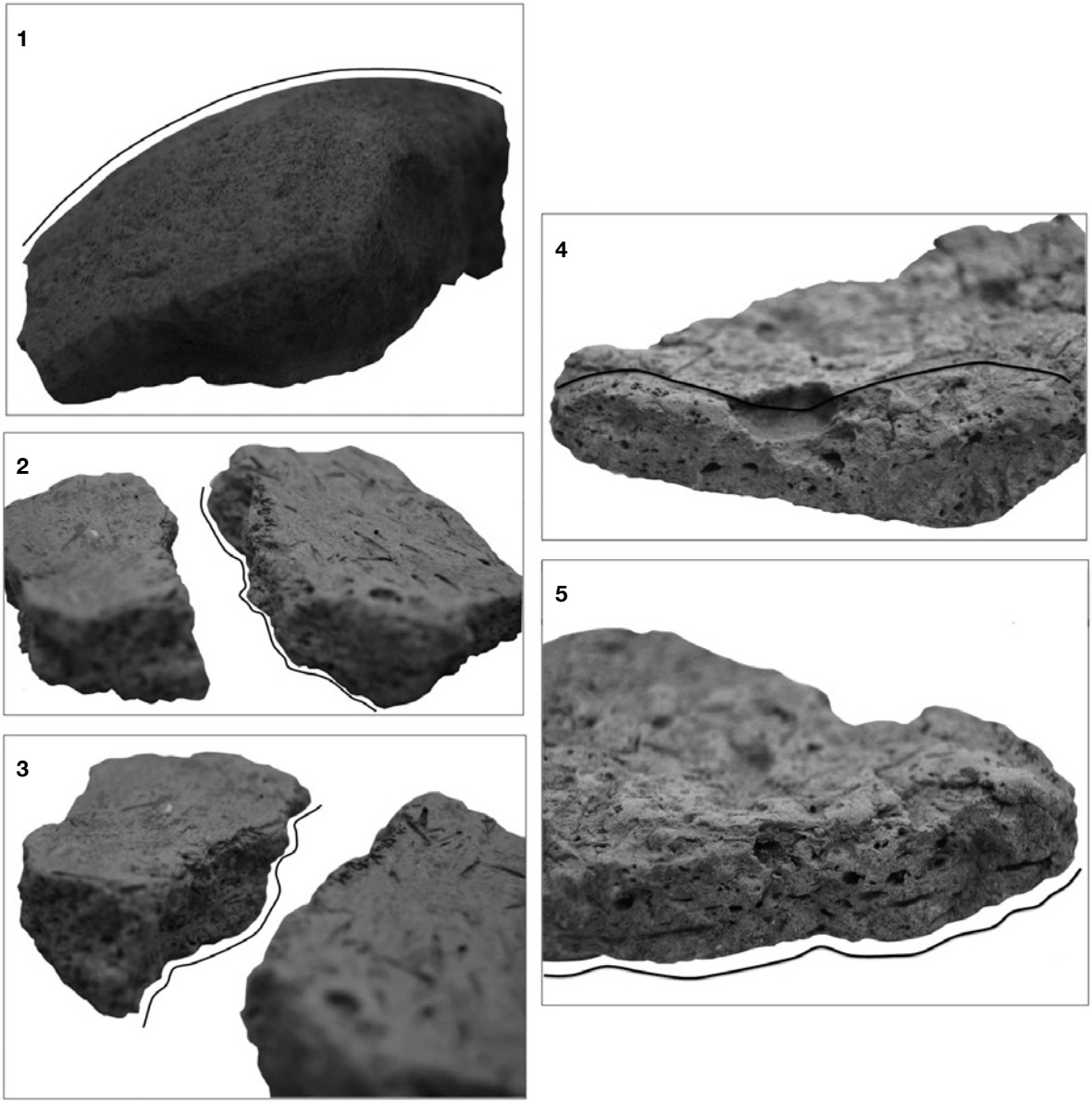

Figure 7. Vessel form; 2-3-Faulty joins fractures; 4-5-Visible wave in the surface.

waves in the surface of the vessel or variations in the thickness of the walls by the thinning and placement of coils (Livingstone 2007: 118 – 119; Rye 1981: 67; Gelbert 2000: 144) (Fig. 7-4 and 5). On the other hand, the less documented trace is the parallel array of inclusions (Fig. 6-2, 3 and 4); we can only observe this trace thanks to the presence of organic o vegetal inclusions (Balfet et al 1989: 53 – 54).

The vessels which have been manufactured by moulding show three different types of traces. The first is a perfect and regular curvature in the bottom of the base (Huysecom 1994: 39; Gelbert 2000: 137) (Fig. 7-1). The second is a uniform thickness of the walls of the vessel, which can be added to regulate the clay to the desired thickness (Gelbert 2000: 140 – 144; Rye 1982: 81 – 82) and the third trace is marks from support used as mould (Gelbert 2000: 140-143).

It is important to highlight those cases without traces or traces with no related techniques, where the approximation to the manufacture technique was not possible. These types of traces can be associated with use-wear phenomena.

SURFACE TREATMENTS

In this reconstruction of the operative chain is important talk about surface treatments and the different traces left from the tools used.

For this set, five different treatments were documented.

If we considered the surfaces lost in post depositional processes, six treatments have to be considered. These are: Smoothing, Burnishing, Polishing, surface evening, slip and lost.

For every type of treatment, different types of traces were found. For the smoothing, three types of traces were documented: aggregation of splines, grooves in the surface and a crumbly surface state.

For the polished surfaces, only one type of trace was identified: little bright ridged surface waves.

Finally, in the burnished surfaces we documented three types of traces: the state of the surface forming small plates, a roughened surface and edge chipping, glowing trails or bands as lines with no uniform lustre and shallow and roughed grooves.

But, if we observe the traces together, we will talk about a majority individual not presenting any, and a surface treatment with more traces is associated to smoothing (30%). The burnishing (21%) and polishing (10%) have a few traces.

FIRING

We can observe the different changes in the firing atmosphere in the exterior, centre and interior of the wall. These changes are described using a colour scale: 1. Black; 2. Grey; 3. Beige; 4. Red; 5. Light Brown; 6. Dark Brown; 7. White; 8. Orange; and 9. Green[5].

In the external parts, the colours from oxidising atmospheres predominate; in the central parts, the black and grey colours predominate; and in the internal parts, the colours are the more homogeneous and no colour prevails over the rest. Most of the atmospheres are mixed and oxidising and that reducing atmospheres are very homogenous.

CONCLUSIONS

The study of the pottery materials allow us to better understand the manufacture strategies, especially the main manufacture techniques, which are very important to approximate in technological and social process in the first pottery production in Tell Halula.

In these final conclusions, we observe the results obtained about the raw materials, the manufacturing techniques, the morphometry, typology and the surface treatments used in this pottery set.

The first aspect that the raw materials show is the texture of the clay. Half of individuals have a porous texture, and 50% have a compact texture. This indicates that the kneaded clay is very homogeneous. Therefore, the presence of porous clays is not due to kneading, but, thanks to the petrographic analysis observed, it has an origin in the use of vegetable inclusions.

If we cross the variables: texture, petrographic groups, size and quantity; we can observe that the set is characterized by compact and fine clays with mineral inclusions, which, in occasions, can be a combination of the two types of small sized inclusions.

Techno–morphological features show that the election of one type of manufacture method or another for bowls depends on the diameter. These vessels have the larger diameters of the set. For the pots, if we use the measures from the thickness of the walls, we can interpret that technique used for manufacture would have been coils. Finally, the criteria to choose one method or other in plates depend on the desired thickness of the wall. Vessels modelled by moulds are thinner than those manufactured by coils.

In bases, the technique election depends on the morphology of the base. Discontinuous or raised bases are modelled using clay disks; and continuous or plane bases are modelled using overlapping spiral coils. For the lips, the manufacture type has no relation with the morphology of the lips or the morphology of the vessel. It is possible that this choice is related to the preference the artisan would have had for easier techniques. Finally, for handle elements it is important to consider its appearance apart from the vessels. This is an indicator about the existence of time a lapse in the manufacture between the drying of the vessel and the application of the handle (García 2007: 52 – 54).

The macro traces are indicators of different steps in the manufacture process. For example, the faulty joint fractures show a weak cohesion of clays and a sharp separation is due to the existence of a drying process between coils or the inexistence of a preparation of the surface (Livingstone 2007: 119; Rye 1981: 67 – 68; Balfet et al 1989: 53 – 55; Martineau 2001: 178; Calvo/García 2013).

For the surface treatments and its documented traces, the different treatments respond to different degrees of application and a bigger variability of tools. The different stretches and marks respond to different types of materials in which the tools were used for the application of the surface treatment (García 2007: 52 – 56; Marti-

5. This scale was defined by Josep Miquel Faura (Faura1996) in his MA thesis. In it, he stablished these atmosphere colours from the Munselltable.

neau 2001: 180 – 182; Gelbert 2000: 148). In the polished surfaces, the traces normally indicate the use of boulders (García 2007: 52 – 56) and in the traces from burnished surfaces, the traces respond to the treatment intensity or the timing applied to the piece during the drying process.

In general, thanks to the analysis, this set would respond to a collective manufacturing work present in all of the operative chain processes with no traces of specialization.

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