

Article

## You Only Live Twice: Reusing Late Roman Amphorae in Saqqara (New Kingdom Necropolis)

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### Abstract

During fieldwork season 2023, the Leiden/Turin Expedition to the New Kingdom Necropolis at Saqqara discovered a remarkable example of amphorae reuse. Four Late Roman amphorae were reemployed as hydraulic pipes in a drainage system: two of them were deliberately laid in the ground and oriented towards another two deliberately inserted, one into the other, in a mudbrick wall. This archaeological feature is consistent with the layers previously investigated at the site by the Dutch/Italian Mission and dated to the transition between the Late Antique and the early Medieval phases. The installation discovered in 2023 should be dated no earlier than the second half of the seventh century AD. While Late Roman 7 (LR 7) amphorae are the best attested transport containers at the site, the drainage system analysed in this paper was made from an amphora type much less commonly found in Saqqara, consistent with type AE 3T-3.2. This paper focuses on both the Saqqara drainage system itself and the amphorae type it was made from, while providing an overview of the most frequent amphorae reuse patterns and strategies in Egypt and beyond across time.

### ملخص

خلال موسم الحفريات لعام 2023، اكتشفت بعثة لايدن/تورينو في مقبرة المملكة الحديثة في سقارة مثلاً رائعاً على إعادة استخدام الأمفورات، وهو إعادة استخدام أربع أمفورات رومانية متأخرة كأنابيب هيدروليكية في نظام الصرف الصحي. تم وضع اثنتين منها في الأرض وتوجيهها نحو وعائين آخرين تم إدخالهما، أحدهما داخل الأخرى، في جدار من الطوب اللبن. تشبه هذه التقنية تلك الآثار التي سبق أن اكتشفتها البعثة الهولندية/الإيطالية في الموقع ضمن الطبقات التي تعود إلى الفترة الانتقالية بين العصور القديمة المتأخرة وأوائل العصور الوسطى. لا نعتقد أن يكون تاريخ هذه التقنية المكتشفة في عام 2023 أقدم من النصف الثاني من القرن السابع الميلادي. في حين أن الأمفورات الرومانية المتأخرة 7 (LR 7) هي أفضل أوعية النقل الموثقة في الموقع، فإن نظام الصرف الصحي الذي تطرق إليه هذا البحث، مصنوع من نوع من الأمفورات أقل شيوعاً في سقارة، وينسب إلى النوع AE 3T-3.2. يركز هذا المقال على نظام الصرف الصحي في سقارة ونوع الأمفورات التي استُخدمت في صناعتها، مع تقديم نظرة عامة على أنماط واستراتيجيات إعادة استخدام الأمفورات الأكثر شيوعاً في مصر القديمة وخارجها عبر الزمن.

### 1. Introduction

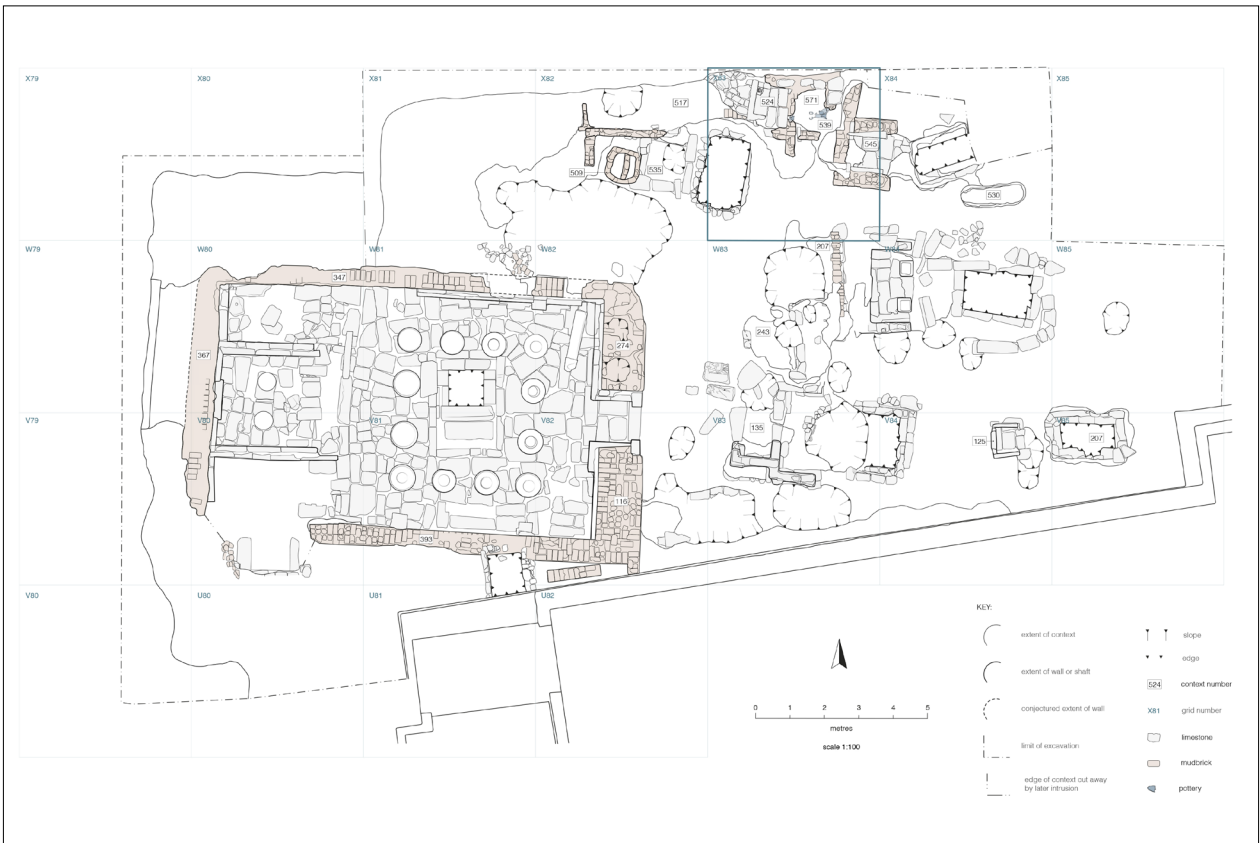
During excavation season 2023, the RMO (Leiden)-Museo Egizio (Turin) Expedition to the New Kingdom necropolis in Saqqara unearthed an unusual installation (context 571: see Figs. 1, 3). This installation is a remarkable example of the

reuse of amphorae in Egypt during the Late Antique Period.

While working north-east of the recently discovered early Ramesside tomb of Panehsy,<sup>1</sup> in a sector identified as X83 (see Figs. 2–3), the archaeologists of the Expedition uncovered four Late Roman amphorae



**Fig. 1:** Amphora installation, context 571. Photo by Paolo Del Vesco/Museo Egizio.



**Fig. 2:** Map of the archaeological area excavated by the Leiden/Turin Expedition to Saqqara. Drawing by Paolo Del Vesco/Museo Egizio; inking by Alice Salvador.



**Fig. 3:** Detail of amphora installation, context 571; floor 524; mudbrick floor 517 and modern pit 539. Drawing by Paolo Del Vesco/Museo Egizio; inking by Alice Salvador.

(Cat. nos. 1–4, and [Pl. 1](#), see also below). Two of them, inserted one into the other (Cat. nos. 3–4, [Pl. 1](#)), were found inside a mudbrick wall (see [Fig. 4](#)). The other two (Cat. nos. 1–2, [Pl. 1](#)) were lying on the ground (see [Fig. 5](#)), one of them aligned with the two vessels inserted one into the other. These amphorae were likely reused as hydraulic pipes in a drainage system, chronologically and archaeologically consistent with previously identified occupation layers dated to the transition from the end of the Late Antique phase to the early Medieval phases.<sup>2</sup>

Unfortunately, sector X83 is located at the bottom of, and is also partially cut by, what has been recognised as a large modern pit (identified as context 539, see [Figs. 2–3](#)) excavated by antiquities hunters in the nineteenth or early twentieth century. When robber pit 539 was dug, the structures and/or layers which may have originally covered amphora installation 571 (see [Fig. 1](#)) were removed along with other materials (if any). Unfortunately, comparable digs by modern looters have been discovered in other sectors of the tomb of Panehsy, some of which have compromised

the stratigraphy of some of the Ramesside layers.

Amphora installation 571 may have played a role connected to other nearby still detectable architectural features. What remains of a limestone floor (context 524) was identified west of amphora installation 571 ([Figs. 3, 6](#)). A drainage hole ([Fig. 6](#)) is drilled through one of the stones of floor 524. Amphora installation 571 may have channelled the liquid(s) coming through this hole. Interestingly, however, at a later stage this drainage hole was deliberately and completely blocked; even if connected originally to this feature, at a certain point drainage system 571 was no longer functioning in relation to floor 524.

Another hypothesis is that amphora installation 571 was originally used in connection with a mudbrick floor (517: see [Figs. 3, 7–8](#)), built before the construction of stone floor 524. New archaeological data will hopefully shed new light on this important point. Was amphora installation 571 used in connection to stone floor 524 or to mudbrick floor 517? Or, perhaps, at an earlier stage with mudbrick floor 517 and later with stone floor 524? And what was its primary function?



**Fig. 4:** Detail of amphora installation, context 571. Photo by Paolo Del Vesco/Museo Egizio.



**Fig. 5:** Amphora installation, context 571. Photo by Paolo Del Vesco/Museo Egizio.



**Fig. 6:** Limestone floor 524. Photo by Paolo Del Vesco/Museo Egizio.



**Fig. 7:** Orthophoto of context 571. Orthophoto by Paolo Del Vesco/Museo Egizio.



**Fig. 8:** Amphora installation, context 571. Photo by Paolo Del Vesco/Museo Egizio.

## 2. Amphorae and their many lives

While the reuse of amphorae is a practice attested all over Egypt in Pharaonic times – possibly the most recurrent and studied case being their “recycling” as coffins for infant burials<sup>3</sup> – the best documented and most diverse cases date from the Roman Empire. Amphora reuse strategies are widely recorded for both the Republican and Imperial periods across the Roman territories. Such strategies are also traceable during the Byzantine and early Islamic centuries across several areas of the Mediterranean region.

As is well known, amphorae were very often reused as transport containers, meaning that they were repeatedly refilled, once emptied of their original contents. This was done during all of antiquity across the Mediterranean and beyond.<sup>4</sup> Leaving aside this specific reuse strategy, these vessels could live many lives after their primary function as transport containers had ceased.<sup>5</sup>

The reasons why amphorae served the most diverse functions, once relieved of their primary/intended one, are many. Some amphorae, for example, may no longer have been suitable as product containers because of the substance(s) they previously held. Some of their products may have produced noxious odours from the residue of hard-to-clean substances.<sup>6</sup> This could have negatively impacted the quality and preservation of the product(s) to be transported next. Thus, in certain cases amphora cleaning may have cost a great amount of effort and energy, counterbalanced by little profit or none at all.

Considering the huge number of amphorae available in the Roman period, amphorae no longer usable for the transport of commodities must have been easy to find, and cost-free or at a very low cost, making them quite valuable as recyclable material.<sup>7</sup> As amphorae could be heavy and unwieldy, giving them away for reuse would have spared the owner the annoyance of having to dispose of them.

Among other uses, reused amphorae served as storage containers for food and other goods, tableware (when recut as beakers or bowls), incense burners, grinding palettes, strainers, boundary markers, libation conduits, urine containers, funnels, braziers or hearths, oven pieces, tokens, gaming pieces, weights, and, of course, writing supports – for example, as ostraca.<sup>8</sup>

Besides having this variety of second-life functions, amphorae were also reused as building and architectural elements. The reuse of amphorae for construction purposes is related to a series of morphological characteristics which made these vessels particularly suitable. Why amphorae? Size, rigidity, robustness, and light weight made them ideal for this purpose.<sup>9</sup> In terms of overall shape, amphorae were versatile and easily remodelled. Their most often elongated bodies could be easily reduced. They could be perforated or effortlessly stripped of some of their parts to adapt them to their new use.<sup>10</sup>

When it came, more specifically, to buildings and hydraulic structures, as in the Saqqara case currently under discussion, amphorae were particularly useful because of their impermeability, as well as their other aforesaid characteristics. They were ideal for carrying water or, more in general, for liquid-related installations – their primary intended function being, indeed, holding liquids and unconsolidated solids.<sup>11</sup>

Many of the reuse strategies outlined above are also applicable and detectable in Egypt, where amphora reuse for non-transport purposes is well documented during both the Ptolemaic-to-Roman and the Late Antique-to-early Medieval periods.

An example of Ptolemaic amphora reuse in cooking installations is observable, for example, at Bi'r Samut, where amphora necks were employed in the construction of ovens. At the same site, amphora sherds were also reused in the paving of floors, and amphora bodies were embedded in floors and courtyards for the storage of foodstuffs.<sup>12</sup> During early Roman times, amphora necks were reemployed for kiln ventilation systems at Buto.<sup>13</sup>

With regard to the Late Antique period, particularly intriguing is an example from Ashmunein,<sup>14</sup> where amphorae belonging to the same types as the ones under discussion here were reused in a drainage system along and in association with tubular elements likely manufactured for that purpose.<sup>15</sup>

Further examples of Late Roman amphora reuse in Egypt are attested at the Monastery of John the Little in Wadi Natrun, where amphorae necks were reused for ventilation and in storage and cooking installations.<sup>16</sup> Similar uses are observable at Kellia,<sup>17</sup> Deir Anba Hadra,<sup>18</sup> and Esna.<sup>19</sup> Finally, reused amphorae were detected in walls at Fustat.<sup>20</sup>

### 3. Reused Late Roman amphorae from the New Kingdom necropolis at Saqqara

The Late Antique layers excavated in the New Kingdom necropolis at Saqqara have yielded abundant remains of amphorae, both Egyptian and imported.<sup>21</sup> The most frequently attested amphorae retrieved from these contexts belong, unsurprisingly, to the Late Roman 7 type (hereafter LR 7 type): the hallmark of Late Roman Egyptian amphorae production. However, installation 571 was made with a different type of Late Roman amphora: Amphores égyptiennes (hereafter AE) 3T-3.2 (Cat. nos. 1–4, Pl. 1 and Figs. 9–17).<sup>22</sup> As discussed by Dixneuf,<sup>23</sup> this specific subtype is the latest evolution, or most recent variant, of AE 3 amphorae, whose production started in the early Roman period<sup>24</sup> and went on through the Late Antique period to the very early Medieval period.<sup>25</sup>

This subtype is attested between the first half of the seventh and the middle of the eighth century AD.<sup>26</sup> AE 3T-3.2 amphorae were no longer manufactured after the mid-eighth century AD and, apparently, they were never found at Fustat, which may indicate a decline in their production and use by the seventh or first half of the eighth century AD.<sup>27</sup> Manufactured from Nile silt, amphorae AE 3T-3.2 were meant for wine transport, as suggested by pitch residues still detectable inside some of them. This type of amphora is attested at several Egyptian sites and appears to have been distributed across the whole country.<sup>28</sup>

A possible reason for the short lifespan and the end of the production of AE 3T-3.2 amphorae may be found in their shapes. As previously pointed out,<sup>29</sup> these transport containers were large and unwieldy compared to the coeval LR 7 amphorae, which were more elongated and slender. Additionally, a change in amphora sizes and shapes is well attested at the transition between the Late Antique and the early Medieval periods. Smaller amphorae with a rounded base (such as AE 5/6, for example)<sup>30</sup> were gradually favoured over elongated ones with a pointed bottom. While the morphology of AE 3T-3.2 amphorae may have played a role in their discontinuance as transport vessels, it encouraged their reuse as building materials (see below).

AE 3T-3.2 amphorae are quite rare among the ceramic materials excavated in the Late Antique layers

of the New Kingdom necropolis at Saqqara. For example, at the nearby Akhetetep mastaba, AE 3T-3.2 amphorae occur rarely among the Late Antique ceramic repertoire, which here, too, sees a prevalence of the LR 7 type.<sup>31</sup>

As mentioned above, the four amphorae (Cat. nos. 1–4) forming drainage system 571 all belong to the same type (AE 3T-3.2). This pattern of selecting amphorae of the same type for a specific reuse strategy has been observed in comparable features excavated across the Roman Empire<sup>32</sup> (while earlier in date, they show highly similar reuse models). A Late Antique example from Egypt is attested at the Monastery of John the Little in Wadi Natrun, where only Egloff 167 and 187 complete necks and handles were carefully chosen to be reused in ventilation systems.<sup>33</sup> The same has been observed in Ashmunein, where only AE 3T-3.2 amphora rims and necks were employed in the drainage system (see above). Clearly, in certain cases the size and shape of a specific amphora type was particularly suitable for a specific purpose.<sup>34</sup>

AE 3T-3.2 amphorae, as noted, rarely occurred in the ceramic records of the Saqqara Late Antique layers, yet were deliberately chosen as building elements in drainage system 571, instead of the more abundantly available LR 7. This most likely depends on their shape: their necks are more elongated and thicker than those of LR 7 amphorae. On average, LR 7 rim and neck diameters vary between (approximately) 5 and 10 cm, 6–7 cm being the most frequently attested measurement.<sup>35</sup> AE 3T-3.2 amphorae have larger rim and neck diameters, between ca. 11 and 15 cm.<sup>36</sup>

In the case of installation 571, an important question should be addressed: After having been decommissioned as transport containers, were these amphorae modified and recut, or were they recycled as drainage system elements because they were already broken? Based on the visual analysis of the breaks, at first glance it would seem that at least three out of four of the amphorae (Cat. nos. 1–3) were already broken before being re-employed. However, amphora Cat. no. 4 shows smooth, regular, and linear cuts on both edges (see Figs. 16–17), which may suggest that it was recut on purpose and according to predetermined meas-

urements. This idea is also reinforced by the fact that Cat. no. 4 was found inside Cat. no. 3, into which it had clearly been deliberately inserted. This indicates that it played quite a specific role in this drainage system. It is likely that the insertion of an amphora neck inside another was done to improve the impermeability of a pipeline incorporated in a mudbrick wall.

It should also be considered that different techniques were applied in the remodelling of amphorae,<sup>37</sup> sawing and chipping being among the most frequent. Assuming the using of different recutting techniques for amphorae Cat. nos. 1–4, Cat. no. 4 could have been remodelled by sawing, the other three by chipping (Cat. nos. 1–3). This may explain why their breaks appear to be different. Remodelling by chipping appears to be highly likely for Cat. no. 2 after careful visual analysis of its breakage pattern (see Fig. 13); deliberate recutting seems indeed plausible in the light of the fact that this was a very specific amphora type, carefully chosen for its morphological characteristics.

In discussing the remodelling and cutting of the amphorae (Cat. nos. 1–4) reemployed in drainage system 571, another aspect should be taken into consideration: the presence or absence of handles attached to their necks. Interestingly, at least in one case, handles were not removed prior to the amphora's deposition (see Cat. no. 1). It is possible that handles were left attached to the neck to improve the drainage system's stability in the ground. A similar pattern is observable in the amphorae drainage system discovered at Ashmunein.<sup>38</sup>

Finally, Cat. no. 2 had two post-firing holes, drilled through the neck, likely to be interpreted as fermentation holes. One of them appears to have been "restored" in antiquity, as it was roughly sealed with a little stone. The other was left untouched, indicating that its presence was irrelevant and did not cause any malfunctioning to this drainage system. It is possible that the second fermentation hole was not restored, being either filled in with solidified sand or earth, or because of the neck's position in the ground. For example, it is possible that Cat. no. 2 was rotated with the second fermentation hole pressed against the ground.

## 4. Conclusions

Amphorae of different types, both imported and locally produced, were easily and abundantly available at the New Kingdom necropolis area during its Late Antique and early Medieval phases. Following on from the previous discussion, once decommissioned from their primary intended function of transport containers, these vessels were easily reemployed for completely different purposes, including construction, as in context 571. The same reuse pattern is easily traceable both at other Egyptian sites and all over the Mediterranean, particularly during the Roman and Late Antique periods.

While amphorae AE 3T-3.2 rarely occur in the Late Antique ceramic repertoire at Saqqara, they are attested both in the New Kingdom necropolis and at the Akhethetep mastaba.<sup>39</sup> Their morphology (particularly their rim and neck dimensions) made them particularly suitable for specific building installations. A drainage system made from the same type of reused amphorae and highly comparable with the Saqqara one was identified at Ashmunein (see above). Due to these specific morphological characteristics, it is possible that AE 3T-3.2 amphorae were recut for reuse in architectural contexts.

Based on the chronology of AE 3T-3.2 production, installation 571 should not date earlier than the seventh and early-to-mid eighth century AD. Amphorae tended to have quite a long life and could have been kept in use as transport containers for up to twenty to twenty-five years.<sup>40</sup> These considerations may suggest a date for the construction of installation 571 in the early eighth rather than the seventh century AD, or at the transition between the seventh and the eighth century.

Installation 571 has been interpreted as a drainage system, as suggested by the drainage hole in stone floor 524 immediately west of it and the presence of two amphorae in the masonry and the alignment of another amphora neck with this pipe, as well as the limited number of vessels occurring in this context. Archaeological evidence from the Roman period suggests that the use of a larger number of reused amphorae usually goes with much more complex hydrogeological features, including programs of land reclamation;<sup>41</sup> which is clearly not the case in the Saqqara context under examination.

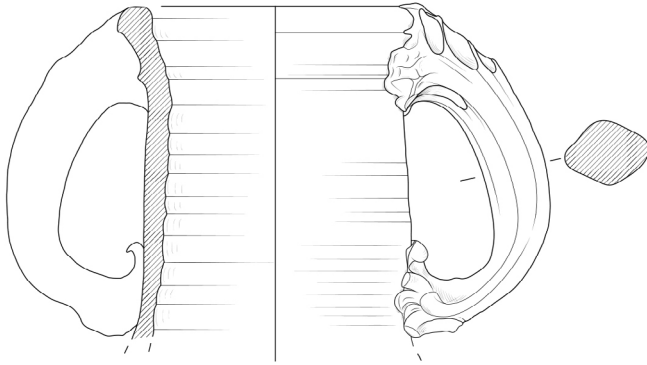
Very likely, the purpose of this installation (571) was to drain water (or other liquids elements) horizontally. It was probably created to compensate for, or improve, a faulty drainage system.<sup>42</sup> As mentioned above, the layers originally covering installation 571 are irremediably lost, having been cut into by a modern robber pit. Therefore, the exact function of installation 571 remains a matter of speculation. This system may have helped with the drainage of rainwater during the rare, albeit occurring, thunderstorms in the area. Another hypothesis, though difficult to demonstrate at the present stage, is that this installation may have collected and expelled liquid(s) from some sort of craft/artisan production. Or it could have served as a sewer.

If drainage system 571 worked in connection with stone floor 524, a few more possibilities should be mentioned. Limestone floor 524 has slightly raised edges (see Fig. 6), indicating that it could have served as a shallow basin, where water was collected for a specific purpose, depending on the function of the building to which it was originally connected. For example, if the original Late Antique/early Medieval structures built there had a religious purpose, might it be possible that this shallow basin played a role in cultic practices? Only the resumption of excavations may provide more evidence about daily life activities (and what is left of them in the archaeological record) at Saqqara at the transition between the Late Antique and the early Medieval period.

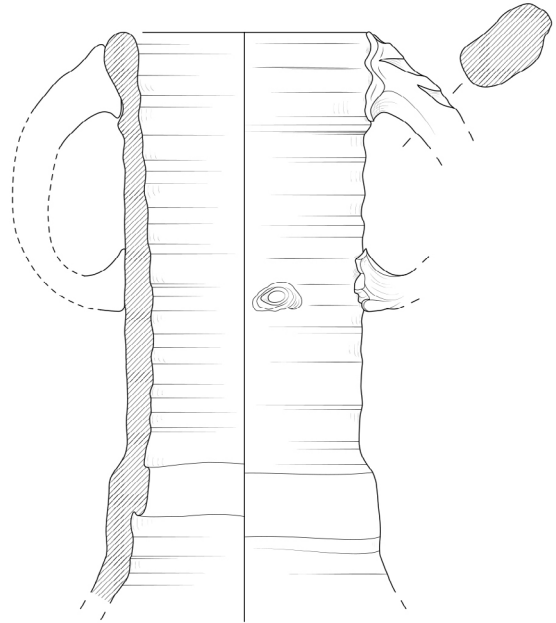
## 5. Catalogue

### Plate 1

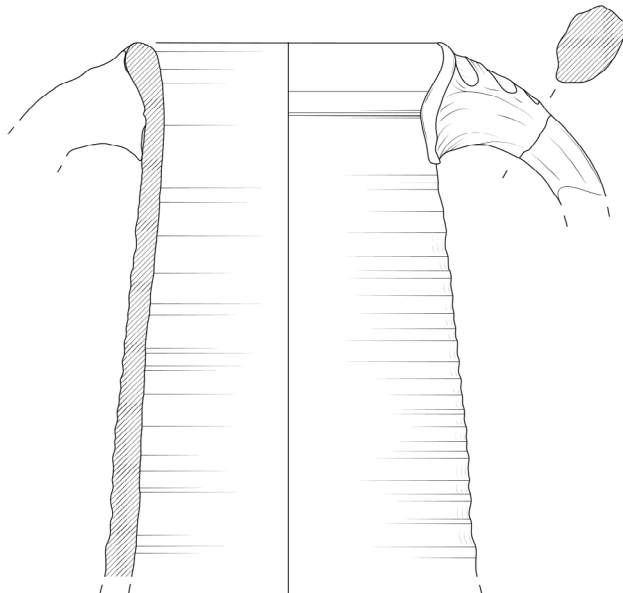
Cat. no. 1



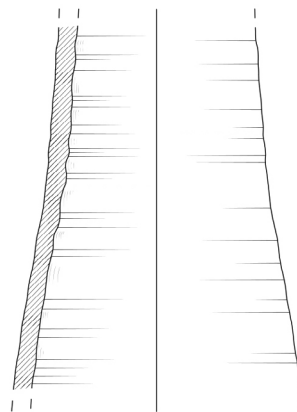
Cat. no. 2



Cat. no. 3



Cat. no. 4



0 5cm

**Pl. 1:** Cat. nos. 1–4: the four AE 3T-3.2 amphorae composing installation 571. Drawing and inking by Alice Salvador.

**Cat. no. 1 (Pl. 1 and Figs. 9–10)**

*Inventory number:* C1556.

*Dimensions:* H (Height) 14 cm; T (Thickness) 0.95–1.4 cm; T of the handle 3.5 cm; D (Diameter) 10.8 cm.

*Fabric:* M3 (Nile silt, brown in colour, medium-fine, hard, with inclusions of straw, sand, limestone, and mica).<sup>43</sup>

*Technology:* Wheel-made.

*Description:* Amphora with direct rim, internally and externally thickened, shallow ridge below rim, cylindrical neck. Two vertical handles, oval in section, from rim to neck. Uncoated.

*Notes:* Found laid in the ground, aligned with Cat. no. 3 (C1558).

*Parallels:* Type AE 3T-3.2.

*Date:* Mid-seventh – mid-eighth century AD.



**Fig. 9:** Amphora Cat. no. 1. Photo by Nicola Dell'Aquila/Museo Egizio.



**Fig. 10:** Amphora Cat. no. 1. Photo by Nicola Dell'Aquila/Museo Egizio.

**Cat. no. 2 (Pl. 1 and Figs. 11–13)**

*Inventory number:* C1557.

*Dimensions:* H 24 cm; T 1.1–1.4 cm; T of the handle 3.2 cm; D 10 cm.

*Fabric:* M3.

*Technology:* Wheel-made.

*Description:* Amphora with vertical rim, internally and externally thickened. Shallow ridge below rim, cylindrical neck. Two vertical handles (one missing, one broken), oval in section, from rim to neck. Uncoated. Two fermentation holes are pierced in the neck. Originally the internal surface was covered with a layer of pitch.

*Notes:* Found laid in the ground, next to Cat. no. 1 (C1556).

*Parallels:* Type AE 3T-3.2.

*Date:* Mid-seventh – mid-eighth century AD.



**Fig. 11:** Amphora Cat. no. 2. Photo by Nicola Dell'Aquila/Museo Egizio.



**Fig. 12:** Amphora Cat. no. 2. Photo by Nicola Dell'Aquila/Museo Egizio.



**Fig. 13:** Amphora Cat. no. 2. Photo by Nicola Dell'Aquila/Museo Egizio.

**Cat. no. 3 (Pl. 1 and Figs. 14–15)**

*Inventory number:* C1558.

*Dimensions:* H 22.4 cm; T 0.8–1.2 cm; T of the handle 2.3 cm; D 12.8 cm.

*Fabric:* M3.

*Technology:* Wheel-made.

*Description:* Amphora with direct rim, internally and externally thickened, shallow ridge below rim, cylindrical neck. Two vertical handles (both broken), oval in section, from rim to neck. Uncoated.

*Notes:* Found inside a mudbrick wall.

*Parallels:* Type AE 3T-3.2.

*Date:* Mid-seventh – mid-eighth century AD.



**Fig. 14:** Amphora Cat. no. 3. Photo by Nicola Dell'Aquila/  
Museo Egizio.



**Fig. 15:** Amphora Cat. no. 3. Photo by Nicola Dell'Aquila/  
Museo Egizio.

**Cat. no. 4 (Pl. 1 and Figs. 16–17)**

*Inventory number:* C1559.

*Dimensions:* H 15.3 cm; T 0.7 cm; D 6.4 cm (measured at the top of the neck break).

*Fabric:* M3.

*Technology:* Wheel-made.

*Description:* Cylindrical neck originally belonging to an amphora. Uncoated.

*Notes:* Found deliberately inserted into Cat. no. 3 (C1558).

*Parallels:* Type AE 3T-3.2. (?).

*Date:* Mid-seventh – mid-eighth century AD (?).



**Fig. 16:** Amphora Cat. no. 3. Photo by Nicola Dell'Aquila/  
Museo Egizio.



**Fig. 17:** Amphora Cat. no. 3. Photo by Nicola Dell'Aquila/  
Museo Egizio.

## Acknowledgments

I would like to express all my gratitude to Leiden-Turin Archaeological Mission Directors Daniel Soliman (RMO), Christian Greco (Museo Egizio), and Paolo Del Vesco (Museo Egizio), who allowed me to study and analyse the ceramic materials, first in the field in Saqqara and now for publication. Paolo Del Vesco, who excavated sector X83 in February and March 2023, gave me access to all his archaeological records, data, and notes, for which I am very grateful.

### Note

- <sup>1</sup> Del Vesco et al., *RiME* 3 (2019); Del Vesco et al., *RiME* 4 (2020); Del Vesco et al., *RiME* 9 (2025).
- <sup>2</sup> Del Vesco et al., *RiME* 3 (2019), pp. 26–28. For a comparable installation, made from Late Antique amphorae and discovered at the nearby tomb of Maya and Merit, see Raven, *Maya and Merit II*, 2001, p. 15; pl. 12c.
- <sup>3</sup> See, for example: Górka and Rzepka, *MDAIK* 67 (2011); Tristant, in Nenna (ed.), *L'Enfant et la mort dans l'Antiquité II*, 2012, pp. 30–32, with previous bibliography.
- <sup>4</sup> See Abdelhamid, in Hahn and Weiss (eds.), *Mobility, Meaning and Transformations of Things*, 2013.
- <sup>5</sup> See Peña, *Roman Pottery*, 2007; see also Peacock, *Pottery in the Roman World*, 1983.
- <sup>6</sup> On this explanation see Peña, *Roman Pottery*, 2007, p. 119.
- <sup>7</sup> Peña, *Roman Pottery*, 2007, p. 119.
- <sup>8</sup> For a very detailed description of all the possible identified amphora reuses, see Peña, *Roman Pottery*, 2007, pp. 123–92.
- <sup>9</sup> Peña, *Roman Pottery*, 2007, p. 181.
- <sup>10</sup> Peña, *Roman Pottery*, 2007, p. 119.
- <sup>11</sup> Peña, *Roman Pottery*, 2007, p. 119.
- <sup>12</sup> Gates-Foster, in Durand et al. (eds.), *Networked Spaces*, 2022, pp. 352–53, fig. 6.
- <sup>13</sup> Ballet et al., *Tell el-Fara'in – Buto VI*, 2019, pp. 194–96; Ballet et al., *BAEFE* (2022), p. 37.
- <sup>14</sup> Bailey, *Excavations at el-Ashmunein V*, 1998, pp. 110–11, p. 129, pl. 78, pl. 111: U 3–6.
- <sup>15</sup> Bailey, *Excavations at el-Ashmunein V*, 1998, pl. 78, pl. 111: U 3–6.
- <sup>16</sup> Pyke and Brooks Hedstrom, in Bader and Ownby (eds.), *Functional Aspects of Egyptian Ceramics in Their Archaeological Contexts*, 2013.
- <sup>17</sup> For reused amphorae as components of ventilation systems: Henein and Wuttmann, *Kellia*, 2000, p. 123, fig. 162; for reused amphorae in cooking installations: Henein and Wuttman, *Kellia*, 2000, p. 213, fig. 229; p. 209, Table J.
- <sup>18</sup> For ventilation and lighting features: Pyke and Brooks Hedstrom, in Bader and Ownby (eds.), *Functional Aspects of Egyptian Ceramics in Their Archaeological Contexts*, 2013, p. 311.
- <sup>19</sup> For amphora reuse in cooking installation: Sauneron

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All the image credits belong to the Leiden/Turin Expedition to Saqqara.

and Jacquet, *Esna I*, 1972, p. 19, fig. 3.

<sup>20</sup> Gayraud, *CCE* 8 (2007).

<sup>21</sup> Gasperini and Salvador, *RiME* 3 (2019), p. 37; *RiME* 4 (2020), p. 84; *RiME* 9 (2025), pp. 170–71.

<sup>22</sup> For a description of this type, see Dixneuf, *Amphores*, 2011, pp. 141–42; figs. 128–30.

<sup>23</sup> Dixneuf, *Amphores*, 2011, p. 141.

<sup>24</sup> Dixneuf, *Amphores*, 2011, pp. 97–128.

<sup>25</sup> Dixneuf, *Amphores*, 2011, pp. 138–42.

<sup>26</sup> Dixneuf, *Amphores*, 2011, p. 141.

<sup>27</sup> Dixneuf, *Amphores*, 2011, p. 141.

<sup>28</sup> Dixneuf, *Amphores*, 2011, p. 141.

<sup>29</sup> Dixneuf, *Amphores*, 2011, p. 142.

<sup>30</sup> See Dixneuf, *Amphores*, 2011, pp. 142–53.

<sup>31</sup> Lecuyot, *CCE* 8 (2007), p. 200.

<sup>32</sup> See Peña, *Roman Pottery*, 2007, p. 183.

<sup>33</sup> See Pyke and Brooks Hedstrom, in Bader and Ownby (eds.), *Functional Aspects of Egyptian Ceramics in their Archaeological Contexts*, 2013, p. 310.

<sup>34</sup> On this point, see also Peña, *Roman Pottery*, 2007, p. 183.

<sup>35</sup> For the measurement range of LR 7, see Dixneuf, *Amphores*, 2011, pp. 163–72.

<sup>36</sup> For the measurement range of AE 3T-3.2, see Dixneuf, *Amphores*, 2011, p. 141, and below, Cat. nos. 1–4.

<sup>37</sup> On this point, see Peña, *Roman Pottery*, 2007, pp. 121–23.

<sup>38</sup> See Bailey, *Excavations at el-Ashmunein V*, 1998, pl. 78, “Q 77–8 and U 3–6 in situ”.

<sup>39</sup> Lecuyot, *CCE* 8 (2007), p. 200.

<sup>40</sup> See Abdelhamid, in Hahn and Weiss (eds.), *Mobility, Meaning and the Transformations of Things*, 2013, p. 94.

<sup>41</sup> Peña, *Roman Pottery*, 2007, pp. 188–92; see also Antico Gallina, *AEArq* 84 (2011).

<sup>42</sup> On this point see Peña, *Roman Pottery*, 2007, p. 181.

<sup>43</sup> The code “M3” is adopted from the fabric classification system established by Janine Bourriau at Saqqara, and still applied for ceramics processing at this site. M3: “A soft, fairly rough, sandy, micaceous, dull brown (10YR 4/4) in colour” fabric; see: Faiers, *Late Roman Pottery at Amarna*, 2005, p. 61.

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