Ancient Pakistan, Vol. XXXIV, 2023: 319–331
ISSN: 0066-1600(print)/ 2708-4590(online)

A Note on the Sphero-conical Vessels:
New Evidence from Swat, Pakistan

Luca Maria Olivieri*

ISMEO/Ca' Foscari University of Venice, Italy.

Abstract: The study deals with three recent finds of imported sphero-conical vessels datable to the Ghaznavid or slightly later period, from Barikot and Udegram in the Swat Valley, northern Pakistan. The first vessel (complete) comes from the excavation conducted in 2023 at the base of the south wall of the site's Acropolis, the second from a reconnaissance conducted in the 1950s by Giorgio Gullini on the spur where excavations would later unearth the so-called 'Castle' of Udegram. The third container (a fragment) is also from Barikot, but from a much earlier chronological phase. Based on these findings, the study features an update of the bibliography from work also published in *Ancient Pakistan* by Saifur Rahman Dar in 2007, and an overview of new hypotheses about the intended use(s) of these enigmatic objects.

Keywords: Sphero-conical vessels, proto-Islamic pottery, Ghaznavid archaeology, Swat

Introduction

In the recently published catalogue of ceramic forms from the excavations at Bazira/Vajrasthana (Bir-kot-ghwandhai, Swat; henceforth BKG), I briefly touched upon the topic of the puzzling pottery class known as 'sphero-conical vessel' or sometimes as 'Kuza-i-fuqqa'a' (Olivieri 2020: 180). The reason why I considered the latter was the discovery of a few sherds which featured thick-walled conical bottoms and nonporous fabric, with a refractory surface, characterised by deep concentric regular grooves. These sherds, which only partly approximated the proper form of sphero-conical vessels, may have been used for pyrotechnic activities and were labelled as Class Form V 12. On the contrary, in this note I present three new specimens of vessels properly belonging to the sphero-conical vessel class. These pieces also come from Swat, where none had been previously reported. The first was found during the 2023 excavation at the BKG Acropolis, and the second was recovered in the late 1950s during a survey in the area of the Udegram Castle (i.e. the acropolis of the ancient Ora) and was found hidden in a basket in the 'godowns' of the Italian Mission House. A third fragment, which potentially belong to the same Class, was found in an earlier phase of Trench BKG 16.

The first specimen from BKG, a complete 'sphero-conical vessel', comes from Trench 20 E, layer (10), a context belonging to BKG Macrophase 9a, which radiocarbon analysis, material culture, and coins ascribe to the 11th-12th century (Fig. 1b). The object was given the inventory no. BKG 10167 and has been handed over to the Swat Museum along with all the inventoried object of the 2023 campaign.

The second piece from Udegram (Fig. 2a-b) does not have a stratigraphic context, although the surface area where it was collected was later the subject of an extensive excavation by Giorgio Gullini. This excavation revealed the presence of a larger fortified complex known as the 'Castle' with phases spanning from the period between the 4th/5th century and the 13th century, including conspicuous monumental phases that can be dated between the Shahi and Ghaznavid and Ghurid periods. The object was given the inventory no. VSN 80 (Varia New Series) and was also delivered to the Swat Museum along with the previous one.

The third piece was found again in Barikot, in the central quarters of the ancient city near the apsidal temple H, but from a context much older than the previous ones (Macrophase 3b; c. 50 BCE-50 CE). The object was given the inventory no. BKG 10911 and has been handed over to the Swat Museum along with the other piece BKG 10167.

* ✉ lucamaria.olivieri@unive.it

Considering these new findings, it became evident to me that the fragments of Class Form V 12 have nothing to do with the true 'sphero-conical vessels', so that to the three new vessels, which are the subject of this Note, were given a different Class Form label (V 15).

Apart from other formal features, we should notice that V 12 vessels are locally produced with local clay, while BKG 10167 exhibits macroscopic characteristics that suggest it was most likely an imported object. Moreover, while V 12 vessels are typical of a late and post-Kushan horizon, 'sphero-conical vessels' can be considered true chronological markers of the Early Islamic period (Figs 1a, 2b). Scholars unanimously date these latter to this chronological horizon. They were mainly produced and found in the Middle East and Iran, but also spread throughout the Indo-Iranian borderland and Western Eurasia. While their chronology is determined (ranging from the 7th to 10th century to the 13th to 15th century), the debate about their intended use(s) remains open. The range of hypotheses is rather wide: most scholars lean toward interpreting them as weapons (hand grenades), while others think they are small gourd-like vessels containing intoxicating liquids, perfume bottles, or apothecary flasks.

Figure 1. (a) Left: Metropolitan Museum of Art, New York, No. 40.170.323 (Nishapur, earthenware, 9th-13th century); h. 9.8 (Courtesy MMA).
(b) Right: Sphero-conical vessel from BKG (11th-13th century); h. 9.8 cm. Italian Archaeological Mission in Pakistan, Swat Museum: BKG 10167, October 2023 (Photo: Italian Archaeological Mission in Pakistan; 2023).

Figure 2. (a-b) Top (left/right): sphero-conical vessel from Udegram 'Castle' (11th-13th century); h. max. 9.8 cm. Italian Archaeological Mission in Pakistan, Swat Museum: VSN 80, October 2023 (Photo: Italian Archaeological Mission in Pakistan; 2023).
(c) Bottom: Vessel from Erich F. Schmidt's excavations at Ravy, Iran. Cf. the second vessel from left as a comparison for VSN 80, and the first from right, as a comparison for BKG 10167 (After Ettinghausen 1951: pl. XLV.A).

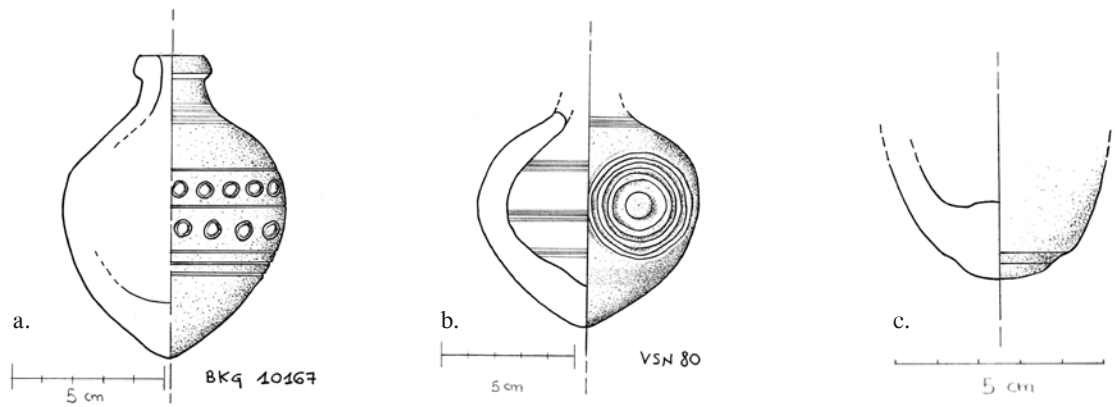

Figure 3. (a) BKG 10167; (b) VSN 80; (c) BKG 10911 (Italian Archaeological Mission in Pakistan; 2023; drawings by Alice Casalini)

The specimens from Swat

Vessel BKG 10176 (Fig. 3a)

Vessel BKG 10176 is a small and heavy vessel (diam. 7.4 cm, h. 9.8 cm) (> 250 grams) (Fig. 2). It can be held within the palm of a single hand. It has a sphero-conical shape with a short, narrow neck and a narrow mouth (diam. 0.7 cm) marked by a thick flaring triangular rim. The flared shape of the rim is associated with the possibility of tying the vessel to a string to carry or suspend it during transport. The narrow orifice might have been closed with some wax (a system which is documented in the literature) and allows the contents to be let out in small quick drops—as we have been able to verify. The vessel's body features short sloping shoulders, followed by a round decorated body, and ends in a pointed conical bottom, which prevents the object from staying up vertically on a flat surface. The decoration around the body consists of two parallel registers, bordered by three horizontal incised lines (upper, middle, and lower). The upper register is slightly higher than the lower one. Both registers are decorated with a row of impressed circles. In the lower part are two deep, parallel, regular grooves, after which the bottom ends in a point. The stamp decorations were made during wheeling or during the drying process, when the vessel had reached the 'leather' stage of hardening.

The vessel was wheel-thrown, as evidenced by regular wheel marks, visible especially on the shoulder and around the neck. The weight of the walls, despite the small size of the object, made it difficult to preserve the form after modelling, as evidenced by the slight subsidence of one side of the shoulder which occurred during the first stage of drying.[1]

The vessel is un-slipped and features a distinctive greenish-grey colour. The type of fabric differs completely from typical local ones. It is an extremely compact and compressed purified clay, fired at a high temperature, which, however, does not reach the 'grès' stage. This type of ceramic is sometimes called 'stoneware', although it is not actual stoneware as much as a very compact and purified grey clay fired at a very high temperature.[2] Many sherds feature in fact a burnt-walled section. The vessel's capacity is 71 ml, which corresponds to 1/3 of an average glass. The inside of the object was found to be empty, with no visible residue or traces of contents.

BKG 10167 was found at the base of the eastern wall of the eastern terrace of the BKG Acropolis in trench BKG 20 E layer (10) (Olivieri 2003a, Id. 2003b, Id. 2023 with references). Layer (10) is one of the lowest of a series of artificial waste deposits which collapsed and spread over the natural bedrock. It is on this bedrock that the walls of the Eastern Terrace were built (Figs. 4a-b). The last structural phase of the walls is dated

Figure 4. BKG 20 E: Fieldwork in progress at the eastern wall of the Acropolis. The bedrock on which the Shahi wall is built, found covered by the deposit layers (1) – (11). (a) Top: A view from the south; (b) Bottom: A view from the north (Photo: Italian Archaeological Mission in Pakistan; 2023).

to the late Shahi period.[3] In the same stratigraphic contexts as BKG 10167, a few fragments of grey and white 'stoneware-like' dishes and small vessels were found, again decorated with stamped motifs.[4] All materials associated with layer (10) and earlier layers can be dated to the same Macrophase BKG 9a, when the late Shahi Temple that dominated above the eastern terrace was demolished. Layers (1) to (11) of Trench BKG 20 E yielded both materials from the demolition of the Temple and materials associated with the coeval material culture. The most representative evidence from these layers is a substantial amount of plain, decorated and glazed Ghaznavid and post-Ghaznavid pottery and Ghaznavid coins. Macrophase 9a is dated to the early 11th century (see Table 1).

In Macrophase 9a, the acropolis of BKG was an important Ghaznavid fortified settlement. In addition, two Ghaznavid/post-Ghaznavid cemeteries have been documented in the past by the Italian Mission both on the summit and at the foot of the Acropolis (Callieri *et al.* 2000; Olivieri and Bagnera in Narsinham *et al.* 2019).

The importance of the site in the coeval sources has been recently analysed by Matteo Sesana (Olivieri and Sesana, forth.).

Vessel VSN 80 (Fig. 3b)

The second object discussed here comes from Udegram. The historic and archaeological importance of Udegram in the Ghaznavid period need not to be emphasized here. Home to a congregational mosque (Fig. 5), a cemetery, and a castle built as the prow of a large, fortified settlement, Udegram was probably the largest early Islamic site in Swat so far excavated (Bagnera 2015 with references).

Only one-third of the sphero-conical vessel has been preserved; the fragment (h. max. 7.6 cm, diam. 8.2 cm) is broken along its height. It features a heavy, compact fabric of dark grey/greenish 'stoneware', which is not slipped (weight max. 160.56 grams). The exterior is impressed with a pattern of large concentric circles with central bosses and a thick groove on the bottom. The vessel is wheel-thrown, and the interior does not feature any obvious traces, apart from some reddish stains that can be explained as traces of residue. The fractures (t. 1.2 cm) are neat; slight subsidence of the body can be seen from the section.

Vessel BKG 10911 (Fig. 3c)

The third object comes again from Barikot, but from a completely different chrono-stratigraphic context. The object features just a fragment of the bottom of a thick, sphero-conical (?) grey ware object (diam. max. preserved 4.6 cm, h. max. preserved 2.3 cm; t. of the bottom 1.6 cm, t. of the body 0.7 cm). The vessel is un-slipped, and it features the same distinctive grey colour and type of fabric of the previous ones. It features also a typical bottom with hollow grooves. The chronological definition of the fragment is interesting because it is much older than its predecessors (ca. 50 BCE - 50 CE.; Macrophase 3b) and was found in a totally secure stratigraphic context, located immediately south of the precinct of the apsidal temple H in Trench 16, sector BKG 16 TTW, layer (800) (see Olivieri *et al.* 2023).

A bibliographic update

In 2007, Saifur Rahman Dar presented in this Journal the first overview on these vessels ever published in Pakistan (Dar 2007). His documented review stemmed from 24 specimens retrieved from Pakistani museums, starting from the examples found in Charsadda by J. Marshall and P. Vogel (1904). The search for comparisons

Table 1. BKG Macrophase 9a: calibrated dates.

Sample No.	Macrophase	Sample Id.	Source	Calibrated date	Confidence	Lab	Year	Material
75	9a	Beta - 664153	BKG 13 E (3)	1028-1172 CE	95.4	Beta	2023	soil
76	9a	PSUAMS-6206	BKG 11 W (46)	1021-1154 CE	/	PSU	2019	bone

Figure 5. The Ghaznavid Mosque of Udegram (nadiral view taken with a drone from the Udegram 'Castle') (Photo: Fazal Khaliq/Italian Archaeological Mission in Pakistan).

has inevitably led Dar to Iran and the Middle East, where these types of vessels are found in fair quantities, in excavations and museums, and extensively studied and are, nevertheless, still debated.

Saifur Rahman Dar's study includes references updated to 1999. After his publication, studies on these vessels have multiplied exponentially, to the point that a special issue of the *Journal of Islamic Archaeology* was dedicated to them.[5]

In the following lines I will briefly review some of the most relevant recent publications on the subject; however, the reader should know that the list is obviously not exhaustive. Therefore, I suggest checking the references of the following works (cited in the text and in the footnotes), as well as those of Dar 2007 for a complete bibliographical overview.

Multiple hypotheses

In 1999 Stéphane Pradines edited a special volume of the JIA. In his Introduction, he first introduces this class of materials, their dimensions (from 5 to 30 cm), shapes, and features (high-temperature fired clay), the chronological spectrum (from 8th to 15th century)[6] and geographical range (from Africa to Central Asia [and India]).[7] Pradines then outlines the various hypotheses on the intended use(s) of these objects, as well as the associated evolution of the terminology (from the function-oriented 'Tongranaten' and 'Handbrandgeschosse' to the more flexible 'sphärisch-konischen Geräte'). Regarding the hypotheses, the following have been considered: (a) hand-grenade/warfare equipment (a theory proposed since end-19th century), (b) containers for alcoholic beverages, as proposed on the basis of some inscribed objects ('they fill us with matured wine'),[8] (c) aeolipiles or fire-blowers, (d) water-pipes, (e) mercury container,[9] (f) perfume vessels, (g) containers for asafoetida (refs. in Fusaro *et al.* 2022: 13) and, last but not least, (h) apothecary vessels. While most of the scholars who published in *JIA* 2019 inclined towards the military interpretation of these vessels,[10] other scholars, such as Valentina Vezzoli, propose a different range of uses for the same form or vessel.[11]

Functions and contents

One of the main reasons for such a vast and contradictory range of functional hypotheses, as Jakob Shravit pointed out, was that '[Only] few vessels have been found in their original archaeological contexts and only in a small number of archaeological excavations; and due to the washing of pottery during excavations, substances and chemicals were washed away, making it difficult to obtain evidence of possible contents in the vessels' (Sharvit 2008: 103). However, in more recent years some important analyses were published.[12] The analysis carried out on a few sherds from Dvin (Armenia) was not particularly productive: 'This finding [of oleic acids etc.] is concurrent with complex perfumes that are composed of several different fragrant compounds, each delivered in their own specific base (oil, wax, or fat). Although our results corroborate the hypothesis that the four vessels we studied did once contain scented oils, other sphero-conical vessels may have been used to store wine or beer, although their volume seems rather small for this purpose' (Hans at al. 2016: 415).

In Matheson *et al.* 2022, sherds from 11th-12th century Jerusalem provided the following information: 'One of these vessels contains residue that indicate the vessel held oils. The residue of the second vessel is consistent with either scented materials or medicinal contents, while a third probably contained medicinal material. The unique fourth sherd is from a stoneware sphero-conical vessel with very thick walls, no decoration and the residue supports the possibility it was used for the storage of chemicals or may have held the chemical ingredients for an explosive device, consistent with a medieval grenade. This residue analysis of Mamluk sphero-conical vessels provides insight into luxury items, medicines, technology and trade in medieval Jerusalem.' (Matheson *et al.* 2022: 1).

Towards a solution

A rather sound summary and conclusion about the function(s) was provided as early as 1965 in a detailed study by Richard Ettinghausen, which can be considered the first modern study of these vessels. Ettinghausen started his study from the materials excavated by Erich F. Schmidt at Ravy, Iran, and preserved at the former Oriental Institute, Chicago (now ISAC) (see Fig. 2c).[13] He was rather sceptical about the idea that these vessels were explosive devices, as he emphasized the role of mercury, which is associated to similar vessels until pre-modern times in Russia and Central Asia.[14] However, due to the large number of vessels found, he concluded that '[it] seems rather unlikely if we assume that these pieces were used only as mercury containers' (Ettinghausen 1965: 223).

The existence of delicate glass vessels of the same shape was conclusive for Ettinghausen to prove that mercury was not the only suitable contents of such vessels. Rather, he pointed to perfume or ointment vessels, following other scholars (Figs. 6b, 7b, 8a-b).[15]

A very informative study by Courtney Lesoon (2022) was finally published in 2022. The study, while summarising previous evidence and hypotheses, convincingly concludes that such vessels were indeed used to contain ointments and other pharmaceuticals.

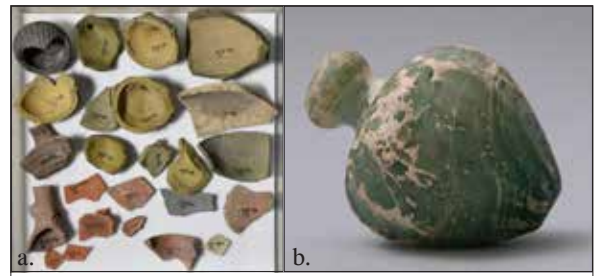

Figure 6. (a) Left: 'Fragments, Eighty-five pieces of pottery, glazed and unglazed, some moulded and stamped in relief; and, with them three pieces of glass vessels. Found in excavations on the site of the ancient destroyed city Rhages (Rhé) in Persia (from the register of the Victoria and Albert Museum, London). The first three rows, from the top, show at least 7 fragments of sphero-conical vessels (average diam. 7 cm). (VAM No. 619:1-1878; *ex* collection of J.F. Richard [Teheran 1844 and ff. years] (Photo Courtesy VAM; https://collections.vam.ac.uk/item/O299176/sphero-conical-vessel-unknown/).
(b) Right: Metropolitan Museum of Art, New York, No. 1975.61.2 (Iran, glass, green; 10th-12th century); h. 6.4 (Courtesy MMA).

The shape: an agnostic review

When we analyse again the formal characteristics of these objects, we can observe the following distinctive elements. These are waterproof containers that enclose small amounts of liquids in an airtight manner. That these are liquids and not dry substances is suggested by the flask shape, the small mouth, and the ceramic material. Despite their weight, they are easily transportable—something which is confirmed by archaeological evidence too.[16] The specimens found in Khyber-Pakhtunkhwa are probably (with due caution) all imported from Iran or Bactria/Tokharistan,[17] and travelled to the regions with their contents. Among the many, two objects are the best comparanda for the BKG 10167 vessel: a specimen from Nishapur preserved at the Metropolitan Museum of Art and reproduced here in Fig. 1a, and another from Ravy, reproduced in Fig. 2c (the last to the right). Additionally, the piece from Udegram (VSN 80) also finds a comparable vessel in another specimen from Ravy, also reproduced in Fig. 2c (the second from left), but also in an almost identical piece manufactured at Termez (Fusaro *et al.* 2022: fig. 10c).

The typical decoration of the more elaborate specimens always features teardrop or almond-shaped elements of the embossed type obtained through a mould system, not appliqued. The simpler ones (like the one from BKG) feature stamped circles, asterisks, stylized rosettes. The bottom often features regular concentric grooves. Overall, these are features that evoke luxury and/or specialized glass production and remind us in form and function of the rich and varied production of Roman *unguentaria*.[18] Sphero-conical glass vessels, decorated with the same teardrop or with almond-shaped concave elements, are attested from the 6th-9th century. (see Figs. 7b, 8a-b).

Figure 7. (a) Left: Sphero-conical vessel from Egypt ('stoneware', grey; 11th-13th century); h. 12.06 cm. The Madina Collection of Islamic Art (M.002.1.126) (After Stănică and Szmoniewski 2016: fig. 24).
(b) Right: Sphero-conical vessel from Iran (?) (glass, dark blue/black; 10th-14th century [but see Fig. 5.A]); h. 10.4; Barakat Gallery, No. LO.891 (https://barakatgallery.eu/artworks/categories/428/60331-sphero-conical-glass-vessel-900-bce-1100-ce/).

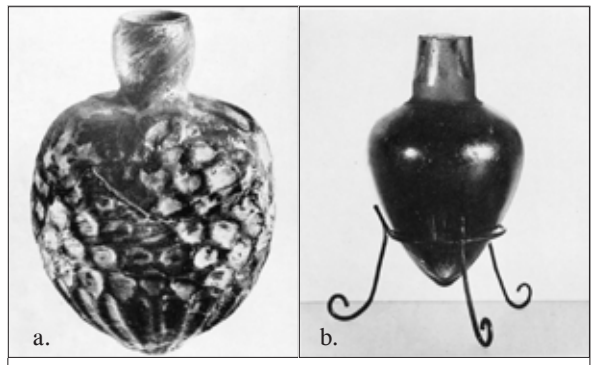

Figure 8. (a) Left: Sphero-conical vessel from Iran (glass, dark blue; c. 6th-9th century); reconstructed h. 10-12 cm [Cf. Fig. 4.b]. Teheran, Collection of Mohsen Moghadam (After Ettinghausen 1965: pl. XLVII.A).
(b) Right: Conical vessel from Middle East (?) (glass, amber; c. 12th-13th century); h. 7.7; Corning Museum of Glass, No. 51.1.49 (Corning, New York) (After Ettinghausen 1965: pl. XLVI.B).

Additional elements

Pharmaceutical flasks…

Based on what I have discussed above, in my opinion the 'apothecary theory' lastly presented by Lesoon in 2022, is probably the best hypothesis proposed, so far regarding the function(s) of these objects. It is also consistent (a) with the shape of the vessel, (b) with the analyses that have revealed the presence of oils, fats and mercury, (c) with the contents of the inscriptions sometimes associated with these vessels,[19] and (d) with the iconographic evidence, which often associates these vessels to healing narratives, and even directly illustrates them in Islamic medical canons and manuscripts (see Lesoon 2022: figs 10-12).

…and not weapons.

The idea that these vessels might have been used as firearms, unless one considers a 180-degree semantic transfer (from an object that brings healing to an object that brings death),[20] which is always possible—indeed it would be an extraordinary oxymoron—needs to be reconsidered. I do not rule it out but find myself sceptical (following R. Ettinghausen and H. Seyrig; see Seyrig 1959). I wonder if experimental tests have ever been done. What would be the explosive impact of these devices? It seems to me that after a good bang they would pulverize, and I cannot imagine them tearing into dangerous 'shrapnels'. I hope that some scholars (with due caution!) will someday test this hypothesis, just as I hope that additional analysis of the residues preserved in ceramic walls from the fragments available in the many museum collections will be done.

Conclusive remarks

Maria Vittoria Fontana's study

These considerations take us back to one of the decisive, and perhaps the finest, work of those written on the subject of these sphero-conical vessels, of their meaning and their function (Fontana 1999). Maria Vittoria Fontana was the first to recognise this form in the vessels held by the archangel Gabriel or Raphael in a sculpture from the school of Nicola Pisano, now in the Victoria and Albert Museum (Fig. 9a).[21] It seems though that the insight of M.V. Fontana's suggestion, already quoted extensively in Dar 2007, did not receive adequate recognition in Lesoon 2022. In the latter study, even though the two statues are key elements in Lesoon's study, Fontana 1999 is cited in this way: 'Two Italian marbles from Pisa […], now in the collection of the Victoria and Albert Museum, serve as concrete evidence that sphero-conical vessels, presumably with their contents, traveled beyond the realm of Islam, across the Mediterranean and into the medieval West. Based on these marbles, Maria Vittoria Fontana has suggested that some sphero-conical vessels served as perfume flasks, yet she does not explain why archangels would be depicted holding such objects' (Lesoon 1999: 325).

I agree that a few details may have been missed, such as the possibility that the archangel St Gabriel (following Pope-Hennessy's suggestions) was actually St Raphael, the healing archangel, or that the perfume flasks hypothesis proposed by Fontana (following Ettinghausen) is not particularly elaborated. Either way, it is precisely because of the brilliant study of these two statues in the framework of these sphero-conical vessels conducted by M.V. Fontana that C. Lesoon was able to arrive at her reconstruction that those are apothecary vessels, and that the emphasis given in the iconography refers to the power of physical and spiritual healing.

Two 13th century Tuscan marbles and the Gandharan Maitreya

Why are these Tuscan marbles particularly revealing? Because the emanating higher spirits

Figure 9. (a) Above: Nicola Pisano, School (second-half of the 13th century): St Gabriel; VAM 5800.1859 (After Pope-Hennessy 1951).
(b) Below: Nicola Pisano, School (second-half of the 13th century): St Michael; VAM 5798.1859 (After Pope-Hennessy 1951).

of healing of the shared tradition from Islam to Christianity (the archangels), are visually represented through a true 'transfer of function.' They are shown, in fact, holding (at least in one case) healing instruments that the observer could recognise immediately, namely, medicine containers, which should have been well known in the Italian and European cities.[22] These sphero-conical containers are not the traditional symbolic attributes of the archangels. Rather, they are visual symbols added on purpose (assuming it was intentional, as I believe) to make the function of the archangels universally readable in the context of that specific sculptural complex and unambiguous.[23] The same semantic function is probably also recalled in the flask carried by Maitreya, the Bodhisattva *soter* par excellence, at least still in the third-century Gandhara. The theme of the *amrita kalaśa*, the sphero-conical flask containing the healing *ambrosia*, held by Maitreya in Gandharan Buddhist stelae was first raised by Saifur Rahman Dar in his 2007 study cited above (Fig. 10).[24] Incidentally, the discovery of a potential fragment of a sphero-conical vessel at Barikot (see Fig. 3c), in phases datable at the latest to the first half of the 1st century CE, although a single find, could, if corroborated by further finds in the future, confirm the actual existence of the vessels depicted in these Gandharan stelae. Another 'transfer of function'.

Interestingly, 'transfers of function' are common in both the Christian and Buddhist traditions (but not unique to them), where ointment flasks are often re- or defunctionalized as reliquaries of saints, as the relics were the ultimate tools of healing.

Too much…too little. If we go back to the more sound and reassuring archaeological aspect, the importance of these finds from Swat lies in the fact that they might help us enrich our knowledge about the chronological spread, function, and geographic diffusion of these sphero-conical vessels. Not least, they also tell us more about the role of the Ghaznavid and post-Ghaznavid centres of Swat, which were important import hubs for the wealth and health of the elites and rulers of these mountain fortresses.[25]

Fig. 10. Sitting Bodhisattva Maitreya from Gandhara (c. 3rd century) MUCIV, Rome, no. Inv. 10919 (Photo Copyright Museo delle Civiltà MUCIV – MNAO).

Notes

1. A phenomenon which can be observed also in other vessels (cf. Arman *et al.* 2020: fig. 3).
2. See what R. Ettinghausen wrote in his 1965 study: "dense, hard, and fireproof clay, which made them not only thick but also impenetrable and not unlike 'stoneware' (ibid.: 224).
3. BKG Macrophases 8a-8b. With the exception of small reconstructions and buttresses added in the Ghaznavid phase (see Olivieri 2003).
4. I have observed this pottery very frequently in Ghaznavid and Ghurid settlements in the Bamiyan Valley and

other sites of Afghanistan. Jean-Claude Gardin's work on Balkh (1957) describes what appears to be a variety of this pottery ('céramique blanche'; see especially the decorative patterns of Gardin 1957: pl XIV). With reference to the Ghaznavid archaeological contexts, one of the most important and best-studied groups of sphero-conical vessels is the small series from the excavations of the Ghaznavid Palace of Mas'ūd III in Ghazni directed by Umberto Scerrato (Fusaro 2014).

5. *Journal of Islamic Archaeology* 3(2) 2016 (Special Issue on 'Sphero-conical Vessels'; Guest Editor: Stéphane Pradines). The issue gathered research by some of the leading specialists on the topic, as proceedings of the Study Day held on the 17th of December 2014 at the French Institute of Oriental Archaeology (IFAO), Cairo.

6. Overall, these objects are frequent from Abbasid, Fatimid, and Ayyubid periods and disappear completely in the Mamluk periods (Pradines 2016: 161); see also Canby et al. 2016: 133-134.

7. Findings are reported also in Western Eurasia (mostly in Russia, Bulgaria, Moldova and Romania). Probably the largest deposit of such vessels was found in the Lower Danube area, Romania (Stănică and Szmoniewski 2016).

8. From an object found in Samarra, Iraq in 1940 (Pradines 2016: 157). For a complete review of the inscribed objects see Fontana 1999: 12-17, fn. 18.

9. 'A very plausible interpretation is that the sphero-conical vessels must have served as containers to carry mercury […]. This view developed based on some ethnographical observations and citations from Arabic sources as well as chemical analyses of the contents. Oral accounts gathered from the Moslem population inhabiting regions of Russian Turkestan seems to support the view of the function of such vessels: they are said to have served as containers for transporting mercury as late as the 19th century. They were called *simop-kusatscha*, i.e. containing 'fluid silver/ mercury. Similar information has been collected in Turkey where settlers from Armenia used such spheroconical vessels as containers to store mercury […]. The Tashkent copy made in 1541 of an Arabic manuscript on pharmacy which had been written by Ali bin Husayn al-Ansari in 1369, contains a drawing of three sphero-conical vessels as suggested containers for mercury storage […]. It should be stressed here that mercury was widely used in the Arabic world for pharmaceutical production; it was utilised against headaches, epilepsy, syphilis and in cosmetic products for dermatological use. It was also exploited in veterinary medicine and the mirror industry […]'. (Stănică and Szmoniewski 2016: 339). The hypothesis was recently reiterated by Arman *et al.* 2020. For the aeolipiles, see Hildburgh (1951), and Rogers (1969).

10. Not all. For example, Elodie Vigoroux argues that some of these vessels were containers for *fuqq'a* (a sparkling beverage) (Vigoroux 2016).

11. Vezzoli, 2016. See also https://sites.lsa.umich.edu/khamseen/topics/2021/sphero-conical-vessels/. Although pottery, in my view, is fundamentally a tool, deriving its form from its specific function, one can have forms with multiple intended uses (not considering forms that by reuse go from a primary to a secondary function).

12. Previous analyses of the contents report the presence of mercury in 4 cases, resin acids, fats and oils, iron, and potassium nitrate+sulfur in one case each (Matheson et al. 2022: table 2). See also Fontana 1999: 12-15, fn. 18.

13. See https://isac.uchicago.edu/sites/default/files/uploads/shared/docs/rayy_expedition.pdf.

14. This evidence was later discussed in Stănică and Szmoniewski 2016.

15. 'This makes it likely, as W. Hauser, C.K. Wilkinson, and Arthur Lane have already

suggested, that many of this type served also as near-unbreakable containers for costly perfumes or drugs, be it for storage or for shipment from production centers.' (Ettinghausen 1965: 224).

16. Dar states differently (Id. 2007: 54). Ettinghausen wrote that 'It can be further stated also functional as far as the packing in the panniers of donkeys or camels as the pieces, placed in cut straw, could easily be made to dovetail' (Ettinghausen 1965: 222; 223, fig. 6).

17. Termez, thanks to recent studies, has been recognised as a centre of production of these vessels (Fusaro et al. 2022).

18. I have in mind the especially ribbed types from the Eastern Mediterranean, c. 2nd-4th century.

19. 'Drink to the best of your health!', 'Drink to your good health!'. These are the most common inscriptions according to Dar 2007: 57.

20. As if death is the ultimate healing for the enemy. Maria Vittoria Fontana, in her 1999 study, added a very interesting footnote (Fontana 1999: 17, f. 29) where the author discusses the difference between 'transformation of use' and 'transformation of function', or 'transfer of functions' (see below). See also Fontana 2019 and 2020 (the latter is a new edition of Fontana 1999).

21. The sculptures are part of larger composition, the 'Arca di San Domenico Maggiore', Bologna; Ark of St. Dominic the Elder, Bologna) reconstructed several times, whose original statuary groups (caryatids) are dispersed in Italian, French, British and US museums. The 'Arca' was originally a sarcophagus (or ark) supported by caryatid standing figures representing the archangels, the Virgin with the Child, allegoric figures, and Dominican deacons. It was built to house the remains of the founder of the Order of the Preachers or Dominicans, St Dominic de Guzmán. The reader should note that, according to M.V. Fontana, the second sculpture (Fig. 9b) represents the archangel Michael with an aspergillum rather than with a sphero-conical vessel.

22. In Mediaeval Europe, ointments, balms, and medicines are associated with the East, not only because the East was the source of spices, resins, plants, etc., but also because most of the *scientia medica* was preserved and practised by Islamic scholars and physicians, and – not least – because in the Christian *geographia sacra* the earthly paradise, or Eden, was in the East. For example, the central figure (or group) of the 'Arca di San Domenico Maggiore', the Virgin and Child, wears a tunic that was intended to be depicted as made of Oriental fabrics. The hem of the tunic bears a pseudo-Kufic inscription, one of the many dozens in four centuries of Italian art (Fontana 1999: 25-28). Pisano's archangels also wear oriental-style embroidered robes. *Ex Oriente lux*.

23. But how do we explain the presence of healing symbols in the shrine built to house the remains of St. Dominic? This belongs to a deeper level of allegorical interpretation. The preaching of St. Dominic (and the Dominican Order) was probably depicted as a healing balm in that period of heresy explosion that was the 13th century.

24. Not only: Dar 2007, Fontana 1999 and Lesoon 2022 pointed to a very interesting (and famous) Umayyad relief now in the Damascus Museum (c. 730 CE) representing a female figure holding sphero-conical vessel, which is part of a reconstructed frieze found at Qasr al-Hayr al-Gharbi, Syria. Another important comparison can be found in an illustration in the *Daqa'iq al-haqa'iq* a compendium of magic and scientific texts. In it the personification of the angel of the 'Third Mansion of the Moon' holds one of these sphero-conical vessels (Canby *et al.* 2016: 134, fig. 59).

25. Other clues had already suggested this to us: the massive architecture of the

fortresses, the wealth of food provisions delivered to the garrisons in standard rations contained in truncated-conical bowls (found intact by the hundreds in the coeval BKG dumps), the shipment of goods attested by elaborate sealings (the 'Solomon's Knot' for example), the wealth of glazed pottery from the Western Ghaznavid regions, the elaborated locally produced stone oil lamps, imported rosaries and ornaments, oil lamps from Balkh...

References

Arman, H., Kouhestani, H., and Zareie, A.
2020. Sphero-Conical Vessels in Islamic Pottery Survey and Explaining of Function. *Journal of Archaeological Studies* 12, 2 (22): 41-59.

Bagnera, A.
2015. *The Ghaznavid Mosque and the Islamic Settlement at Mt. Raja Gira, Udegram.* ACT-Field School Reports and Memoirs, V. Lahore: Sang-e-Meel Publications.

Callieri, P., Colliva, L., Micheli, R. Nasir, A. and Olivieri, L.M.
2000. Bīr-koṭ-ghwaṇḍai, Swat, Pakistan. 1998-1999 Excavation Report. *East and West* 50(1-4): 191-226.

Canby, S.R., Beyazit, D., Rugiadi, M., and Peacock, A.C.S.
2016. *Court and Cosmos: The Great Age of the Seljuqs*. New Haven and London: The Metropolitan Museum of Art, New York/ Yale University Press.

Dar, S.
2007. Kuza-i-Fuqqa's or Huqqa-i-aatish. A neglected collection of some ceramic vessels of early Muslim period in Pakistan. *Ancient Pakistan* XVIII: 49-93.

Ettinghausen, R.
1965. The Uses of Sphero-Conical Vessels in the Muslim East. *Journal of Near Eastern Studies* 24(3) [Erich F. Schmidt Memorial Issue. Part One]: 218-229.

Fontana, M.V.
1999. An Islamic Sphero-conical Object in a Tuscan Medieval Marble. *East and West* 49(1-5): 9-33.

2019. 'I am a makhfiyya for serving food': Islamic prototypes and some Byzantine and Western depictions of them. *Mantua Humanistic Studies*, VII (ed. E. Scarpanti). Universitas Studiorum: Mantova, 69-96.

2020. An Islamic Sphero-Conical Object in a Tuscan Medieval Marble. *Islam and the West. Arabic Inscriptions and Pseudo Inscriptions*. Universitas Studiorum: Mantova, 135-152.

Fusaro, A.
2014. *Studio del corpus ceramico di età islamica dagli scavi italiani a Ghazni, Afghanistan (X-XIII secolo): contributo alla ricostruzione storica del palazzo sultanale e della 'casa dei lustri'*. PhD thesis, Sapienza Università di Roma, 3 vols (unpublished).

Fusaro, A. Esparraguera, J.M., Ariño Gil, E., Uribe Agudo, P., Angás Pajas, J. and Pidaev, S.R.
2022. Islamic ancient Termez: An active and long-established ceramic manufacturing centre along the silk road. Archaeological Research in Asia 31(100375): 1-25.

Gardin, J.-C.
1957. *Céramiques de Bactres*. MDAFA, XV. Librairie Klincksieck: Paris.

Gullini, G.
1962. *Udegram* [*Reports on the campaigns, 1956-1958, in Swat (Pakistan)*]. IsMEO Reports and memoirs, I. Libreria Poligrafico dello Stato: Rome.

Hans, B., Shah, S., Areshian G.E., and Faull, K.F.
2016. Chemical insights into the function of four sphero-conical vessels from medieval Dvin, Armenia. *Muqarnas* 33: 409-419.

Hildburgh, W.L.
1951. Aeolipiles as Fire-blowers. *Archaeologia* 94: 27-25.

Lesoon, C.
2022. The Sphero-Conical as Apothecary Vessel: An Argument for Dedicated Use. *Muqarnas* XXXVIII: 317-331.

Marshall, J. and Vogel J.Ph.
1904. Excavation at Charsadda in the Frontier Province. *Archaeological Survey of India*

Annual Report 1902-1903. Office of the Superintendent of Government Printing, India: Calcutta, 141-184.

Matheson C.D., Vickruck, C.R., McEvoy, C.J., Vernon, K.K., and Mason, R.
2022. Composition of trace residues from the contents of 11th–12th century sphero-conical vessels from Jerusalem. *PLoS ONE* 17(4): e0267350, 1-19. https://doi.org/10.1371/journal.pone.0267350.

Narasinham, V. *et al.*
2019. The formation of human populations in South and Central Asia. *Science* 365: 6457, DOI: 10.1126/science.aat748

Olivieri, L.M.
2003a. *The survey of the Bīr-koṭ hill. Archaeological map and photographic documentation*. [Bīr-koṭ-ghwaṇḍai Interim Reports I]. IsIAO Reports and Memoirs, Series Minor, VI. IsIAO: Rome.

2003b. La fase di occupazione islamica del colle di Bir-Kot. Le evidenze della ricognizione e dello scavo. In M.V. Fontana and B. Genito (eds) *Studi in Onore di Umberto Scerrato per il suo Settantacinquesimo Compleanno*. Napoli: Istituto Universitario Orientale: Napoli, 593-608.

2020. *Ceramics from the excavations in the historic settlement at Bīr-koṭ-ghwaṇḍai (Barikot) Swat, Pakistan (1984-1992). I. The Study*. ACT-Field School Reports and Memoirs, Special Volume 2.1 [Bīr-koṭ-ghwaṇḍai Interim Reports IV]. Lahore: Sang-e-Meel Publications.

2023. Temples of Swat: The Śāhi archaological landscape of Barikot. In H. Prabha Ray, S. Kulshreshtha, and U. Suvrathan (eds) *The Routledge Handbook of Hindu Temple. Materiality, Social History and Practice*. Routledge: London-New York, 253-278.

Olivieri, L.M., Iori, E., Minardi, M., Lant, E., Abdul Samad, Vidale, M. *et al.*
2023. Barikot, Swat: Excavation Campaign 2021-2022. Preliminary Report. Trenches BKG 16, BKG 17, and BKG 18. *East and West*, n.s. 3(2): 68-194.

Olivieri, L.M. and Sesana, M.
forth. A Tale of Two Cities. Notes on the two Barikot in Dir and Swat. In Al. Cacopardo and Aug. Cacopardo (eds) *Roots of Peristan. An International Interdisciplinary Conference on the Pre-Islamic Cultures of the Hindukush-Karakorum. Rome 5-7 October 2022*. ISMEO: Rome.

Pope-Hennessy, J.
1951. The Arca of St Dominic: A Hypothesis. *The Burlington Magazine* 93 (584): 347-351.

Pradines, S.
2016. The Sphero-conical Vessel: A Difficult Interpretation between Historical Sources and Archaeology. *Journal of Islamic Archaeology* 3(2): 153-162.

Rogers, J.M.
1969. Aeolipiles again. In O. Aslanapa and R. Naumann (eds) *Forschungen zur Kunst Asiens. In memoriam Kurt Erdmann*. Istanbul Üniversitesi Edebiyat Fakültesi - Türk ve Islâm Sanati Kürsüsü: Istanbul, 147-158.

Seyrig, H.
1959. Flacons? Grenades? Eolipiles? [Antiquités syriennes]. *Syria*, XXXIX(1-2): 81-89.

Sharvit, J.
2008. "The sphero-conical vessels". In V. Tzaferis and S. Israeli (eds) *Paneas II: Small Finds and Other Studies*, edited by 101–112, Israel Antiquities Authorithy Reports 38: 101-112.

Stănică, A.-D., Szmoniewski, B.S.
2016. The sphero-conical vessels from the Lower Danube in the light of new discoveries from Isaccea, Tulcea county, Romania. *Sprawozdania Archeologiczne* 68: 327-344.

Vezzoli, V.
2016. Sphero-conical vessels from Baalbek: A diverse and challenging collection. *Journal of Islamic Archaeology* 3(2): 209-232.

Vigoroux, E.
2016. 'Note on a use of sphero-conical vessels in Mamluk era Damascus'. *Journal of Islamic Archaeology* 3(2): 187-193.