

# The Set of Ushabtis in the Box From SC3, Theban Tomb 209, Luxor

## Typological and Chronological Study and Statistical Analysis of the Dimensions of its Figurines

Begoña GUGEL GIRONÉS  
Miguel Ángel MOLINERO POLO  
Elías SÁNCHEZ CAÑADILLAS

The article offers a methodological approach for the study of the production process of small faience ushabtis, which were characteristic in the first millennium BCE. It presents a statistical analysis of the measurements of specimens contained inside a box found in Side Chamber 3 of TT 209. The aim is to quantify the variability of the dimensions of a closed set of pieces and to use these objective data to deduce the information they can provide about the manufacturing process of these figurines and the artisans involved. Morphometric measurements were taken at eleven parts of the pieces to observe variations and correlations between these measurements. The results of the study determine that there are three possible linear combinations of the morphometric variables studied that would have influenced the moulding of the ushabtis. These combinations of variables enable three groups of pieces to be statistically identified, and this could indicate that three people were involved in the manufacturing process.

*El conjunto de ushebtis hallado en la caja de SC3, tumba tebana 209, Luxor. Estudio tipológico y cronológico y análisis estadístico de las dimensiones de sus figuras*

El artículo ofrece una propuesta metodológica para el estudio del proceso de elaboración de los pequeños ushebtis de fayenza característicos del Egipto del I milenio a. n. e. Presenta el análisis estadístico de las medidas de los ejemplares contenidos en el interior de una caja hallada en la cámara lateral 3 de la TT 209. El objetivo es cuantificar la variabilidad en las dimensiones de este conjunto cerrado de piezas y, a partir de esos datos objetivos, deducir la información que pueden proporcionar sobre el proceso y los agentes implicados en la fabricación de estas figuras. Se tomaron once medidas morfométricas en otras tantas partes de estas piezas con el objetivo de observar variaciones y correlaciones entre esas medidas. Los resultados determinan que existen tres posibles combinaciones lineales de las variables morfométricas estudiadas que influyen en el moldeado de los ushebtis. Estas combinaciones de variables permiten realizar una identificación estadística de tres grupos de piezas, los cuales podrían identificar ese mismo número de personas involucradas en la fabricación.

**Keywords:** Manufacture of faience figurines, Theban Necropolis, Twenty-fifth Dynasty, Waset/Thebes.

**Palabras clave:** Dinastía XXV, fabricación de figuritas de fayenza, necrópolis tebana, Waset/Tebas.

TdE 14 (2023) – Páginas 1 – 21

Recepción: 9 septiembre 2023 – Admisión: 31 noviembre 2023

**Begoña Gugel Gironés** – begogugel@gmail.com  
Universidad de Alcalá, Madrid, Spain  
ORCID: <https://orcid.org/0009-0008-9937-2950>

**Miguel Ángel Molinero Polo** – mmolipol@ull.edu.es  
Universidad de La Laguna, Tenerife, Spain  
ORCID: <https://orcid.org/0000-0002-4892-3686>

**Elías Sánchez Cañadillas** – esanchezcan@gmail.com  
Universidad de Las Palmas de Gran Canaria, Spain  
ORCID: <https://orcid.org/0000-0002-6485-2910>

DOI

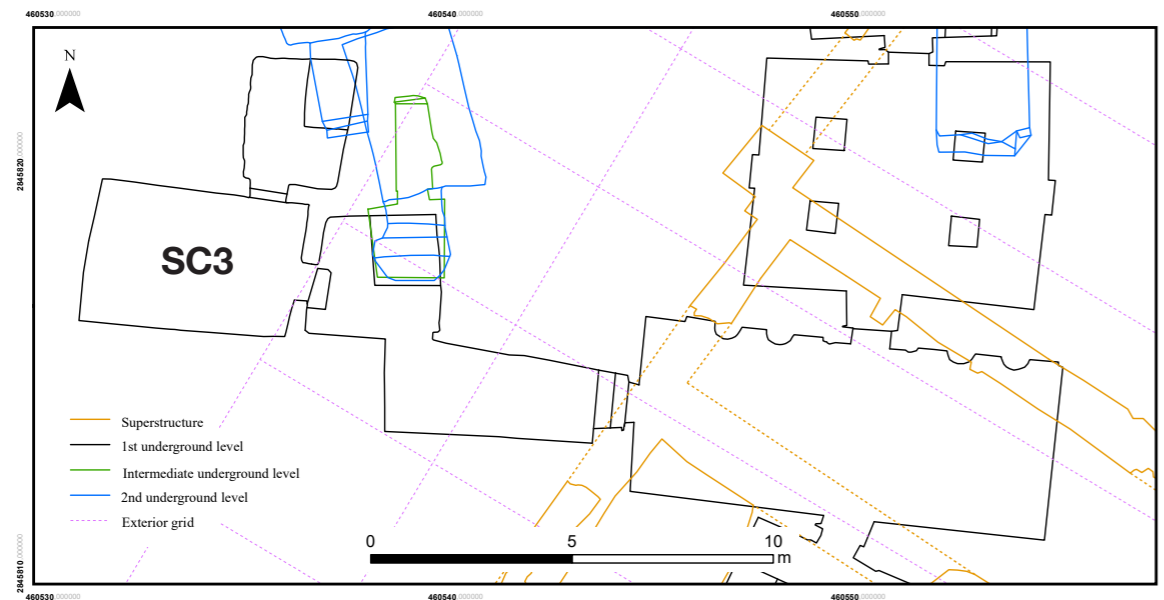


Figure 1. Location of SC3 on the lateral axis of TT 209. Map drawing: Proyecto dos cero nueve / S. Pou Hernández.

This article presents a typological study and statistical analysis of the dimensions of a set of faience ushabtis found in side chamber 3 (hereinafter: SC3) of Theban Tomb 209 (hereinafter: TT 209) during the 2022 season (fig. 1).<sup>1</sup> It also proposes a chronology for the manufacture of the pieces and a hypothesis about the manufacturing process and the people involved in it. The interface between stratigraphic unit (hereinafter: SU) 455 and SU 365, where they were found—we call it SU 365/455—correspond to a period after the first phase of use of the tomb, but it was not in its original position. The figurines formed a compact, quadrangular block, showing that they were originally

inside a container, probably the box in which they were deposited in one of the chambers as a part of the funerary assemblage for a burial (fig. 2). The box, undoubtedly made of wood, had disappeared due to the humidity inside TT 209 caused by periodic flooding from the Wadi Hatasun.

The humidity that destroyed the container was also responsible for the fragility of the ushabtis themselves (fig. 3). Their surfaces were weak and some were fragmented when retired from the finding spot, making it necessary to consolidate and adhere the disintegrated parts together. Once treated and observed as a complete set, it was obvious that, despite having a simple and very similar morphology,



Figure 2. Box of ushabtis SU 365/455 *in situ*, during the excavation process. Photograph: Proyecto dos cero nueve / J.M. Barrios Mufrege.

they were not identical to each other, as there were notable differences in their proportions. On the contrary, in terms of their morphology, they showed very similar features and, each one was carrying the same agricultural tools in their hands. There are no traces of any text, either written in ink or in relief, which would have helped to date them with palaeographical or prosopographical comparisons.

The contradiction of a set with identical morphology but marked differences in the heights, widths and thicknesses has piqued our interest in finding an explanation for these variations. An analytical methodology was developed that would enable the

deviation of each specimen from the average to be quantified and, these objective data were used to attempt to elucidate key operational aspects that could clarify the manufacturing process of these figurines, in order to provide more in-depth knowledge on the technical and social details of this craft.

This type of ushabti was made using a mould and, therefore, the figurines should be relatively uniform. The moulds preserved in several museums and collections show that they were open, i.e. single-sided with the relief of the figure on their inner surface. This type of mould only reached down to the end of the legs, making the figurine easier to remove,

<sup>1</sup> The name used in Project two zero nine for these figurines is ushabti, as this is the term commonly used by ancient Egyptians from the Libyan Period onwards, to which the specimens found in TT 209 belong. These figurines are referred to in ancient texts with three different terms—transcribed as shabti, shawabti or ushebti—depending on the historical period in which they were made. The root of all three terms is *wšb*, which literally means “to respond”, so the name can be translated in each as “responders” (Schneider 1977: 138), although an etymology from a Semitic loanword meaning “stick” or “staff” has also been proposed (Schneider 1977: 1, 136–137).



Figure 3. Ushabtis from the box SU 365/455 stuck together by mud after their extraction. Photograph: Proyecto dos cero nueve / B. Gugel Gironés.

but the feet must have been made afterwards, by hand.<sup>2</sup> The features printed on the faience were generally blurred, and the use of single-sided moulds meant the backs were unfinished.<sup>3</sup> The manufacturing process consisted of several steps.<sup>4</sup>

- Once the raw material, in this case faience, had been prepared, the amount required for the piece was applied to the mould.

- Immediately afterwards, the ushabti was removed in a swift movement to prevent the material from sticking.

- Next, the excess raw material was removed from the moulded figurine, the edges were smoothed, and the figurine was placed on its

side so that the back could be shaped; this was done using a tool or fingers.<sup>5</sup>

- The feet were finished by hand, the details of the face, tools, arms and hands were outlined, and the text was added, if any was required.

- The final step in the production of a faience ushabti consisted of the glazing process, which comprised different techniques: efflorescence, cementation or application. These were sometimes used in combination, and they are not always easily identifiable.<sup>6</sup> This step finished with the firing of the piece.<sup>7</sup>

The first objective of this study was to quantify the variability of the ushabtis from one single container. As the pieces were found together, it could be assumed that they were produced in the same workshop and within a similar time period. The second objective was to determine whether the metric information can be used to identify the number of moulds used to make the specimens in box SU 365/455. Next, whether there were any differences that could not be attributed to the mould, and, if this were the case, to deduce what might have caused them. It is conceivable that the differences are the result of different volumes of raw material, which could be proved if the shorter specimens were also the narrowest and thinnest and vice versa. An attempt was also made to determine whether these variations could provide information on the gestures of each individual artisan, and

how the piece was handled during the mould extraction process or afterwards.

This work is part of a series of studies being carried out on the ushabtis found in TT 209, which are numerous in recently excavated burial chambers, but are also widely scattered throughout the various underground stratigraphic levels as the tomb was continuously reused.<sup>8</sup> The typological analysis of a closed set such as that in the SU 365/455 box can help the variability of other specimens to be understood, and it could be the first step towards establishing formal and metric equivalences between figurines from different chambers.

### 1 | Archaeological Context of the Discovery of the Box of Ushabtis

SC3 is located at the western end of the lateral axis of TT 209. This axis is a succession of chambers that could correspond to one or more extensions of the original tomb, probably created with a single axis. Like two other underground chambers, SC3 may have been designed as an antechamber to a burial space, but it was converted into a burial site later.

The excavation has identified a complex stratigraphy, with a high number of SUs. These are particularly numerous in the upper third of the sedimentary deposit, as the strata become thinner at higher altitudes, when there was less space for silt-laden water, whose decantation produced the levels identified.

Two sets of burials have been excavated in SC3. In the lower one, the coffins were arranged in two rows, with a space between them for circulation. In the upper one, the mummies were stacked on top of each other in the south-eastern corner of the chamber.

Based on the information given by sediment deposits and differences in mummification rituals and body placement, three phases of use have been identified: the Twenty-Fifth Dynasty, the Persian Period, and the Ptolemaic Period.

The box of ushabtis does not appear to have been found in its original position. Had it been found there, there would have been two boxes, and they would have been associated with the other elements of the funerary equipment. However, it was found alone, stuck next to the northern wall of the chamber on the top of a layer, SU 455, consisting of sediments of highly variable thicknesses on its eastern and western parts, with a steeply sloping surface rising towards the west. These characteristics make it highly unlikely that the unit was formed as a result of suspended silt settling after a flood. These sediments also covered several mummified bodies, M10, M11 and M12, but the mummies are situated at some distance from the box of ushabtis, and do not appear to be connected to it.

Both SU 455 and the ushabti box itself were covered by SU 367. SU 367 is a very thick deposit consisting of dark sediment and large limestone blocks. If these had come from the chamber itself, they could have only fallen from the ceiling. However, the ceiling and walls are both relatively well preserved and there are no such gaps visible. Therefore, the blocks and the sediment binding them together must have come from outside SC3.

Although the box has not been preserved, it has been possible to determine the dimensions of the interior space between its inner sides, which were approximately 29.0 x 12.0 cm.

<sup>2</sup> Williams M. Flinders Petrie's excavations yielded numerous examples of clay moulds. His drawings are collected in several publications (Petrie 1909; 1935). Several museums and collections have examples on display, including Ashmolean Museum (1921.94); BM (EA43407) and Liverpool Museum (1973.2.521).

<sup>3</sup> Schneider 1977: 235–236.

<sup>4</sup> On matters of experimental archaeology and faience composition, see Tite, Manti and Shortland 2007: 1568–1583; Lavenex Vergès 1992.

<sup>5</sup> Lavenex Vergès 1992: 33–35, fig. 8–17.

<sup>6</sup> Nicholson 1998: 56–58; Nicholson and Peltenburg 2000: 189–191.

<sup>7</sup> Experimental studies in modern kilns have shown that faience is fired at between 800 °C and 1000 °C, but it would be necessary to carry out these experiments with replicas of ancient kilns (Nicholson and Peltenburg 2000: 191–192).

<sup>8</sup> For an analysis of the artisans (women in this case) who made other types of ushabtis from TT 209, see: Molinero Polo, Gutiérrez Redomero, Herrerin 2023; Gutiérrez Redomero, Herrerin and Molinero Polo, in press.



Figure 4. Details of the raw material of the ushabtis. Obverse: inventory no. TT 209\_SU455\_168 and reverse: inventory no. TT 209\_SU455\_196. Photographies: Proyecto dos cero nueve / B. Gugel Gironés.

## 2 | Description of the of SU 365/455 Ushabtis

The ushabtis in the SC3 box were made of faience.<sup>9</sup> The surfaces of some specimens are eroded and the colour has faded, degraded by the humidity in the tomb, while on others the blue, almost turquoise, colour has remained largely unchanged, especially on the front (fig. 4).<sup>10</sup> They are small (their average height is 4.9 cm), so their features are poorly defined (fig. 5).

Each one represents a mummified person holding an agricultural tool, a hoe, in each hand. Therefore, they are all workers, but given their number, it is possible that some of them acted as foremen.<sup>11</sup>

The ushabtis in box SC3 have very faint facial features and beard, and they are wearing tripartite wigs. On most of the figurines, only the hands holding the hoes are visible, not their arms. All their backs are smooth.

These details can be explained in greater detail.

The wig was made in the tripartite style, which is mainly associated with mummy-like statuettes. It consists of two masses of smooth, flat hair hanging down over the shoulders at the front, as well as a third element hanging down over the shoulders at the back,<sup>12</sup> which is not visible in the SC3 group (Schneider's W35a).

The beard is very wide and long when compared to the size of the face.

The hands appear to be facing each other, and the fingers and thumbs are poorly defined (Schneider's H13 or, more likely, H14).<sup>13</sup> According to Schneider,<sup>14</sup> they follow the trend, which began at the end of the New Kingdom, of representing hands in a more abstract manner.



Figure 5. Ushabtis from box SU 365/455: the difference in dimensions can be clearly seen. Photograph: Proyecto dos cero nueve / J.M. Barrios Mufrege.

The hoes are clearly visible on some of the best-preserved figurines, while on others they can only be guessed at. They appear to be highly stylized, consisting of two sticks tied together with a rod. However, their poor state of preservation makes it impossible to determine their exact type (they are probably Schneider's I5).<sup>15</sup>

The feet vary greatly from one specimen to another as they were manufactured by hand. There are even small, incised lines, made after each ushabti was removed from its mould, which seem to imitate the toes.

On some specimens, the frontal strands of the wig seem to be curved, whilst on others they are straight. This difference suggests, a

<sup>9</sup> We use this traditional Egyptological term, even though it is a fictitious name, as it is a glazed or vitrified paste, so it would be more correct to call it Egyptian faience, frit, Egyptian paste or glazed siliceous paste. It is made from quartz powder, a natron-type alkali, lime, and copper oxide which acted as a colouring agent. Its glazed appearance was the result of various production techniques (Nicholson and Peltenburg 2000: 177).

<sup>10</sup> The colour of faience can vary depending on the proportions of the materials used. According to Kaczmarczyk and Hedges (1983: 156, 160, 261), the colour blue is obtained with copper and tin. The greater the amount of copper oxide (Cu<sub>2</sub>O), the bluer the result. Different shades may be visible on the same piece, possibly because the materials were not fully mixed when the paste was prepared (Frigolet and Cristóbal 2012: 108).

<sup>11</sup> The fact that the everyday attire of overseers and their gesture, one hand holding a whip and the other one hanging loosely, fell out of use during the first millennium BCE does not mean that they had disappeared. One piece of evidence is the number of ushabtis belonging to a single owner, which equalled the number found in the collections which included both groups (Schneider 1977: 322). This is also evident in TT 209, where other groups of funerary figurines, such as those in the two boxes in SC2BC2, contained a total of 396 specimens. For more information on these boxes, see Molinero Polo 2022: 61.

<sup>12</sup> Schneider 1977: 166–167.

<sup>13</sup> “Hands crossed opposite unsleeved, arms not indicated” (Schneider 1977: 168).

<sup>14</sup> Schneider 1977: 165–240.

<sup>15</sup> “Hoes stylized” (Schneider 1977: 170).

priori, that two different moulds were used to make them. However, we have not detected any differences in the proportions between the specimens of the two types of wigs, and there are other figurines on which the form of the frontal strands cannot be distinguished. For this reason, the metric analysis of the figurines has been carried out by treating them as a single group.

### 3 | Methodology

To achieve our objectives, we have established a multi-phase methodology that combines, direct observation of the pieces to identify their characteristics and a series of measurements and their statistical analysis, inspired by anthropometric measurements in Osteology. These later phases are a procedure that, to the best of our knowledge, has not been previously applied to ushabtis. We have therefore:

- recognised the preserved part of each figure;
- calculated the minimum number of individuals in the set;
- identified the morphological and iconographic characteristics of the model in order to establish parallels with published examples and to propose a chronology;
- analysed the metric differences and similarities between the ushabtis; and
- drawn conclusions about the manufacturing process.

#### 3.1 | Treatment and Inventory of Preserved Elements

After being discovered, the pieces were dry cleaned. The parts that had fragmented during the extraction process were adhered together. Different concentrations of an acrylic adhesive

were used, depending on whether the purpose was adhesion (higher concentration) or consolidation (higher dilution). The aim of the treatments was to keep the ushabtis stable and handle them without causing damage.

The preserved anatomical parts of each figurine were identified according to a four-part division: head, body, legs and feet, following a procedure that had already been proposed to show the different states of preservation of other similar ushabtis.<sup>16</sup> The figurines with all four parts preserved, were recorded as complete, regardless of whether they were extracted in one piece, or had needed any later restorations. Our objective was not morphological but morphometric, that is, the goal was to count the minimum number of individuals (MNI), represented by the most frequently repeated anatomical part.

#### 3.2 | Search for Formal Parallels

In order to obtain additional information about the ushabtis and their chronology, formal parallels were sought in the typologies already established. In general, Egyptological research has paid little attention to these simple specimens even though their common presence in Theban tombs from the Libyan Period onwards indicates that they were a significant phenomenon during those centuries, one of the most important elements of funerary equipment.<sup>17</sup>

Some of the morphological features of the SC3 ushabtis have been equated with the typological variations established by Hans D. Schneider,<sup>18</sup> despite the fact that this author bases his findings on a series of minute details that are difficult to identify in the TT 209 box examples due to their poor definition and state of preservation. The comparison with David

Aston's typology presents the same problem,<sup>19</sup> even though it would be more suitable for the present study as it classifies Theban examples, but they are of better quality than the specimens analysed here. However, as will be seen below, these two classifications have been the basis for the first published analyses of these "small" ushabtis.

A series of recent studies has focused on funerary figurines with features similar to those of SU 365/455, most of which come from the Theban region.<sup>20</sup> All of them establish typologies based, first, on the material used to make them: faience and clay, the latter sometimes painted and fired and sometimes not. The studies based on a larger number of examples create a second level of subgroups based on morphological characteristics: the presence or absence of a beard, the type of wig, the position of the hands and the utensils. They reference the typologies established by Aston and Schneider despite the difficulties already mentioned. Chronologically, these examples are placed in the Libyan and Late Periods, although there is a probability—albeit rather low—that some specimens could date back to the Ptolemaic Period.

The ushabtis closest to those in SC3 are those published by Agnieszka Makowska and Marta Kaczanowicz. The former analysed 619 ushabtis—only 44 of which are complete—from seven tombs excavated in Hatshepsut's chapel during the early centuries of the first millennium BCE in the queen's Mansion of a Million Years at Deir el-Bahari. She organises them into sixteen types, of which the closest to those studied here is her IC, subtype 1C.1, made of fired clay.<sup>21</sup>

Those studied by Kaczanowicz come from tombs MMA 1151 and 1152, in the vicinity of the same wadi as TT 209. There is a large number of specimens, 1,238, and half of them were complete. The typology she published focused only on those made of clay, both fired and unfired, with some covered in blue paint, a colour that is yellow or green in certain individuals. She organises them into nine types, none of which are identical to those in the SC3 box, but quite a few features do coincide, as will be seen below.<sup>22</sup>

#### 3.3 | Taking Measurements for Statistical Analysis

The uniqueness of a closed set of "small" ushabtis and the absence of a previously published method for the morphometric study of ushabti assemblages from the first millennium BCE has led to the development of an *ex novo* system for measurement and statistical analysis to identify metric differences and draw conclusions about their manufacture. To achieve this aim, a database was created that assigned a registry number to each piece separately, and identified which body parts were present, as well as the general degree of preservation (complete or incomplete) of the piece.

A set of measurements was defined to establish a morphometric criterion. They are taken with a calliper on each individual piece, and they refer to the three-dimensional X, Y and Z axes of the figure (width, thickness and height). In total, 11 measurements are proposed—they can be seen in the diagram in figure 6—that represent the following variables:

A: Maximum height of the piece. The entire Z axis of the piece is measured. It is taken

<sup>16</sup> Makowska 2015: 141, table 1.

<sup>17</sup> Schreiber and Vasáros 2005: 17.

<sup>18</sup> Schneider 1977.

<sup>19</sup> Aston 2009; 2011.

<sup>20</sup> Graefe 2003: 184–192; Schreiber and Vasáros 2005; Schreiber 2008: 57–60; 2011; 2014; 2018; Fábian 2007; Makowska 2015; Kaczanowicz 2017 and 2018. The exception is James 2018, based on material from Abydos.

<sup>21</sup> Makowska 2015: 148.

<sup>22</sup> Kaczanowicz 2017: 4; 2018: fig. 2.

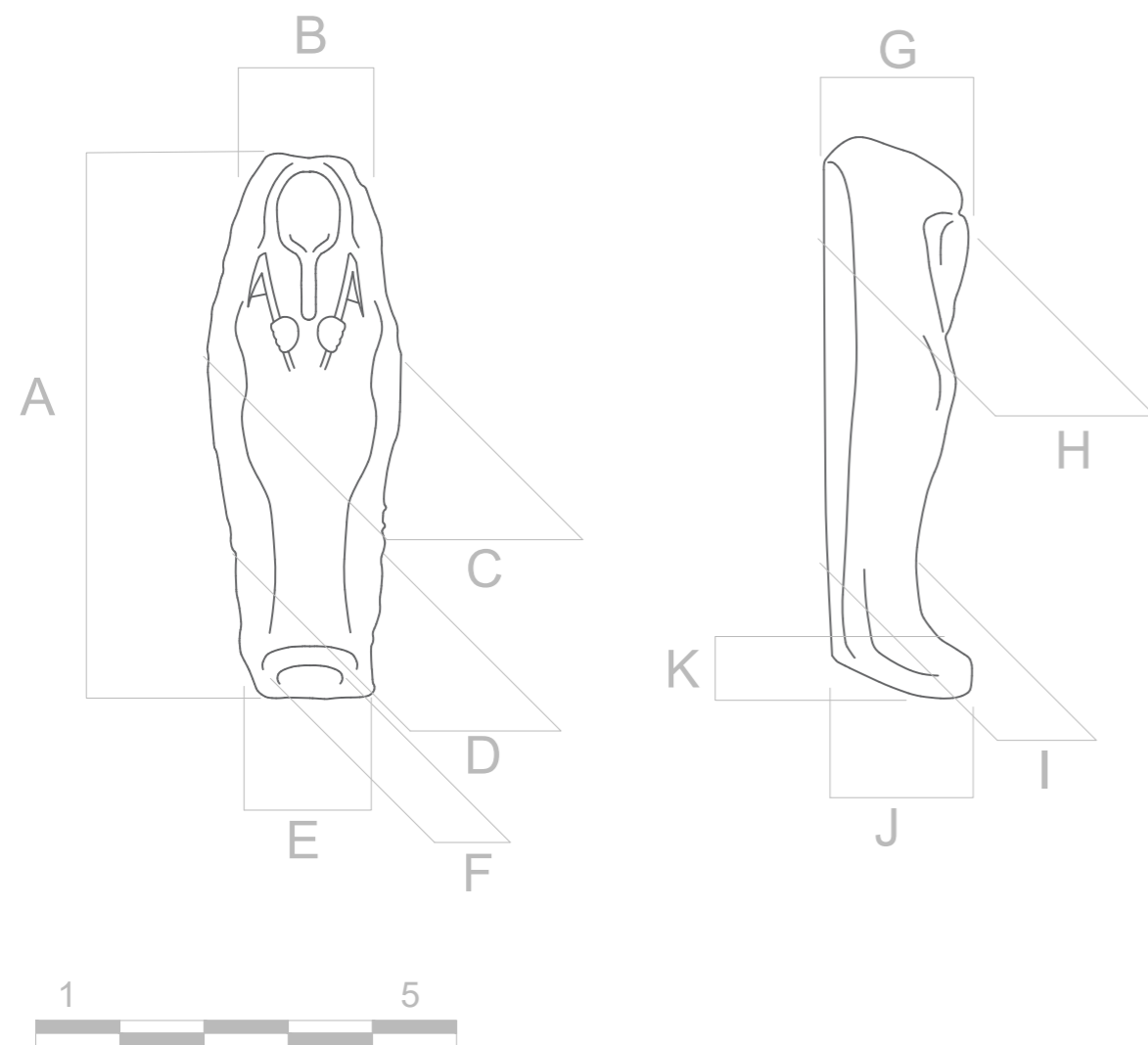


Figure 6. Model of the measurements taken on the ushabtis. Drawing: Proyecto dos cero nueve / Manuel Guerra-Librero.

A: total height  
 B: head width  
 C: maximum body width  
 D: minimum body width  
 E: width of the feet (back)  
 F: width of the feet (front)

G: head thickness  
 H: maximum body thickness  
 I: minimum body thickness  
 J: length of the feet  
 K: thickness of the feet

between the upper end of the head and the flat base, corresponding to the soles of the feet.

- B: Head width. The X axis in the anatomical part of the head is measured; it is taken at the widest part of the head.
- C: Maximum width. The X axis in the anatomical part of the body is measured; it is taken at the shoulders of the ushabti.
- D: Minimum width. The X axis in the anatomical part of the legs is measured; it is taken in the lower area of the figurine's legs, where the ankles would have been located.
- E: Posterior foot width. The X axis at the posterior part of the feet is measured; it is taken at the base, that is, the soles of the feet of the piece, from the back.
- F: Anterior foot width. The X axis at the front part of the feet is measured; it is taken at the front of the feet.
- G: Head thickness. The Y axis in the anatomical part of the head is measured; it is taken in the thickest area of the head, above the eyes.
- H: Maximum thickness. The Y axis in the anatomical part of the body is measured; it is taken in the thickest area of this part, which represents the figure's chest.
- I: Minimum thickness. The Y axis in the anatomical part of the legs is measured; it is taken in the thickest area of the ushabti's legs, which represents the figure's ankles.
- J: Foot length. The Y axis in the anatomical part of the feet is measured; it is taken between the anterior and posterior parts of the feet, measuring their total length.
- K: Foot height. The Z axis in the anatomical part of the feet is measured; it is taken between the base and the highest part of the foot, that is, between the sole and the instep of the ushabti.

These variables were taken using a digital calliper on each piece that was suitable for measurement (both complete and incomplete pieces), and they were recorded in the database in millimetres, including two decimals. The full set of measurements can be found in supplementary table 1.

All the variables were subject to statistical analysis. All tests were carried out using the IBM SPSS Statistics software. The results of the tests can be found in the supplementary material (supplementary tables 2–4).

All the pieces, regardless of their state of preservation, were measured. From 208 records in the database, 188 individual pieces were used for the descriptive statistics. The other pieces are loose unidentifiable formless fragments, whose measurements cannot be considered representative. From 188 measured ushabtis, only 107 were complete and had the full range of measurements (A–K).

## 4 | Results

### 4.1 | Minimum Number of Individuals (MNI)

The most frequently represented parts in this set were the heads, which enabled an MNI of 174 individuals to be determined, from a database that contains 208 different records. 107 pieces are complete, that is, with all anatomical parts; in some cases, they have been reassembled from fragments that were undoubtedly connected (fig. 7).

### 4.2 | Parallel Typologies to the SU 365/455 Ushabtis

Overall, the typology of the ushabtis from SU 365/455 can be related to those of Schneider's Class X mummiform, either to subtype XA4, made of faience and dated to the Twenty-fifth and Twenty-sixth dynasties, or to subtype XB: "Mummy with flat back and rounded shoulders", from the Twenty-fifth Dynasty;



Figure 7. Complete set of ushabtis from box SU 365/455. Photograph: Proyecto dos cero nueve / J.M. Barrios Mufrege.

uninscribed.<sup>23</sup> When considering Aston's typology, the type which most closely resembles this set of ushabtis is G: "ushabtis without arms, having smooth, uncontrored,

<sup>23</sup> Schneider 1977: 225–226.

tapering bodies. The wig is plain, and a beard is always present". The wigs correspond to Schneider's types W<sub>34</sub>–35a.<sup>24</sup>

IC<sub>1</sub> is the closest type from Makowska's typology (Schneider's VIIIA.1),<sup>25</sup> made of fired clay, with an identical wig (W<sub>35a</sub>) and instruments (I<sub>5</sub>) and a flat back, such as those from SU 365/455, although it has different hands (H<sub>30</sub>).

The ushabtis published by Kaczanowicz are extremely similar. The figurines she analyses only show two types of wigs and two types of instruments, one of which is identical to those in the SC<sub>3</sub> specimens: W<sub>35a</sub> and I<sub>5</sub>, respectively. On the contrary, her examples have many different types of hands, which do not match the H<sub>14</sub> (or H<sub>13</sub>) model proposed for those of SC<sub>3</sub>, which adds one more type to the varieties of hands found on the ushabtis of the first millennium BCE.

The similarity with examples made from clay should come as no surprise. The possibility has already been raised that the same moulds were used for both raw materials and, consequently, that they may have come from the same workshop or from workshops that shared moulds or models.<sup>26</sup>

#### 4.3 | Descriptive Statistics

Statistical analysis was carried out in four consecutive phases. First, a descriptive phase was conducted, in which the means and standard deviations of all the variables studied were calculated. Supplementary table 2 shows a standard deviation higher than 1 for several variables (A-F, and J). A standard deviation close to "0" indicates that the values of the distribution are grouped, while a standard deviation greater than "1" indicates that the values are poorly grouped; therefore, many of these

variables, especially those related to width and, most notably, height, are not homogeneous within the set.

The descriptive phase also addressed the normality of each variable. The starting hypothesis assumed that ushabtis created using a unified mould (either a single mould or several with the same dimensions) should follow a normal distribution, since most variables in nature behave according to symmetric distributions, with a large number of values around the mean, and few extreme values. A Shapiro-Wilk statistical test was used for normality, taking statistical significance values (p) greater than 0.05 as characteristic of a normal distribution. Of all the variables studied, only variables B, D, and F were non-normal distributions (supplementary table 2).

#### 4.4 | Correlation Analysis

One of the objectives was to determine the probability that, once a possible mould-based production process had been identified, the objects would have been standardised, and they would show covariation between variables. Consequently, the second phase of the statistical analysis aimed to examine possible correlations between variables and to determine how one or more morphometric variables of the ushabtis influence others. Since three variables followed a non-normal distribution, a Spearman correlation was carried out between all variables (A–K). This correlation is expressed in a value of  $\rho$  (rho) that produces a numerical result between  $-1$  and  $+1$ . A positive result implies a positive correlation (when one variable increases, another one does too), and a negative result implies a negative correlation (when one variable increases, another decreases). Supplementary table 2

<sup>24</sup> Aston 2009: 357, fig. 44.

<sup>25</sup> Makowska 2015: 148–149.

<sup>26</sup> Nicholson and Peltenburg 2000: 186, 189; Gutiérrez Redomero, Herrerín and Molinero Polo, in press. Kaczanowicz (2018: 267) attributes to identical moulds figurines of baked and unbaked clay.

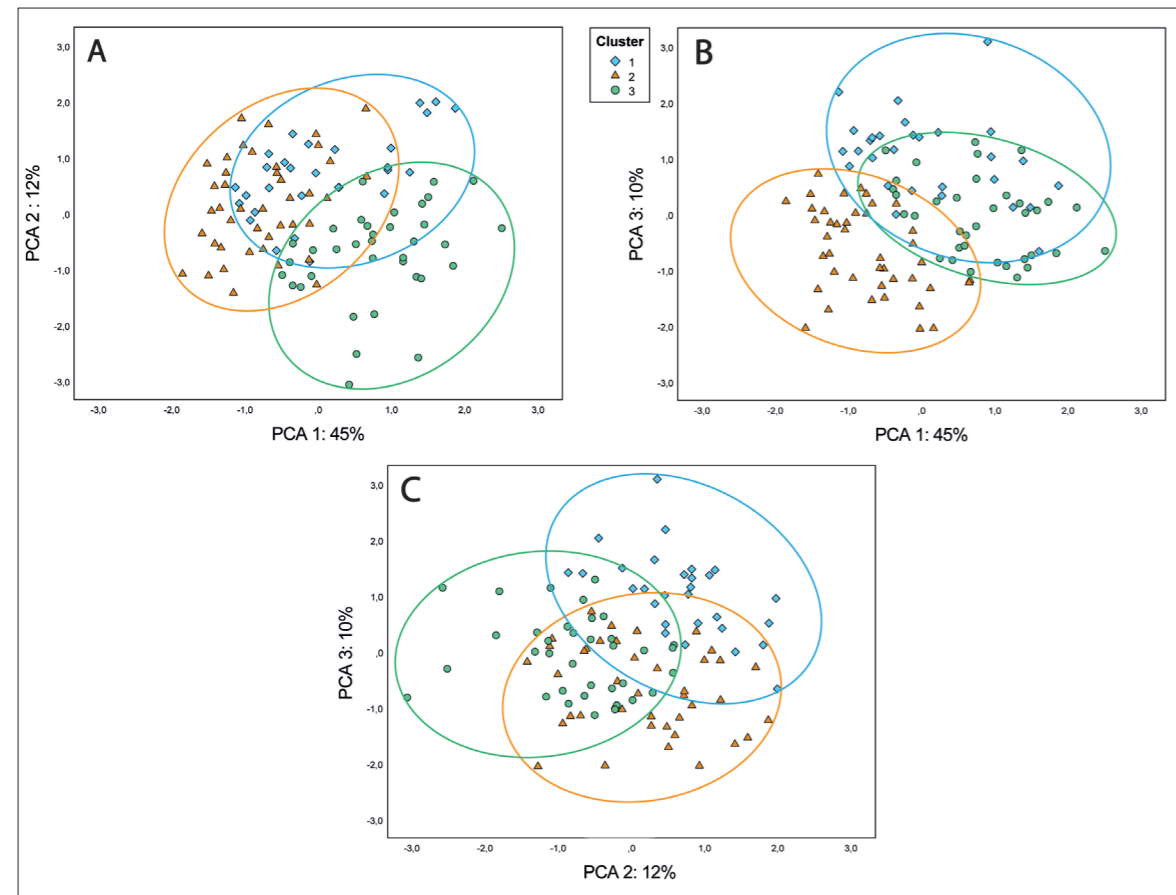


Figure 8. Dispersion of complete set of ushabtis from box SU 365/455 distributed by PCA and clustered. This clustering enables three distinct groups that are separated from each other to be observed. Graphs: Proyecto dos cero nueve / E. Sánchez Cañadillas.

includes the Spearman correlation between all the variables and the correlation coefficient of all the morphometric characteristics. The widths and thicknesses of the ushabtis correlate positively with each other (0.35–0.62). However, their height shows weak correlations with widths (0.12–0.25), and a negative correlation with maximum thickness (–0.55) and minimum thickness (–0.64). This implies that the figurines with longer heights have lower thicknesses.

#### 4.5 | Principal Component Analysis (PCA)

The next phase of the statistical analysis consisted of conducting a principal component analysis (PCA) of the variables. This type of analysis is used to reduce a large number of variables (in this case, 11) in order to facilitate statistical interpretation. The principal component model first scaled all the measurements to unit variance and was then applied to all the morphometric variables (A–K) from complete ushabtis ( $n = 107$ ), extracting three principal components that together explain 67.45% of the variance. The first component

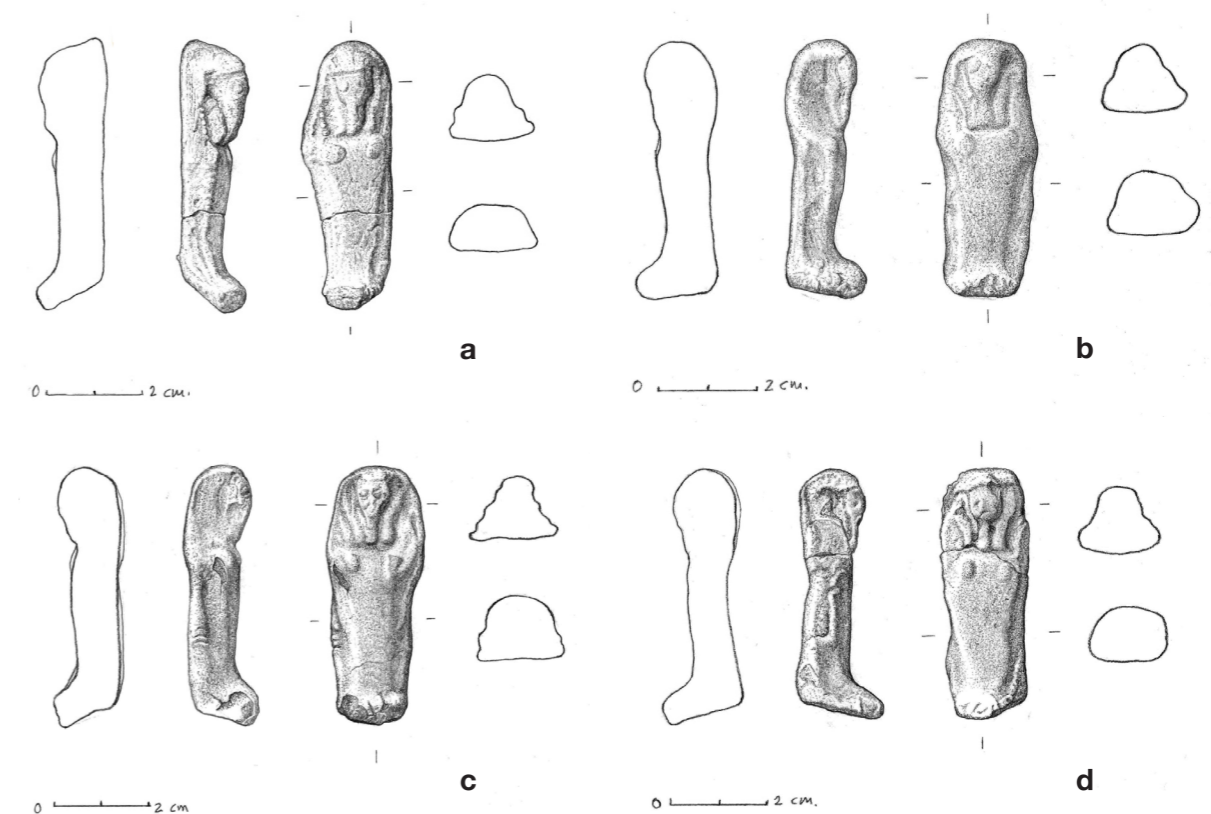


Figure 9. Four examples of ushabtis from box SU 365/455 showing: (a) the tallest one (TT 209\_SU455\_083), (b) the widest one (TT 209\_SU455\_071), (c) the one with the widest feet (TT 209\_SU455\_018) and (d) the one with longest feet (TT 209\_SU455\_082). Drawings: Proyecto dos cero nueve / M.Á. Nuñez Villanueva.

(PCA 1, 45% of the variance) grouped the widths and thicknesses of all parts of the body and represented the general size and volume of the figurines. PCA 2 (12% of the variance) was dominated by variable A (height) and reflected the vertical proportion of the pieces. PCA 3 (10% of the variance) captured minor variations located in the upper part of the piece (head and trunk) and the feet. The PCA results are available in supplementary table 3.

#### 4.6 | Cluster Analysis

The fourth phase consisted of the hierarchical clustering of the principal components identified, using Ward's and K-means cluster methods. The two methods were used in a

complementary way. Ward's clustering, performed first, considers each case individually and groups the most similar cases, generating compact groups; subsequently, the K-means analysis refines the groups generated by Ward's method. By using these two methods, three coherent morphological groupings related to the PCA were obtained (supplementary table 4). This enabled three different clusters to be observed, and for three possible groups of ushabtis to be distinguished: the first cluster, with 29 figurines, with high levels of representation in PCA 2 and 3; the second group ( $n = 42$ ) with low levels of representation in PCA 1 and 3; and the third group ( $n = 36$ ) with high levels of representation in PCA

1 and low levels of representation in PCA 2. Figure 8 shows scatter plots of all the complete ushabtis distributed by using PCA and cluster grouping. The ushabtis clusters, which are defined statistically, can also be distinguished visually. Figure 9 presents archaeological drawings highlighting their morphometric and morphological differences.

## 5 | Discussion

### 5.1 | Hypothesis on the Chronology of the Production of the SU 365/455 Ushabtis

The chronology of the small, uninscribed ushabtis from the first millennium BCE, which have been so numerous in excavations, is an unresolved issue. Examples of a similar type to those from SU 365/455 box have been published with different dates, ranging from the Libyan to the Ptolemaic Periods.<sup>27</sup>

The first chronological argument for the SC3 box and its ushabtis is their stratigraphic location. They were found at the interface between two SUs. The lower unit, SU 455, contained mixed materials dating mainly from the Twenty-Fifth Dynasty and it also covered mummified remains with ritual characteristics that could correspond to the Twenty-Seventh Dynasty. The upper unit, SU 365 contained a large volume of rubble and some objects that can be mainly dated to the Twenty-Seventh to the Ptolemaic Dynasties. This would mean that they can be dated to the Kushite or Persian periods, ruling out the possibility that it was manufactured during Ptolemaic

rule. However, its location between two strata composed of mixed materials, undoubtedly brought in from outside this chamber, suggests that the box should be interpreted as displaced material and, probably, of Twenty-Fifth Dynasty chronology. This was a time of intensive use of TT 209, and the materials from this phase were removed from the main axis of the tomb for the reuse of its chambers around the 5th century BCE.

The raw material, faience, was used throughout the first millennium, and the colour blue is also documented throughout that period,<sup>28</sup> so neither aspect serves to confirm either of the potential chronologies.

On the contrary, certain morphological details provide clues as to when it was made. The lappet or tripartite wig, so characteristic of mummiform statuettes, does not define a precise chronology, but, according to Schneider, it establishes limits ranging from the Libyan Period to the Saite Period,<sup>29</sup> thus excluding a date under the Persian Dynasty.

The presence of a beard is also a significant criterion. Aston does not record any funerary figurines with beards until those of Istemkheb B, dated 700–680 BCE, and he considers this to be a characteristic element of Twenty-fifth Dynasty funerary assemblages from that date<sup>30</sup> This feature means that he assigns a chronology to his type G, which is similar to the one that we have proposed stratigraphically to the examples from SU 365/455.<sup>31</sup> Beards continued to appear until the beginning of the Twenty-sixth Dynasty.<sup>32</sup>

### 5.2 | Number of Ushabtis in the Original Assemblage

One of the objectives of calculating the minimum number of individual pieces recorded in the box was to help identify the total number of ushabtis in the original assemblage. Their number in each set grew significantly from the end of the New Kingdom, reaching groups of up to 401 individuals from the beginning of the first millennium BCE. For the SC3 box, it should be noted that this figure must be multiplied by 2, as the equipment would have contained two boxes,<sup>33</sup> as shown by other burials of the first phase of use of TT 209, that of the Twenty-fifth Dynasty (SC2BC2 and SC4BC).

The pieces from the SC3 box do not reach half of this “orthodox” figure, although the number is very close. A minimum of 174 individuals (based on the heads) was counted, to which about twenty unidentified fragments must be added. If the set had been composed of a large crew (365 workers + 36 foremen = 401 ushabtis) divided into two boxes, 26/27 specimens would be missing in the preserved box.<sup>34</sup> However, the two boxes of SC2BC2 in TT 209 contained a total of 396 figurines, i.e. 360 workers and 36 foremen, which slightly reduces the total number if this set is taken as a reference. If the set to which the SU 365/455 box belonged had consisted of only 360 figurines distributed in two boxes, i.e. workers without foremen, only 6 would be missing. Given the level of deterioration of the pieces caused by humidity, the disappearance of 6 heads would not be surprising, but it is actually a very small number if we take into account the twenty unidentified formless fragments. It should be borne in mind that at the time of its deposition in SC3, the box could have been open, and some pieces could have

been lost or scattered. It is also possible that the number of pieces were not divided into two strictly equal quantities between the two boxes. In short, given the relatively high number of unidentified fragments, it is more likely that the set had foremen and was an “orthodox” figure of around 396–401 individuals.

### 5.3 | Figure Variability

The morphometric study of the ushabtis has enabled the variability of this unique set of pieces to be studied. Descriptive morphometric analyses and Spearman tests have established coherence among the general measurements. Furthermore, since the objects were found as part of a closed set and display similar morphology and dimensions, they have been considered as the product of one manufacturing process and workshop. However, the PCA and the Ward cluster analysis of the set have revealed identifiable differences, which are most likely the consequence of a manual manufacturing process (see fig. 4).

The first phase of the statistical analysis verified that this initial homogeneity shows high deviations in some aspects of the morphology of the pieces, especially in the height of the figurines. Despite this, most variables are normal, therefore, a high percentage of the values are symmetrically concentrated around the mean, which is characteristic of a unitary process. The variables that turned out to be non-normal, which are head width, minimum width (in the legs), and foot width, may reflect secondary modelling processes.

Spearman’s correlation shows a certain standardisation of the measurements around the X and Y axes (width and thickness), and that the variables of the latter (maximum and

<sup>27</sup> For example, types B3–B6 and U1–U3 by Kaczanowicz (2018), although in this case they are all clay, not faience, and she doubts that they date back to the Ptolemaic Dynasty.

<sup>28</sup> Blue faience specimens from the middle of the Ptolemaic Dynasty are published by Schreiber (2011: 123, fig. 31).

<sup>29</sup> Schneider 1977: 166–167.

<sup>30</sup> Aston 2009: 363, fig. 11; 2011: 25, 29, figs. 7–8.

<sup>31</sup> Aston 2011: 25, 29.

<sup>32</sup> Kaczanowicz 2018: 11, n. 30.

<sup>33</sup> Aston 2009: 374.

<sup>34</sup> The ushabti underwent major changes in both their meaning and function at the end of the New Kingdom (Schneider 1977: 319–335) and, as a result, it became customary to bury the deceased with complete sets of up to 401 individual pieces, although in practice the exact number was rarely reached. In theory, this number consisted of 365 mummy-shaped ushabti (or ordinary workers) and 36 figurines of reis or supervisors (Aston 2009: 357).

minimum thickness of each piece) correlate negatively with the Z axis (height). That is, the greater the width, the greater the thickness of the ushabtis, but thickness is inversely related to height, and the greater the height, the smaller the thickness. This correlation enabled a hypothesis for the possible first step in the manufacture of these pieces to be made, which would have been the introduction of the paste into the mould and the pressure exerted on the paste by the artisan. This would be consistent with a process in which, in general terms, the same amounts of raw material were used for the entire set, and the paste was distributed homogeneously in the mould, with millimetric differences that could have depended on the degree of pressure exerted on the paste at the time of manufacture.

Using the PCA, the 11 variables were reduced to controlled principal components; these components show a major difference between the general morphological characteristics of each piece, which together explain 45% of the variance of the data (PCA 1). The other PCA (2 and 3) explain these differences to a lesser extent. PCA 2 is dominated by height and explains only 12.3% of the variance; PCA 3, represented by minor aspects in the upper and lower parts of the pieces, explains only 10.13% of the variance. The differences between the ushabtis, therefore, are largely explained by the combination of variables related to width and thickness, which makes it possible to propose that the differences occurred during the manufacture of each piece, perhaps after its removal from the mould. These differences can therefore be attributed to the secondary modelling process.

Based on the PCA values (supplementary tables 1 and 4), cluster grouping enables three differentiated groups, which maintain a certain separation from each other, to be observed (see fig. 7). These three groups confirm the formal differences of these pieces and suggest that they were made by different hands. With cluster analysis, it can be proposed that

this process was carried out by three different artisans—men or women—without dismissing the possibility that it was the same artisan at three different moments. However, it should be noted that the number of pieces in each cluster is not homogeneous, making the first option more likely.

### Conclusions

The statistical study of the figurines of SC3 enabled a more precise approach to the main morphometric characteristics of these “small” ushabtis to be taken. Starting from prior hypotheses about how the raw material was modelled to complete each figure, the interpretation of the data obtained has supported proposals about the production process and the identification of possible movements made by each artisan—man or woman, we do not presuppose their gender—in the two consecutive phases of moulding and subsequent manufacture.

The ushabtis in this set show high dimensional homogeneity, which is consistent with a standardised production process based on a similar volume of raw material being introduced into a mould. Spearman’s correlation reveals a formal consistency in transverse proportions (width and thickness), which, however, varies in height. This variation could have been caused by the pressure exerted on the mould by the artisan, which would have generated an unequal distribution of the paste inside it.

Principal Component Analysis has revealed that the shapes of the ushabtis is organised around three-dimensional aspects: general body size (PCA 1), the height/width proportion (PCA 2), and the modelling of the upper area (PCA 3). The micro-variations identified do not seem sufficiently significant to propose that different moulds were used, which confirms that they would have been made from one single mould, or identical replicas of it, and these micro-variations would have

occurred in the following phase of production, when the proportions of the piece would have been modified while the final details were being added.

Ward’s hierarchical clustering analysis, followed by cluster validation using the K-means algorithm, applied to the PCA scores, enabled three distinct groups to be identified within the set. These groups represent internal variations within a shared formal scheme, characterised by subtle yet systematic differences that mean that clusters can be differentiated from each other. The presence of these three groupings may reflect either discrete moments during production by a single artisan, or the involvement of several artisans in the same workshop. Overall, the results suggest a collaborative and tightly controlled manufacturing process, in which standardisation around a single mould—or several identical moulds—coexisted with variability introduced by individual manual gestures. This combination is a distinctive feature of the production of faience (or clay) ushabtis during the first millennium BCE.

### Acknowledgements

The authors would like to express their gratitude to our colleague in the Proyecto dos cero nueve Cristo M. Hernandez Gómez and to the two blind referees for their suggestions that have greatly improved the original version. Any errors that may remain are the responsibility of the authors. We also thank Miguel Ángel Nuñez for his accurate drawings of the ushabtis, some of which are included in this article.

### Partnership

The fieldwork season 2019 in which the ushabtis of the box were found and the two seasons in which they were studied, 2022 and 2023, were funded by the Dirección General

de Patrimonio Cultural of the Consejería de Turismo, Cultura y Deportes, Gobierno de Canarias; Fundación Palarq, Barcelona; and the Universidad de La Laguna, Tenerife, Canary Islands. We would like to express our deepest gratitude to all of them.

### Supplementary tables

Supplementary Tables 1–3 are available on the journal’s website for further reference.

## Bibliographical references

ASTON, David A.

2009 *Burial Assemblages of Dynasty 21–25: Chronology, Typology, Developments*. (Österreichischen Akademie der Wissenschaften. Denkschriften der Gesamtakademie 56). Vienna.

2011 “Theban Funerary Customs ca. 950-650 BC”, in: Z.A. Hawass, T.A. Bács and G. Schreiber (eds.): *Proceedings of the Colloquium on Theban Archaeology at the Supreme Council of Antiquities, November 5, 2009*, Cairo: 9–32.

FABIAN, Zoltan L.

2007 “Theban Tomb 184 (Nefermenu) and the Upper Section of the South Slope of El-Khokha Hillock-2005”, *Acta Archaeologica Academiae Scientiarum Hungaricae* 58: 1–42.

FRIGOLET VELA, Gema; CRISTÓBAL HORCAJO, Paula

2012 “Tjehmed: reproducción de fayenza en el laboratorio de arqueología experimental de la Universidad Autónoma de Madrid”, *Boletín de Arqueología Experimental* 9: 103–109.

GRAEFE, Erhart

2003 *Das Grab des Padihorresnet, Obervermögensverwalter der Gottesgemahlin des Amun (Thebanisches Grab Nr. 196) (Monumenta Aegyptiaca 9)*. Turnhout.

GUTIÉRREZ REDOMERO, Esperanza; HERRERÍN, Jesús; MOLINERO POLO, Miguel Ángel

In press: “Fingerprints as Indicators of Craftworkers’ Age and Sex in a Sample of Clay Ushabtis from TT 209, Luxor, Egypt”, *Anthropologischer Anzeiger: Journal of Biological and Clinical Anthropology*.

JAMES, Janet

2018 *Embodied Persons in the North Abydos Votive Zone during the Third Intermediate – Late Period (1069- 332bce): Constructing Social Identities with Osteology and Mortuary Behaviour*. PhD Thesis, University of Toronto.

KACZMARCZYK, Alexander; HEDGES Robert E.M.

1983 *Ancient Egyptian Faience: An Analytical Survey of Egyptian Faience from Pre-dynastic to Roman Times*. Warminster.

KACZANOWICZ, Marta

2017 “Shabtis from Tombs MMA 1151 and 1152 in Western Thebes”, *Egyptian Archaeology* 50: 1–4.

2018 “The Third Intermediate Period and Late Period Burials to the West of the South Asasif Necropolis: Polish Excavations in the Tombs MMA 1151 and 1152”, in: E. Pischikova, J. Budka and K. Griffin (eds.): *Thebes in the First Millennium BC: Art and Archaeology of the Kushite Period and Beyond*, London: 214–230.

LAVENEX VERGÈS, Fabienne

1992 *Bleus égyptiens: De la pâte auto-émaillée au pigment bleu synthétique*. Leuven.

MAKOWSKA, Agnieszka

2015 “Ushebtis of the Third Intermediate Period from the Chapel of Hatshepsut in the Queen’s temple at Deir el-Bahari”, in: E. Szafranski (ed.): *Polish Archaeology in the Mediterranean 24/2, Special Studies: Deir el-Bahari Studies*, Warsaw: 137–160.

MOLINERO POLO, Miguel Ángel

2022 “Pilono, terrazas y enterramientos de época kushita: tres nuevas campañas en la TT 209 (2019-2022)”, in: M.Á. Molinero Polo and A. Martín Flores (coords.): *Arqueología Canaria en Egipto. Fotografías de José Miguel Barrios Mufrege en la Tumba Tebana 209, Luxor*, Madrid: 52–66.

MOLINERO POLO, Miguel Ángel; GUTIÉRREZ REDOMERO, Esperanza; HERRERÍN, Jesús

2023 “Ellas dejaron huella: mujeres alfareras en la elaboración de los ushebtis hallados en la TT 209, Luxor”, in: *La Mujer en el Antiguo Egipto*, Madrid: 109–123.

NICHOLSON, Paul T.

1998 “Materials and Technology”, in: F.D. Friedman (ed.): *Gifts of the Nile*, New York: 50–64.

NICHOLSON, Paul T.; PELTENBURG, Edgar

2000 “Egyptian faience”, in: P. Nicholson and I. Shaw (eds.): *Ancient Egyptian Materials and Technology*, Cambridge: 177–194.

PETRIE, Williams Mathew Flinders

1909 *Memphis I. (British School of Archaeology in Egypt 15)*. London.

1935 *Shabtis: Illustrated by the Egyptian Collection in University College. (British School of Archaeology in Egypt 57)*. London.

SCHREIBER, Gábor

2008 *The Mortuary Monument of Djehutymes II. Finds from the New Kingdom to the Twenty-Sixth Dynasty (Studia Aegyptiaca Series Maior 2)*. Budapest.

2011 “Early and Middle Ptolemaic Funerary Art at Thebes (ca. 306–88 BC)”, in:

T. Bács and Z. Hawass (eds.): *Proceeding of the Colloquium on Theban Archaeology at the Supreme Council of Antiquities, November 5, 2009*, Cairo: 105–139.

2014 “Kushite and Saite Period Burials on el-Khokha”, in: E. Pischikova, J. Budka and K. Griffin (eds.): *Thebes in the First Millennium BC*, Newcastle upon Tyne: 235–248.

2018 “Yet Another Kushite Tomb Group from the el-Khokha Cemetery”, in: A. Tamás Bács, Á. Bollók and T. Vida (eds.): *Across the Mediterranean – Along the Nile. Studies in Egyptology, Nubiology and Late Antiquity Dedicated to László Török on the Occasion of his 75th Birthday*, Budapest: 1, 259–268.

SCHREIBER, Gábor; VASÁROS, Zsolt

2005 “A Theban tomb of the late Third Intermediate Period on el-Khokha”, *Acta Archaeologica Academiae Scientiarum Hungaricae* 56: 1–27.

SCHNEIDER, Hans D.

1977 *Shabtis: An Introduction to the History of Ancient Egyptian Funerary Statuettes with a Catalogue of the Collection of Shabtis in the National Museum of Antiquities at Leiden*. Leiden.

TITE, Michael S.; MANTI, Panagiota; SHORTLAND, Andrew J.

2007 “A Technological Study of Ancient Faience from Egypt”, *Journal of Archaeological Science* 34: 1568–1583.