Stone Vessels of Egyptian Appearance from Ibiza

María José LÓPEZ-GRANDE

The aim of this paper is to throw light on the specific raw material of four Egyptian-style stone vessels. They were found in Ibiza, probably at the Puig des Molins necropolis, and are kept in the Archaeological Museum of Ibiza and Formentera (Eivissa). These four specimens have served as a basis to initiate preliminary research that seeks to determine their specific raw materials and their provenance; in addition, it aims to clarify the location of the workshops in which these vessels, which were of a type widely distributed throughout the Mediterranean basin in antiquity, were produced. Physicochemical analyses have been carried out to confirm or rule out the Egyptian background of the Ibiza samples. The results of these analyses and a first set of conclusions are discussed below.

El objetivo de este artículo es dar a conocer cuatro recipientes de piedra procedentes de Ibiza, considerados de tipología egipcia, probablemente hallados en la necrópolis del Puig des Molins y conservados en el Museo Arqueológico de Ibiza y Formentera (Eivissa). Estos objetos han servido de muestra para iniciar una investigación que intenta determinar los materiales constitutivos de este tipo de recipientes, ampliamente distribuidos por el Mediterráneo, con la finalidad de intentar localizar los lugares de origen de sus materia primas y ubicar los talleres relacionados con este tipo de vasos. Se han realizado análisis fisicoquímicos con el objetivo de confirmar o descartar la posible filiación egipcia de estos recipientes. Los resultados de los análisis realizados y las primeras conclusiones se presentan y discuten a continuación.

Keywords: "Egyptian alabaster", stone vases, gypsum, speleothem limestone, Ibiza, Egypt.
Palabras clave: "Alabastro egipcio", vasos de piedra, yeso, caliza espeleotema, Ibiza, Egipto.

The present study describes a small group of stone vessels found separately in Ibiza. This ensemble is formed by an almost complete vase together with fragments of three other specimens, all of which were probably found in the Puig des Molins necropolis (Eivissa), and are currently held in the Archaeological Museum of Ibiza and Formentera (Eivissa).

In accordance with their shape, these vessels should be regarded as "alabastra"[1], a classification that ranges from small to large stone vessels, each size serving different purposes. The "alabastra" vessels category also comprises small pottery and glass vases[2]; therefore, the term by itself is scarcely restrictive. Vessels within the type are also considered and even called "unguent" or "ointment" jars, both terms referring quite explicitly to their main use as scented oils and ointment containers. However, these are also inaccurate terms. They refer to very

1 Aston, 1994: 166, numbers 227-229.

2 Gómez Peña, 2013: 901.

TdE 7 (2016) — Páginas: **67-88**
Recepción: 25/10/2016 - Admisión: 10/11/2016
María José López-Grande — mariajose.lopez@uam.es
Departamento de Prehistoria y Arqueología / Facultad de Filosofía y Letras / Universidad Autónoma de Madrid / España

http://doi.org/10.25145/j.TdE.2016.07.05

generic classifications that group together vessels of different shapes, raw materials and dates. On that basis, neither the term "alabastron", nor unguent or ointment jar are considered appropriate enough to fit the vessels described below[3].

The vagueness of these terms has led our Research Group to use the generic terms "vessels" or "vases" to describe them, adding to it the descriptive term "stone" without specifying alabaster or any other particular mineral or rock. Their shape, however, points to their use as ointment containers, and references to that suggested specific purpose are also made in this paper.

As indicated in the present report, despite the term alabaster having been widely used, in most cases it does not match the chemical composition that is known for this rock. The origins of this term are uncertain. From at least the fourth century BC[4] it was used by the Greeks to designate one of the Egyptian stones used to carve vessels of different shapes and sizes, as well as a specific type of Egyptian vase. Such vases were usually made of stone, with a slender body, rounded base and almost in all cases featuring small protuberances in the place of handles. The shape, previously known in stone vessel, adopted by potters spread throughout Greece from the sixth century BC becoming one of their most important pottery vase types[5].

Importantly, the use of the term alabaster to refer to the stone of which some Egyptian vases are made is problematic as the chemical composition of their raw material often differs from that found in alabaster[6]. Alabaster is a sedimentary rock formed by chemical precipitation. It consists predominantly of a solid, coloured form of the gypsum material ($CaSO_4\ 2H_2O$), a hydrated calcium sulphate with a solid structure, or its precursor, the anhydrite ($CaSO_4$).

Furthermore, most of the Egyptian vases designed as "alabaster vases" are often made of a sedimentary rock, but one which is actually a variety of veined stalagmitic calcite ($CACO_3$), a crystalline and compact form of calcium carbonate formed by a secondary chemical precipitation of underground aqueous solutions of limestone formations. This difference in composition has led certain authors to specifically term it "Egyptian alabaster"[7]. Adjectives like "calcareous" or "calcium-based rock"[8] are also used as well as the term "travertine", whose main defender was J. Harrell[9] followed by

3 Neither the English term "dipper", nor Italian "attingitoio", seem to reflect properly these vases functionality.

4 Teofrasto (371-287 BC) in *De Lapidibus* referred twice to a stone he called *alabastrites*: first, in passage 6, 6 where the author specified its Egyptian provenance; then, in 65, 3 where he remarked its resemblance to *gypsum* (plaster) (see the translation by Caley and Richards, 1956: 20 and 29).

5 Badinou, 2003: 54-59.

6 The chemical properties of the different raw materials that the term alabaster has been assigned to, such as colour, crystalline form, density and hardness, have a range of variations that can overlap, thus making such properties inconclusive.

7 See, for example, Lilyquist, 1995: 13.

8 Lilyquist, 1995: 13.

9 Harrell, 1990: 37-42.

Figure 1a. Stone vessel found in Ibiza, MAEF 2631.

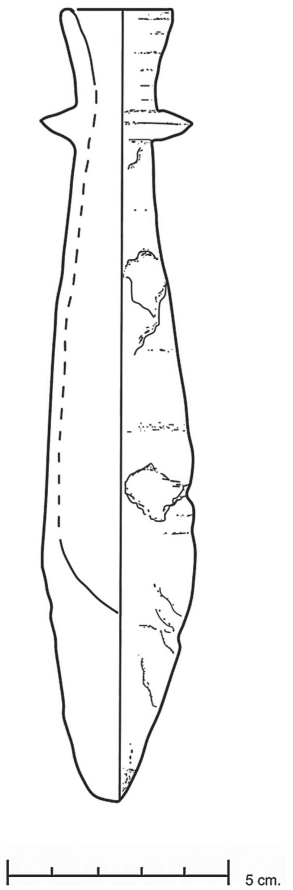

Figure 1b. Stone vessel found in Ibiza, MAEF 2631.

other authors[10]. The term calcite is often inadvisable, as that is used for the mineral, therefore inappropriate to designate the rock[11]. For this reason, whenever the term alabaster is used within this paper to refer to raw material, it will be written with quotation marks[12] until a consensus on how to designate it is reached.

Calcite and "alabaster" were widely used by the ancient Egyptians to carve vessels, although the mistakenly called "alabaster" was done so to a greater extent. The difference between both mineral categories can be verified by means of a simple chemical test. In the case of the specimens from Ibiza, as discussed in this paper, physicochemical analyses have been performed to identify their raw materials accurately. The results of those analyses are comprehensively discussed in this article.

10 Aston, 1994; Aston *et alii*, 2000: 59-60.

11 Aston *et alii*, 2000: 59.

12 For a precedent of that issue see: Molinero Polo, 1995: 229-230 and 237.

1 | Stone Vases from Ibiza

Stone vase findings are a rare occurrence in the island. Only a sherd of an open shape[13], four fragments from the Vives Collection[14], and the four specimens discussed in this paper bear testimony to their use in the Phoenician-Punic and/or Roman periods. It would appear that all this rare evidence comes from the necropolis of Puig des Molins, the ancient cemetery of the Punic settlement of Ibosim, nowadays the modern city of Eivissa[15]. Both in this necropolis and in other locations in Ibiza a great number of hypogeum tombs and other burials have been excavated, and a wealth of archaeological remains of various categories have been uncovered. The shortage of stone vases amongst them is unusual, to say the least. Such scarcity could be due to cultural, contextual or chronological factors.

1. 1 | Description of the vessels

No. 1 MAEF 2631 (figs. 1a and 1b)

Material: White stone, translucent, not veined.

Measurements: 18.6 cm maximum height; 3.6 cm maximum diameter of the body; 2.4 cm mouth diameter; 3,6 cm diameter of the disc-shaped ring around the neck.

Description: Slender vase, with straight flaring neck and pointed base broken at its edge. At 2.2 cm from the rim mouth a disc-shaped ring of 3.6 cm of diameter is carved around the body. It was probably designed to collect and reuse drips from the content.

The interior of the vase is carved 14.5 cm from the edge of its mouth to its bottom, so its volume is less than suggested by the exterior size. Its wall is extremely thin, 0.3 cm in its width. Its inner surface shows vertical lines and scratches, which correspond to tool marks left by the craftsman during the production process.

This is the only vessel in our sample that is nearly complete, although its conservation is rather poor. It was reconstructed from fragments, albeit in a mediocre method, at the time of its discovery. It shows some missing sherds in its body, around the disc-shaped ring and on the edge of the base.

No. 2 MAEF 10013/69/23 (figs. 2a and 2b)

Material: Lower part of the body and rounded base of a vase, carved from a veining ivory-coloured stone.

Measurements: Preserved to a maximum height of 7 cm; maximum diameter of the body 3.5 cm, extremely thin and rather regular wall, its width ranges between 0.2 and 0.3 cm.

Description: The inner surface follows the shape of the vessel and shows tool marks. The outer surface is polished.

No. 3 MAEF 5128 (figs. 3a and 3b)

Material: Fragment from the upper part of a slightly shouldered jar with high neck and flat rim, carved from a vertical veining ochre-beige coloured stone.

13 Gómez Bellard *et alii*, 1990: 64, no. 221, Fig. 54.

14 Vives, 1917: no. 433-436.

15 López-Grande *et alii*, 2014: 95-96.

Figure 2a. Fragment of a stone vessel found in Ibiza, MAEF 10013/69/23.

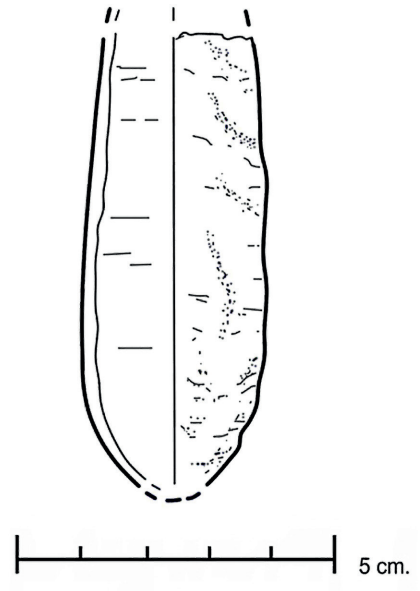

Figure 2b. Fragment of a stone vessel found in Ibiza, MAEF 10013/69/23.

Measurements: Preserved to a maximum height of 6.3 cm. Its original height can be estimated as 14-16 cm. The height of its neck is 1.5 cm, and the diameter of its mouth 2.6 cm. The average thickness of its walls is 1.5 cm.

Description: The fragment shows part of the body, neck and mouth of a vase, the latter with a broken flat rim, which would have reached 6 or 7 cm of diameter. The rather uneven inner surface of the vase shows tool marks. Its outer surface is polished.

No. 4 MAEF 791 (figs. 4a and 4b)

Material: Small fragment of the body of a vase carved from a horizontally veined yellowish-ochre stone.

Measurements: Preserved to a maximum height of 7.6 cm, maximum width 3 cm. Its walls are extremely thin, ranging from 0.2 to 0.25 cm width.

Description: The inner surface shows tool marks. The outer surface is well polished.

1. 2 | Archaeological context and chronology

There is no information regarding the archaeological contexts of any of these four stone vessels and very little has been reported about their discovery.

Vases No. 1, No. 3 and No. 4, were discovered during poorly documented early excavations at the Puig des Molins necropolis. None of these specimens had been hitherto published.

Vase No. 2 comes from controlled excavations carried out in the Puig des Mo-

Figure 3a. Fragment of a stone vessel found in Ibiza, MAEF 5128.

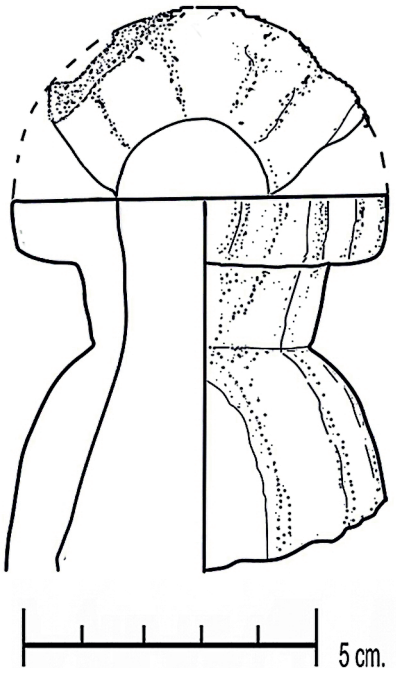

Figure 3b. Fragment of a stone vessel found in Ibiza, MAEF 5128.

Figure 4a. Fragment of a stone vessel found in Ibiza, MAEF 791.

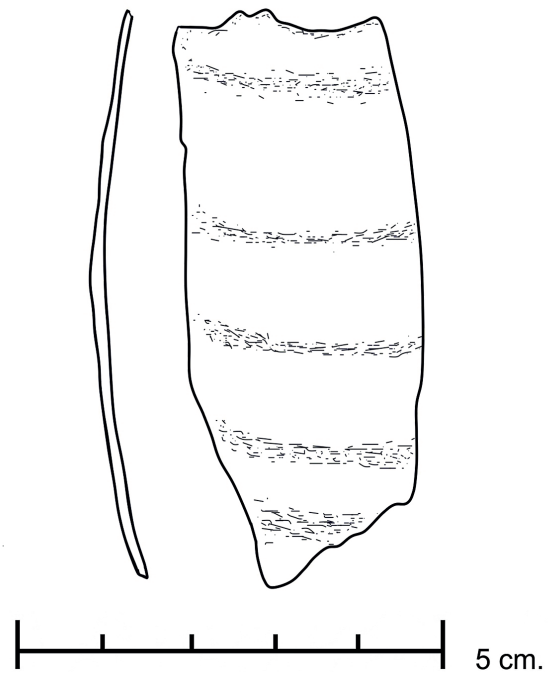

Figure 4b. Fragment of a stone vessel found in Ibiza, MAEF 791.

lins necropolis during 2001 and 2002. It was found inside hypogeum tomb No. 3, grid 7-6 A/B. However, as is often the case with these collective tombs used by several generations, the hypogeum had been ransacked and the data gathered from its archaeological remains are scarce. In fact, we only know that its rectangular 17m² burial chamber was filled with earth, stones, pottery sherds, fragments of metal and vitreous material, along with some assemblages of bones associated to collective burials. From this disturbed material it was possible to establish three periods of use for the tomb, dating from Punic times to the Roman period. The first one spanned from the sixth century to the end of the fifth century BC. The tomb was used a second time during the third to second centuries BC, as indicated by several remains. A third phase, dating to the first century BC, corresponds to the Roman period.

Bearing in mind the aforementioned time span, a chronology towards the end of the fifth century BC can be suggested as the earliest possible date for the presence of vase No. 2 in hypogeum tomb No. 3. However, it could have also been carved at an earlier date but left in the tomb as part of the funerary equipment of a later burial belonging to any of the three mentioned phases.

In order to improve our understanding of these stone vessels from Ibiza, it might be useful to take into account some other data related to similar vessels found outside the island.

2 | Origins and Distribution of Stone Vases Related to Ointments or Scented Oils

The origin of the vase type might be considered Egyptian and as such is generally recognised in scientific literature. The stone in which they were carved, whose earliest reference *šs*[16] goes back to the beginning of the Fourth Dynasty, was used in ancient Egypt from Predynastic times to the Graeco-Roman period to carve vases in different shapes.

Establishing the first appearance of the stone vase type being discussed here is a challenging task, as it has been so in the past for other researchers. F. W. von Bissing[17] suggested the type would have appeared at the end of the Middle Kingdom, while acknowledging there were not any parallels known to him that dated from before the Kushite period.

More recently, J. Bourriau[18] concluded that the "alabastron" stone type was linked to the Twenty-Fifth Dynasty and derived from Third Intermediate Period pottery and stone vessels. According to C. Lilyquist[19], there were earlier examples dating from the end of the Middle Kingdom and Second Intermediate Period, of both stone and pottery vessels showing similar ovoid body shapes and rounded

16 *šs* –alabaster, vase of alabaster– and *šst* –alabaster– (Sethe and Helck, 1906: I, 107,17; IV, 1044,4; and Erman and Grapow, 1926-1931: IV, 540-541). Also *bit* –stone block– (Anthes, 1928: 9, 10; Erman and Grapow, 1926-1931: I, 433, 2-3), –ovoid vessels– (Sethe and Helck, 1906: IV, 637, 19). All the terms referred to the Old Kingdom.

17 von Bissing, 1904 and 1907.

18 Bourriau, 1984: 365.

19 Lilyquist, 1995: 61, Fig. 149.

bases[20]; there are even wood examples such as the one found in KV 62 (Tutankhamun) which shows a slightly slenderer shape than the aforementioned pottery vases[21].

Without excluding the possibility of an earlier origin, it is known that some specimens of the type are documented at Dra Abu el-Naga in a Seventeenth Dynasty[22] wooden box containing several stone cosmetic vessels. The type commonly referred as alabastra in the scientific literature is also well attested in the Third Intermediate Period. At this point, large stone vessels similar in shape to the type discussed here began to appear and would remain in use until the Graeco-Roman period.

W.M.F. Petrie suggested in his catalogue of stone vessels that the different types of these alabastra had their origin in the various pottery shapes of the Third Intermediate Period[23], which in turn evolved from Eighteenth Dynasty egg-shaped ceramic vessels with handles. In his catalogue, Petrie estimated a Twenty-Sixth Dynasty to first century AD chronology. One of the specimens he included, attributed to the reign of Nekau II[24], presents a rounded base and a remarkably slender body converging towards a cylindrical neck. This vase is quite similar to two other examples that Petrie dated to the late Ptolemaic period. These latter vessels present a slender body but their bases are rather flat. One of them shows a disc-shaped ring close to its mouth[25], similar to that attested in No. 1.

Following the chronology suggested by Petrie, B. Aston dated the alabastra type to between the Late Period and the Roman period[26]. According to her, those with a rounded base, egg-shaped body and short neck, would have belonged to the Twenty-Sixth Dynasty, while those of more pronounced slender body converging to its neck and flat rim should be dated to the first century AD.

Finally, the vase with the disc-shaped ring around its neck, dated by Aston between 150 BC and 100 AD[27], shows similarities with vase No. 1 from Ibiza, but the former's base is flatter and its body less elongated than that of the Ibizan example.

Outside Egypt, vases whose shape is reminiscent of that of the alabastra type are also found. Some of them, dated to the beginning of the second millennium come from the Western Asiatic/Anatolian area. This is the case for a specimen found in Amman[28]. Its chronology is assigned to the Late Bronze Period, even though it is quite similar in every respect to the alabastra of a later date.

Within the first millennium BC, small "alabaster" containers, which could be regarded as interesting reference points and

20 Lilyquist, 1995: 118, Fig. 148.

21 Lilyquist, 1995: 119, Fig. 152.

22 The box belonged to queen Mentuhotep (17th Dynasty), although Lilyquist (1995: 59-60, 118, Fig. 147) considered that attribution not to be correct, arguing that the box or, at least part of its contents, would have been part of later grave goods.

23 Petrie, 1937: 14, Pl. XXXVII, no. 947.

24 Petrie, 1937: 15, 25, Pl. XXXVII, no. 968.

25 Petrie, 1937: 25, Pl. XXXVII, no. 966, 967.

26 Aston, 1994: 90, Fig. 19, no. 227-230 and p. 166.

27 Aston, 1994: 166, no. 227-230.

28 Lilyquist, 1995: 119, Fig. 153.

which could provide us with information related to the vases' origin and chronology, have been found in different sites across the Near East. These include Iran[29], Babylon—where archaeological excavations have uncovered a stone vase workshop[30]—Palestine[31], Syria, Debe Hüyük[32], Al Mina[33] and Sidon[34]. Other samples come from different areas of the Mediterranean basin, such as Cyprus[35], Greece[36], and the Iberian Peninsula[37], where a great variety of shapes have been attested[38]. The chronology of some of these latter vases is rather early. This is the case for some examples found in Tumulus I at the necropolis of Las Cumbres (Puerto de Santa María, Cádiz), dated to the eighth century BC, and two specimens found in transitional contexts between the eighth and the seventh centuries BC in tomb number 9 at the necropolis of la Joya (Huelva). Similar stone vases dated to the seventh century BC come from the Sevillian necropolis of Cruz del Negro (Carmona), Setefilla and Osuna[39]. Furthermore, a stone vase from the sanctuary of Caura (Seville) is dated between the eighth and sixth centuries[40], when it is generally accepted that these stone vessels were replaced by similar containers made of clay or vitreous material in contemporaneous contexts[41].

29 Stern, 1973: 149.

30 Moorey, 1980: 48. Quoted by Koldewey, 1914: 72.

31 Stone alabastra are attested in Palestine from the end of the seventh century BC. There is a large number of them until the fourth century BC. Some of these vessels were imports but other specimens were carved in the area as shown by their raw material, which is genuine alabaster from Palestinian subsoil similar in its features to alabaster from Cyprus. Thus, we find that some alabastra found in Atlit, Gezer, Asquelon or Samaria, are carved in Egyptian "alabaster", but similar stone vessels found in Jericho are carved in local "alabaster". See: Ben-Dor, 1945: 93-112; Stern, 1973: 149; Moorey, 1980: 48; Press, 2011: 422-424, nos. 7-11.

32 Moorey, 1980: 48.

33 Woolley, 1938: 141.

34 Torrey, 1920: 25, Fig. 21.

35 Gjerstad *et alii*, 1935, 1937 and 1948; Karageorghis, 1962: 411, 1963: 347, 1964: 63, 1970: 226-227, Fig. 78; Chavanne, 1990: 77-81; Hermary and Mertens, 2014: 384-395. Alabastra vessels are attested in Cyprus from the Archaic Period, with examples from Idalion and Salamina (necropolis of Cellarka). They were rather rare until the Classical Period. From that moment there have been findings all over the island, but particularly large numbers being uncovered at Salamina, where 28 vessels were found in Tumulus 77 (Palma di Cesnola, 1884: 110; Karageorghis, 1973: 197; Chavanne, 1975: no. 20).

36 Zaphiropoulou, 1973: 614.

37 In the Iberian Peninsula, the finding of small "alabaster" vases in different shapes is well attested. They have been found in orientalising Tartessian necropolises, settlements such as Huelva, as well as sanctuaries like Montemolín (Marchena) (Chaves and de la Bandera, 1984: 149, Figs. 5, 18 and 5, 19a) and Caura (San Juan de Coria del Río), the latter probably dedicated to Baal Saphon (Gómez Peña, 2013: 904). The occurrence of these vessels is also attested in tombs and ritual bonfires at Tumulus I of the necropolis of Las Cumbres (El Puerto de Santa Maria, Cadiz). Outside Andalusia, one fragmentary specimen was found in Cancho Ruano (Zalamea de la Serena, Badajoz) (Maluquer, 1983: 112-113) and another one in tomb 5 of Collado y Pinar de Santa Ana (Jumilla, Murcia) (Hernández Carrión, 1999: 188-190, Fig. 4).

38 Torres, 1999: 155; García Martínez, 2001; Gómez Peña, 2013: 900-926.

39 Torres, 1996: 156.

40 Gómez Peña, 2013: 905.

41 Gómez Peña, 2013: 906.

Despite the great quantity of findings mentioned, neither a comprehensive analysis of these stone vases nor a study of the chronological evolution of their different types (or subtypes), has been hitherto carried out. Some suggestions were given by P. Zaphinopoulou[42] in his study of the materials from a "Purification grave at Rhénée related to the tombs of Delos (Greece), where ten vessels of a similar typology to that of the specimens studied here were found". They were discussed by M. J. Chavanne in her study of the vessels found in tombs 110-385 at Amatonthe[43].

The chronological evolution of these alabastra suggested by Zaphinopoulou is based on their comparison with pottery vessels of similar shape. The earliest stone alabastron of this series would be number 29, a vase of heavy appearance, quite similar to Corinthian pottery alabastra. This stone vase is broad at the lower part of its body and presents a narrow mouth, which is not in accordance with its full size. Such shape resembles that of two early pottery alabastra dated around 520 BC, one attributed to Psiax, the other to the Painter of Cerbère.

The next stage is dated to the end of the sixth century or early fifth century BC. It is represented by numbers 28 and 27. Both show an improvement of the design with more harmonious proportions: its shape is now closer to a cylinder, much lighter and less compact than their predecessors. It has a correlation in the Paidikos pottery alabastra Group, dated to the beginning of the fifth century BC.

The vase body and neck-enlarging trend was even more pronounced during the fifth century BC. Zaphinopoulou's vases 25 and 26 are dated to the second and third quarter of the fifth century. The former is closer to some pottery alabastra dated towards 470 BC. The latter, with a slender profile and a clearly shown neck, follows the proportion of classical aesthetics. The closest pottery samples are dated to 460-440 BC, with Zaphinopoulou's number 31 being included in this same period. This stone vase comes from a site to the south of the "Purification grave", where several tombs were uncovered. The oldest offerings dedicated to their burials date back to the sixth century BC.

The following alabastra included in Zaphinopoulou's study, numbers 23-24, are lighter and slender. They seem to show the beginning of the decline of the balance achieved in the Classical period. Both vases could be compared to stone alabastra found in Athens dated to 430 BC or shortly after[44]. This date is confirmed by example number 30, which was uncovered inside one of the sarcophagi found above the "Purification grave", alongside other vessels from the same period.

Zaphinopoulou's number 22, with an extremely stylised body of fairly straight walls, belongs to the later group among the stone vases found in the "Purification grave". Its shape indicates the trend of the alabastra dated to the last quarter of the fifth century BC, which presents a smaller diameter of their bodies according to their height, and less pronounced shoulders.

42 Zaphinopoulou 1973: 633-634, Figs. 18, 19, no. 22-31. The author states that ancient "marble" vessels, a group in which he includes the alabastra type, are generally few in number in Greece. In his view, apart from the collection of the National Museum of Athens, which brings together stone vases from several findings and private collections, the Delian tombs have uncovered the most important group.

43 Chavanne, 1990: 77-81, Pl. XVIII.

44 Schlörb-Vierneisel, 1966: 39.

According to Chavanne[45] in her analyses of the stone vases from the necropolis of Amathonte, it is nearly impossible to suggest a chronology for them based on their own peculiarities. In Chavanne's view, it would be risky to establish a date following Zaphiropoulou proposal, at least for the vases found in Amathonte tombs, because he established the chronology of the Rhénée findings on the basis of the more or less stylised shape of the body of the vessels and their correspondence with pottery types. For Chavanne, Zaphiropoulou's classification is a subjective one that does not fit in with the findings of several Amathonte tombs, where stone vases of different types have also been found.

Chavanne considers that the alabastra from Amathonte were generally carved in local "alabaster" of lesser quality, much softer and rather crumblier than the Egyptian one. The Amathonte stone is of a very pure white colour, sometimes with grey or black shades. There is evidence for quarries in the outskirts of Ayios Iakovos and in Boghaz, related to the area of Famagusta, and near Kalavassos in the south[46] respectively.

Chavanne took into account for her classification[47] the presence or absence of small vertical lumps in the upper part of the body of the stone vases, as well as the shape of their mouth.

Unfortunately, the scarcity of findings in Ibiza and their fragmentary preservation do not allow for the possibility to develop a typology, nor to deepen the understanding of their chronology. However, based on the available data, a broad chronological span can be proposed, ranging from the end of the fifth century BC for No. 2 (10013/69/23) to the first century BC or AD for No. 1 (MAEF 2631), which can be dated according to the chronology suggested by Petrie and Aston.

3 | The Function of the Vessels

The small size and other features of the Ibiza stone vases, such as their long neck, slender body and flat rim, suggest their use as luxurious containers of scented oils. Perhaps the cooling effect of the stones in which they were carved contributed to the preservation of their contents. The use as ointment vessels for vase No. 1 would also be supported by the disc-shaped ring around its neck, probably designed for collecting and reusing drips of its likely valuable content.

The use of this vessel type as scented oil containers has been argued by several authors for the examples found in the Iberian Peninsula[48], Cyprus[49], and other sites. Some scholars have suggested that vases of this type might be intended as containers of different products, amongst them, wine[50].

The scarcity of this type in Ibiza suggests that these vases were not common at least in funerary rituals. They were replaced in such ceremonies by less sophisticated pottery

45 Chavanne, 1990: 77.

46 Karageorghis, 1960: 551, note 3, referenced the study Gass, 1959.

47 Chavanne, 1990: 78-81, Pls. XVIII, XIX, XXIV.

48 Ramos, 1984-1985: 218; Torres, 1999: 155; Belén, 2001: 59.

49 Chavanne, 1990: 78.

50 Gómez Peña, 2013: 909.

or vitreous material vessels, in the shape of flasks and other mushroom mouthed vases. The stone ointment containers, as scarcely attested as they are, might have been used by only a few elite individuals of the island at the time. Such individuals were probably aware of the social-ideological meanings linked to the use of scented oils, well documented in Eastern Mediterranean societies during the first half of the first millennium BC. Another element worth considering in order to explain the scant presence of this type in Ibiza's archaeology is the high cost that these vessels and their contents might have had.

Unfortunately, the lack of any information related to the archaeological context of the island sample prevent for offering any information related to the status, sex, age or other social or cultural parameters linked to the vase owners.

4 | Research Project

In order to gain more knowledge about these stone vases, different studies and analyses were required to confirm the compositional characteristics and origin of their raw material as well as the techniques used to carve the vessels. To achieve these objectives, our Research group "Ibiza Púnica" has launched a pilot project in cooperation with the MAEF and the Polycristalline X-Ray Diffraction laboratory within the Interdepartmental Investigation Service (SIdI)[51], and the Conservation, Restoration and Scientific Studies of Archaeological Heritage laboratory (SECYR) within the Department of Prehistory and Archaeology, both belonging to the Autónoma University of Madrid (UAM). This project, still in a preliminary stage, has three main objectives that will be explained below.

4. 1 | Identification of raw materials

The first objective of the project is to identify the raw material of the four stone vases found in Ibiza described in this paper. Physicochemical analyses have been performed in order to confirm or rule out the Egyptian origin of the rock in which they were carved. This kind of identification has been made for other stone vases of similar appearance, for example, one specimen found in the Phoenician necropolis of Lagos (Málaga). Its analysis found the presence of calcium carbonate[52]. Physicochemical analyses have also been carried out on similar stone vases from Cyprus currently kept at the Metropolitan Museum of Art, New York (Cesnola Collection). The material of the vases in this group has been found to include either calcium carbonate or calcium sulphate. The result of analyses performed in stone vases from Asquelon shows that they were carved in Egyptian "alabaster"[53].

To perform the analyses of the Ibizan sample, two techniques have been used.

51 PXRD analysis was undertaken by Miss Noemí González (SidI, Sciences Faculty, UAM); PXRD interpretation was carried out by Miss Inmaculada Donate (SECYR); mineralogical interpretation was performed by Dr. Eleuterio Baeza and Dr. Rafael Lozano (Geological and Mining Institute of Spain). We thank them for their co-operation.

52 Aubet *et alii*, 1991: 21-24.

53 Press, 2011: 422-424.

Both of them provide supplementary information:

1. Optic microscopy, using a Lumera Infinity 1 high-resolution digital camera, adapted to a Zeiss Stemi 2000 C trinocular microscope that enables a 50x magnification, complete with optical fibre lighting, which can be modified to achieve the best light level. These resources enable a thorough and full analysis of the topography of the surfaces, whilst also providing detailed documentation.

2. Polycrystalline X-Ray Diffraction (PXRD)[54], a technique of structural characterisation for materials with a certain degree of crystallinity (atoms or molecules are arranged in a regular or periodical way). This enables the identification of the crystalline phases in the type of solid sample.

The technique is based on the constructive interferences created whenever an X-ray beam hits a sample with a similar wavelength to that of the interatomic distances of the solid to be analysed. This technique allows for two types of tests:

2a. The sweep theta2/theta can be performed on either powdered or small and flat-surfaced samples. The result is the compositional analysis of the whole sample. This technique has been used on two of our four vessels, No. 1 (MAEF 2631) and No. 2 (MAEF 10013/69/23). For the former, a small powder sample was carefully taken with a scalpel. For the latter, a sherd that had been previously glued as part of an early restoration was used. Once the analyses were carried out the fragment was stuck to the vessel again.

2b.- Grazing incidence analysis was used for the smaller vessel. It provides the composition of the upper layers of the sample. The depth of its scope (several microns) can be adjusted with the angle of incidence to a certain extent. This was the technique used for the two remaining samples, No. 3 (MAEF 5128) and No. 4 (MAEF 791) (fig. 5).

Both types of testing provide a diffractogram (diffracted intensity as a function of the scattering angle), which with the support of the crystallographic databases[55] enables to identify the crystalline compounds present in the samples.

Being homogeneous samples, a single analysis of X-ray diffraction in each one of them has allowed obtaining their crystalline composition with the following results.

1. MAEF 2631 (SECYR 517)

The sample stands out for its low hardness (easily scratched). The microscope shows a spongy texture, even saccharoidal, formed by fine grains that disintegrate easily.

The polycrystalline X-ray diffraction study has unambiguously identified the type of stone of this sample as "gypsum", also currently named calcium sulphate dihydrate ($CaSO_4\ 2H_2O$) (fig. 6), which is characterised by its low hardness (2 on the Mohs scale), being composed of fine-grained aggregates and with a white colour.

54 This technique has been performed with a diffractometer X'Pert PRO of Panalytical, with geometry theta/2theta. This resource is provided with a set of motorised slits, a monochromator Johansson for wavelengths K-alpha, automatic sample changer of fifteen positions, a detector X'Celerator and secondary monochromator and devices for geometry of transmission line (capillaries).

55 ICDD Database PDF-4+ (International Centre for Diffraction Data), via software X'Pert High Score Plus, and free database online: American Mineralogist Crystal Structure Database (The RUFF Project).

SAMPLE	TEST	ANGULAR RANGE (θi-θf)	ANGULAR INCREMENT (△θ)	TIME INTERVAL FOR EACH INCREMENT (τ△θ)	FIXED ANGLE
MAEF 2631 (SECYR 517)	Sweeping theta/2theta	10º-80º	0,0167º	100s	--
MAEF 10013/69/23 (SECYR 518)	Sweeping theta/2theta	10º-80º	0,0167º	100s	--
MAEF 5128 (SECYR 519)	Gracing Incidence	10º-80º	0,04º	2s	2º
MAEF 791 (SECYR 520)	Gracing Incidence	10º-80º	0,04º	2s	2º

Figure 5. Parameters of the X-Ray Diffraction Policristal tests performed.

Natural gypsum is a very common mineral. It can be part of monocrystal sedimentary rock formed by the evaporation of oversaturated aqueous solutions from shallow lakes or seas. Deposits of this material are abundant and they can be found in many areas of the Mediterranean basin. Consequently, specialised comparative analyses are needed to identify the provenance of the rocks.

2. MAEF 10013/69/23 (SECYR 518)

This example presents a rough surface, not polished, although its raw material is formed by fine grains (<1mm), with a higher scratch resistance than that of the first sample.

The PXRD analysis of this fragment shows it is mostly composed of calcite or calcium carbonate ($CaCO_3$). It is therefore a limestone rock, which also contains a small amount of quartz (Silicium oxide, SiO_2) (fig. 7).

Limestone is a very common sedimentary rock distributed across the earth, but may have a different texture from region to region. The analyses carried out do not allow specifying which type of limestone corresponds to the analysed sample. In order to achieve this identification, an examination of a thin section with a petrographic microscope would be required. Similarly, a comparative study of material from different areas would be needed to identify the provenance of its raw material more clearly.

3. MAEF 5128 (SECYR 519)

The analysed sherd shows a very polished outer surface of veined appearance, with veins in different shades, opaque white, yellowish and brown. The presence of fractures has allowed for the examination of the unpolished surface and confirmation that it is a

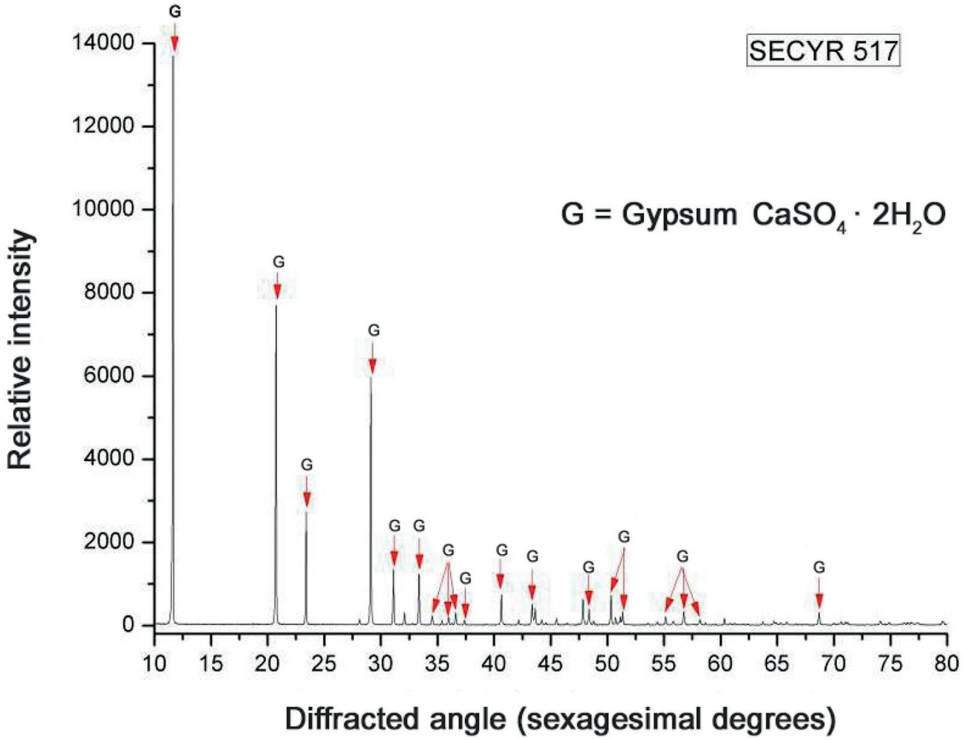

Figure 6. X-Ray sweep powder diffractogram theta/2theta of the stone vessel MAEF 2631.

dense rock formed by fine grains (<1mm). Its hardness is higher than that of the previous samples.

The PXRD analysis shows the rock is composed of calcium carbonate, magnesium and a small amount of quartz (fig. 8). Since the proportion of magnesium does not appear to be abundant[56] it can be classed as limestone. Furthermore, the clarity of the rock suggests that it may be a speleothem[57] (stalactite, stalagmite, flow, etc.) formed in a cave, and therefore it can be called speleothem limestone, sometimes commercially called onyx marble.

This kind of sedimentary rock, which is rather soft and relatively easy to finish, is very common in the entire Mediterranean basin. Therefore, to determine its provenance specialised comparative studies are also required.

56 Grazing incidence X-ray diffraction does not allow to measure with accuracy the amount of magnesium. This makes it difficult to differentiate between a magnesian calcite and a dolomite. In this case, the proportion of magnesium does not appear to be very important, and the material can be identified as a limestone.

57 It must be emphasised that the term speleothem does not refer to a particular material but to its deposition. Spleothems are formed by the precipitation of minerals in solution inside a cave where the high concentration of carbon dioxide alters the ability of water to hold these minerals in solution. Therefore, this material has been extracted from a very specific type of fluvial accident. Perhaps this might be a clue to follow in future studies to determine their origin.

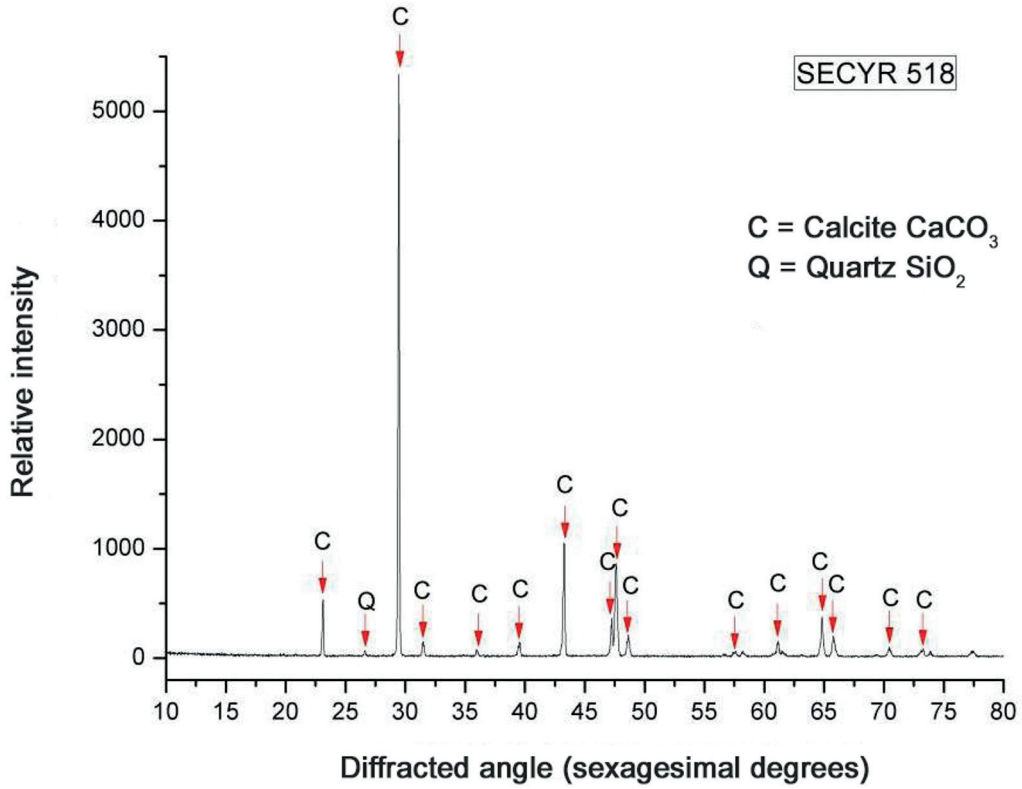

Figure 7. X-Ray diffractogram theta/2theta of sample No. 2, MAEF 10013/69/23.

4. MAEF 791 (SECYR 520)

As in the previous sample, this fragment has a veined structure with shades of white, yellowish and brown clearly seen in its unpolished outer surface. It is also a dense rock formed by fine grains (<1mm).

The PXRD analysis is also similar to sample MAEF 5128. It shows that the rock is mainly composed of calcium carbonate and magnesium (fig. 9). It is, therefore, a speleothem limestone.

Once the mineralogical composition of the four samples has been verified (fig. 10), some data can be offered. Sample No. 1 (MAEF 2631) would be identified with genuine alabaster, the soft material also present in ointment vessels from the Levant and Cyprus. Sample No. 2 (MAEF 10013/69/23) would correspond to the so-called "Egyptian alabaster", harder than the material of sample No. 1; its material 2 has been credited by the scientific literature as the raw material of the Egyptian ointment vessels despite the genuine alabaster being that identified in our sample No. 1. The other two samples, No. 3 and No. 4 (MAEF 5128 and MAEF 791, respectively) are carved in a harder limestone, speleothem limestone. Its appearance is recognisable as that of Egyptian vessels of the Pharaonic period. Further research concerning this specific raw material is needed to obtain conclusive data regarding its origin.

4. 2 | Comparative analyses

Two objectives are aimed:

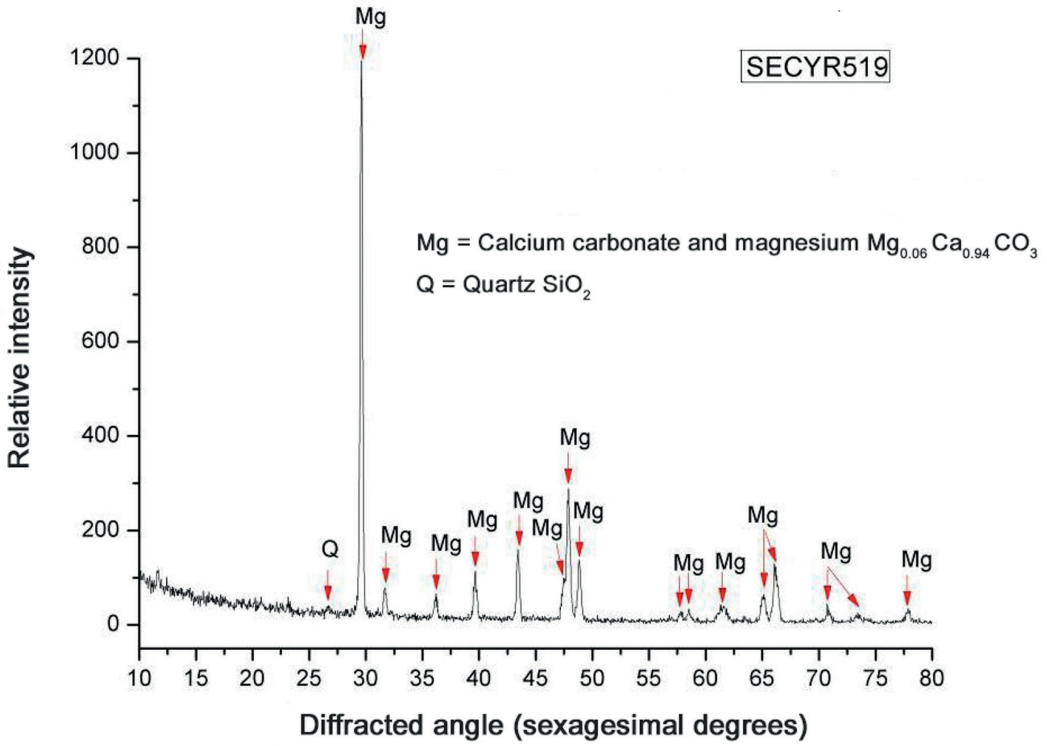

Figure 8. Grazing Incidence diffractogram of sample No. 3, MAEF 5128.

1. Physicochemical analytical comparison between similar specimens found in different areas mainly Egypt, the Levant and Cyprus. At a later stage, it would be advantageous to expand the scope of this study to the Iberian Peninsula and the central Mediterranean area. To achieve these objectives, the following phases have been established: Firstly, it would be useful to know the results of physicochemical analyses of a sample of similar Egyptian vessels, such as those from Memphis kept at University College, London. Secondly, interest would fall on the stone ointment vessels from Levant sites, such as Beit-She'an (Palestine) and Askhelon (Israel). Physicochemical analyses of some specimens have already been carried out. Thirdly, the project would focus on the specimens from Cyprus, gathering the analyses made for the vessels of the Cesnola Collection in the Metropolitan Museum of Art, New York, as well as those related to vessels located in the necropolis of Amathonte.

2. Once in possession of the data, new physicochemical as well as petrographic analyses would be made, with the aim of locating the quarries related to the rocks found in the previous investigation ("Phase a" of our project).

4. 3. Identification of processing techniques

This project also aims to identify the technology involved in the manufacturing of the vessels by detecting and comparing the perceptible traces on their remains. This would allow verifying Ben-Dor sug-

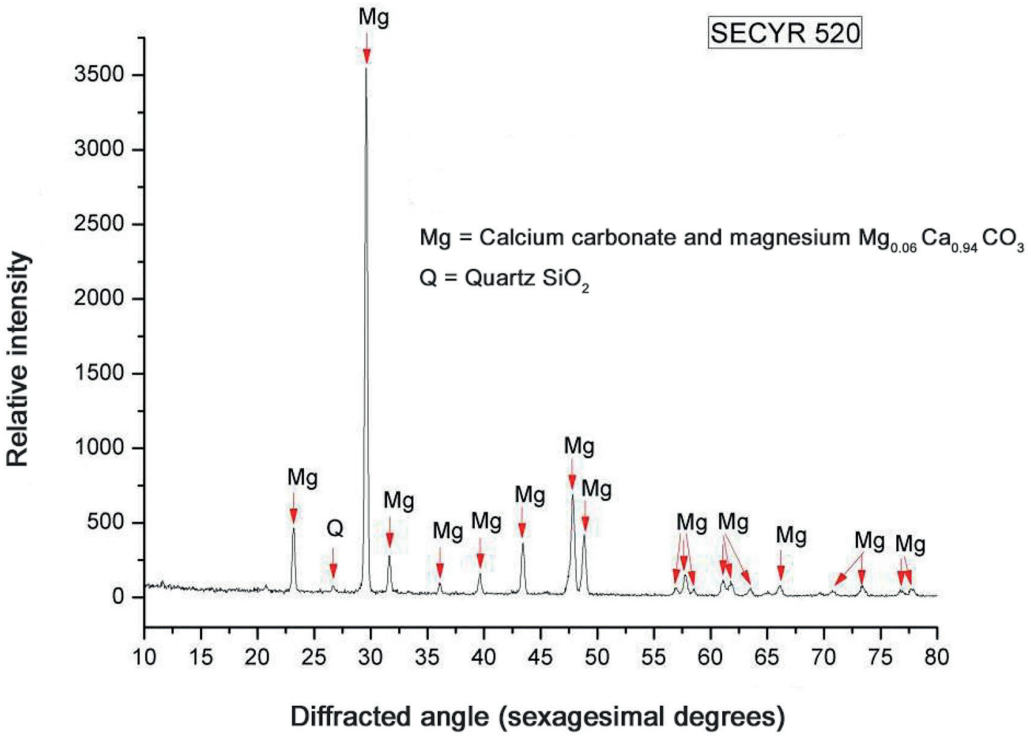

Figure 9. Grazing Incidence diffractogram of sample No. 4, MAEF 791.

gestions[58] related to some differences between the Egyptian and Canaanite emptying techniques. According to Ben-Dor, the former were emptied using circular hollow tubes of different diameter and drills. The result of this process shows stone bits of various shapes and sizes, visible to the eye in Ibiza sample No. 2. In contrast to this technique, the Canaanite vessels show a greater use of chisel, a tool that leaves a different type of marks and scars on the stone surface.

Conclusions

The four specimens indicate the sporadic and occasional presence of this kind of vessels in Ibiza's Phoenician-Punic context. Their scarce presence in the island's contemporary funerary contexts suggests they had little impact in the funerary ritual. Because of their luxurious status, these expensive stone vessels were probably replaced by more affordable pottery containers. Though a small sample, the physicochemical analyses carried on the Ibiza specimens showed the heterogeneity of their raw materials and probably their varied origin. Determining this origin issue is an important objective to be achieved by our project. The results of the proposed research would allow us to assess the relationship between the Ibiza vessels and

58 Ben-Dor, 1945.

SAMPLE	CRISTALLINE COMPOUNDS IDENTIFIED	MATERIAL: ROCKS (Common names)
MAEF 2631 (SECYR 517)	—Gypsum or calcium sulphate dihydrate ($CaSO_4\ 2H_2O$)	Alabaster
MAEF 10013/69/23 (SECYR 518)	—Calcite ($CACO_3$) —Quartz (SiO_2)	Limestone
MAEF 5128 (SECYR 519)	—Calcium carbonate and Magnesium ($Mg_{0,06}Ca_{0,94}CO_3$) —Quartz (SiO_2)	Speleothem limestone
MAEF 791 (SECYR 520)	—Calcium carbonate and Magnesium ($Mg_{0,06}Ca_{0,94}CO_3$) —Quartz (SiO_2)	Speleothem limestone

Figure 10. Mineralogical and petrographical identification from RXD-P analyses.

examples found in other Phoenician-Punic archaeological sites and therefore to map the distribution of these stone vessels in the Mediterranean basin, and perhaps determine their Egyptian, Canaanite or other Mediterranean origin.

Bibliography

Anthes, R.
1928 *Die Felsinschriften von Hatnub*. (*Untersuchungen zur Geschichte und Altertumskunde Ägyptens* 9). Leipzig.

Aston, B.
1994 *Ancient Egyptian Stone Vessels. Material and Forms*. (*SAGA* 5). Heidelberg.

Aston, B.G.; Harrell, J.A.; Shaw, I.
2000 "Stone", in: P.T. Nicholson and I. Shaw (eds.): *Ancient Egyptian Materials and Technology*, Cambridge: 5-77.

Aubet, M.E.
1991 *Sepulturas fenicias en Lagos (Vélez Málaga, Málaga)*. Sevilla.

Badinou, P.
2003 *La laine et le parfum. Épinetra et alabastres. Forme, iconographie et fontion*. Leuven.

Ben-Dor, I.
1945 "Palestinian Alabaster Vases", *Quarterly of the Department of Antiquities in Palestina* XI: 93-112.

Belén, M.
2001 "La Cremación en las Necrópolis Tartésicas", in: R. García and J. Morales (coords.): *Arqueología funeraria: las Necrópolis de Incineración*, Cuenca: 37-78.

von Bissing, F.W.
1904 *Steingefässe. Catalogue général des antiquités égyptiennes du Musée du Caire* 17. Vienna.
1907 *Steingefässe. Einleitung und Indices. Catalogue général des antiquités égyptiennes du Musée du Caire* 34. Vienna.

Bourriau, J.
1984 "Salbgefasse", in: W. Helk *et alii*: *Lexikon der Ägyptologie*, Vol. 5, Wiesbaden: 362-366.

Chavanne, M.J.
1975 *Salamine de Chypre, VI. Les petits objets*. Paris.
1990 *La nécropole d"Amathonte. Tombes 110-385. IV. Les petits objets*. (*Études Chypriotes* 12). Nicosia.

Chaves, F.; de la Bandera, M.L.
1984 "Avance sobre el yacimiento arqueológico de Montemolín (Marchena, Sevilla)", in: T.F.C, Blagg, R.F. Jones and S.J. Keay (eds.): *Papers in Iberian Archaeology,* (*BAR International Series* 193), Oxford: 141-157.

Erman, A.; Grapow, H.
1926-1931 Wörterbuch der Agyptischen Sprache. Berlin, Leipzig.

García Martínez, M.A.
2001 *Documentos prerromanos de tipo egipcio de la vertiente atlántica hispano-mauritana*. Montpellier.

Gass, I.G.
1959 "Notes on the occurrence of gypsum in Cyprus", *Annual Report of the Geological Survey Department for the Year 1958*: 21-23.

Gjerstad, E.
1935 *The Swedish Cyprus Expedition*, Vol. II. Stockholm.
1948 *The Swedish Cyprus Expedition*. Vol. IV: 2. Stockholm.

Gjerstad, E.; Westholm, A.
1937 *Swedish Cyprus Expedition: Finds and results of the excavations in Cyprus (1927-1931)*, Vol. III. Delhi.

Gómez Bellard, C.
1990 *La colonización fenicia de la isla de Ibiza*. (*Excavaciones Arqueológicas en España* 157). Madrid.

Gómez Peña, A.
2013 "Algunas notas sobre los alabastrinos fenicio-púnicos de la Península Ibérica", in: L. Girón Aguiozar, M. Lazarich González and M.C. Lopez (coords.): *Actas del I Congreso Internacional sobre Estudios Cerámicos. Homenaje a la Dra. Mercedes Vegas*, Cádiz: 900-926.

Harrell, J.A.
1990 "Misuse of the term "alabaster" in Egyptology", *Göttinger Miszellen* 119: 37-42.

Hermary, A.; Mertens, J.R.
2014 *The Cesnola Collection of Cypriot Art: Stone Sculpture*. New York.

Hernández Carrión, E.
1999 "Excavaciones en el collado y pinar de Santa Ana (Jumilla, Murcia). Campaña de 1993", *Memorias de Arqueología* 8: 183-193.

Karageorghis, V.
1960 "Fouilles de Kition 1959", *Bulletin de Correspondance Hellénique* 84, 2: 504-588.
1962 "Chronique des fouilles et découvertes archéologiques à Chipre en 1961", *Bulletin de Correspondance Hellénique* 86, 1: 327-414.
1963 "Chronique des fouilles et découvertes archéologiques à Chipre en 1962", *Bulletin de Correspondance Hellénique* 87, 1: 325-387.
1964 "Excavations in the Necropolis of Idalion", *Report of the Department of Antiquities, Cyprus*: 28-84.
1970 "Chronique des fouilles et découvertes archéologiques à Chipre en 1969", *Bulletin de Correspondance Hellénique* 94, 1: 191-300.
1973 *Excavations in the Necropolis of Salamis* III. Nicosia.

Koldewey, R.
1914 *The excavations at Babylon*. London.

Lilyquist, C.
1995 *Egyptian Stone Vessels. Khian through Tuthmosis IV.* New York.

López-Grande, M.J.; Velázquez, F.; Fernández, J.H.; Mezquida, A.
2014 *Amuletos de iconografía egipcia procedentes de Ibiza. (Treballs del Museu Arqueològic d"Eivissa i Formentera* 69). Eivissa.

Maluquer, J.
1983 *El santuario protohistórico de Zalamea de la Serena, Badajoz II, 1981-1982*. Barcelona.

Molinero Polo, M.A.
1995 "Los recipientes de piedra", in: M.J. López-Grande, F. Quesada and M.A. Molinero: *Excavaciones en Ehnasya el-Medina (Heracleópolis Magna)*, Vol. II., Madrid: 205-277.

Moorey, P.R.S.
1980 *Cementeries of the First Millennium B.C. at Deve Hüyük, near Carchemish*. (*BAR International Series* 87). Oxford.

Palma di Cesnola, A.
1884 (2nd ed.) *Salaminia*. London.

Petrie, W.M.F.
1937 (1977, 2nd edition) *The Funeral Furniture of Egypt. Stone and Metal Vases.* Warminster.

Press, M.D.
2011 "Faience and Alabaster Vessels", in: L.E. Stager, D.M. Master and J.D. Schoen: *Ashkelon 3: The Seventh Century BC. Final Reports of the Leon Levy Expedition to Ashkelon 3*, Winona Lake, Indiana: 1-9.

Ramos, M.L.
1984-1985 "El culto funerario en el mundo fenicio púnico peninsular, resumen de las ceremonias fúnebres realizadas en sus necrópolis", *Cuadernos de Prehistoria y Arqueología de la Universidad Autónoma de Madrid* 11-12: 217-224.

Schlörb-Vierneisel, B.
1966 "Eridanos-Nekropole I. Gräber und Opferstellen hS1-204", *Mitteilungen des Deutschen Archäologischen Instituts. Athenische Abteilung* 81: 4-111.

Stern, E.
1982 *The Material Culture of the Land of the Bible in the Persian Period*. Warminster.

Teofrasto
De Lapidus. Introduction, Greek text, English translation and commentary by E.R. Caley and J.F.C. Richards, 1956. Columbus, Ohio.

Torres, M.
1996 "La cronología de los túmulos A y B de Setefilla. El origen del rito de la cremación en la cultura tartésica", *Complutum* 7: 147-162.
1999 *Sociedad y mundo funerario en Tartessos*. (*Bibliotheca Archaeologica Hispana* 3). Madrid.

Torrey, C.
1920 "A Phoenician Necropolis at Sidon", *Annual of the American Schools of Oriental Research* 1: 1-28.

Sethe, K.; Helck, W.
1906-1958 *Urkunden der 18 Dynastie.* 4 Vols. Leipzig, Berlin.

Vives, A.
1917 *Estudio de Arqueología Cartaginesa. La necrópolis de Ibiza*. Madrid.

Woolley, C.I.
1938 "The Excavations at Al Mina, Sueidia I-II", *Journal of Hellenic Studies* 58: 1-30, 133-170.

Zaphiropoulou, P.
1973 *Bulletin de Correspondance Hellénique. Supplément* I. Paris.

* This investigation is being carried out within the scope of the "Ibiza Púnica" Research Group (F073-UAM), with the direct involvement of Francisca Velázquez Brieva, Ana Mezquida, Jordi H. Fernández and Benjamí Costa.

Trabajos de Egiptología
Papers on Ancient Egypt

Trabajos de Egiptología

Papers on Ancient Egypt

Número 7
2016

Trabajos de Egiptología está producida por
Isfet. Egiptología e Historia
con la colaboración del **Centro de Estudios Africanos**
de la Universidad de La Laguna

C/ Blanco 1, 2º
38400 Puerto de la Cruz
Tenerife-Islas Canarias
España

Diseño de arte y maquetación
Marian Montesdeoca y Ulises Ramos
info@marianmontesdeoca.com

Imprime: Gráfica Los Majuelos

Depósito Legal: TF 935-2015
ISSN: 1695-4750

Contents