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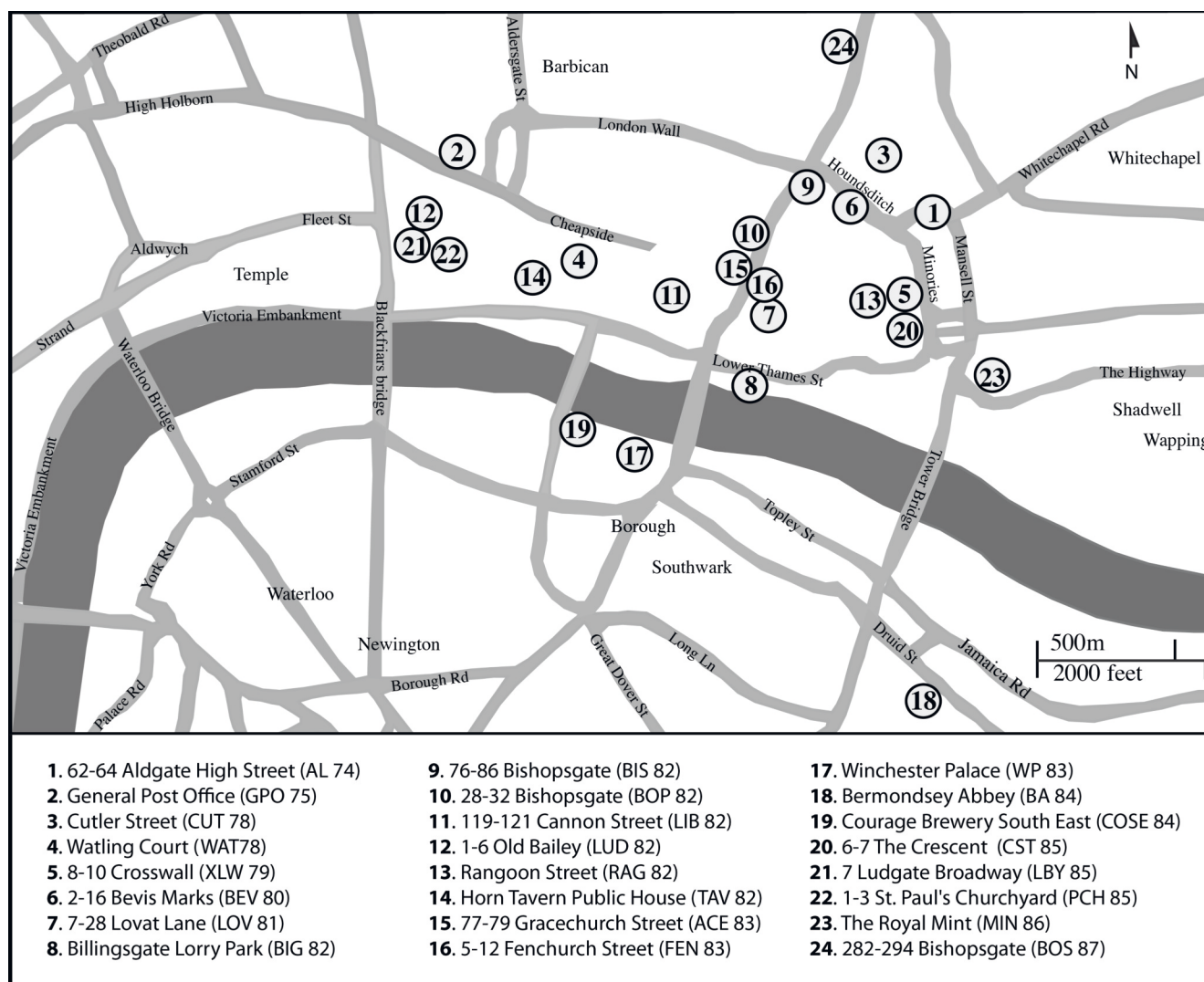


Fig. 1: location of sites in London where pharmaceutical glass was found

Pharmaceutical glass in post-medieval London: a proposed typology

Karime Castillo Cardenas

Apothecary glass containers evolved through time into a variety of unique shapes for specific uses. They developed into two distinct forms: containers used to store medicaments in the pharmacy, later known as furniture bottles; and small containers used to dispense medicines to customers, which became known as phials.¹ As archaeological artefacts, phials were defined by Willmott as small vessels with insufficient capacity to have held comestibles.²

Although many publications address post-medieval glass bottles,³ they are usually concerned with bottles for

drinks such as wine, ales and mineral water; in contrast, little has been written on pharmaceutical glass vessels.⁴ Most of the literature related to post-medieval glass bottles available today has been written by collectors,⁵ rather than archaeologists. Archaeological reports mention the presence of these kind of glass vessels in their assemblages but rarely deal with them in detail. Noël Hume explains that the fragility of glass phials hampers their survival as complete vessels, which might contribute to the limited interest these vessels have received.⁶ Though some authors have roughly dated and

grouped phials and pharmaceutical bottles into broad categories based on their shape,⁷ a systematic typology has not yet been proposed.

This article proposes a typology of post-medieval glass phials from the 17th, 18th and 19th centuries. The material studied came from archaeological excavations performed by the former Department of Urban Archaeology of the Museum of London in twenty-four sites in the City of London and Southwark areas (Fig. 1). It is kept in the London Archaeological Archive and Research Centre (LAARC). Most of the material was found as part

of the fill of cess-pits, domestic refuse pits, drains, wells and cellars, which allowed the preservation of the phials in a complete or nearly complete state. The fills included other material such as ceramics, clay pipes, and glass bottles which helped to date the context. Although these features may have been reused many times, a final backfill occurred during a specific period of time after which the feature was cancelled and closed, giving greater precision to the dating periods of the artefacts. The dating information was obtained from excavation reports, publications, and spot-dating cards kept at LAARC.

Previous studies

One of the first researchers who looked into how phials behave in time was Thorpe. He did not create a classification, but he described three stages in their development based on the changes in their shape.⁸ He was followed by Noël Hume’s interest in this “neglected glass”. Although his aim was not to create a typology, he offered general descriptions of different kinds of apothecary vessels from archaeological excavations, from the 17th to the early 18th centuries.⁹

In the 1970s, Mathews completed a broad research in pharmaceutical

equipment, dedicating a section to pharmaceutical glass. He described certain particularities in the shape and size of phials from the 16th to the 19th centuries.¹⁰ Later, Crellin and Scott performed a study into pharmaceutical glass that concentrated mostly on display vessels. They mention some 19th-century dispensary containers, but their study did not include phials.¹¹

Goeder studied the phials found at Temple Balsall in Warwickshire, dated between the late 17th and the first half of the 18th century. She divided them into three chronological groups based on the kind of metal: Group 1, the oldest, corresponds to thin aquamarine glass phials; Group 2 comprises phials made with a thicker olive green metal; and Group 3 is formed by colourless glass phials made with flint glass.¹²

More recently, Willmott offered a simpler classification, grouping bottles, flasks and phials together, and then distinguishing between two types of phials: globular, from the second half of the 17th century; and cylindrical, covering the second half of the 17th and the 18th century, and later made of lead glass.¹³

A typology of post-medieval glass phials

I propose a typology of glass phials that

intends to include a wider range of this kind of glass container. It should not be considered conclusive, as it has certain limitations. Firstly, it is based on a limited sample, with all the examples coming from contexts in London, so it is possible that the typology may be particular to this city, and the appearance of the different types of pharmaceutical bottles could occur at dissimilar times in other regions. Secondly, although an effort was made to include as many different types of phials as possible, some will not be represented; this is particularly true for the late 18th and 19th centuries, when the variability in shapes greatly increases. Despite these limitations, it is hoped that the proposed typology will contribute to the identification, dating and understanding of this particular kind of glass.

The main feature that distinguishes the types from one another is the shape of the body, but the shape of the section is also important. Phial types include conical, tubular, cylindrical and globular, all of which are circular in section, and square-sectioned phials. Apothecary bottles were also considered. These are pharmaceutical vessels that resemble small “onion” wine bottles. A simple statistical analysis was done in order to test the

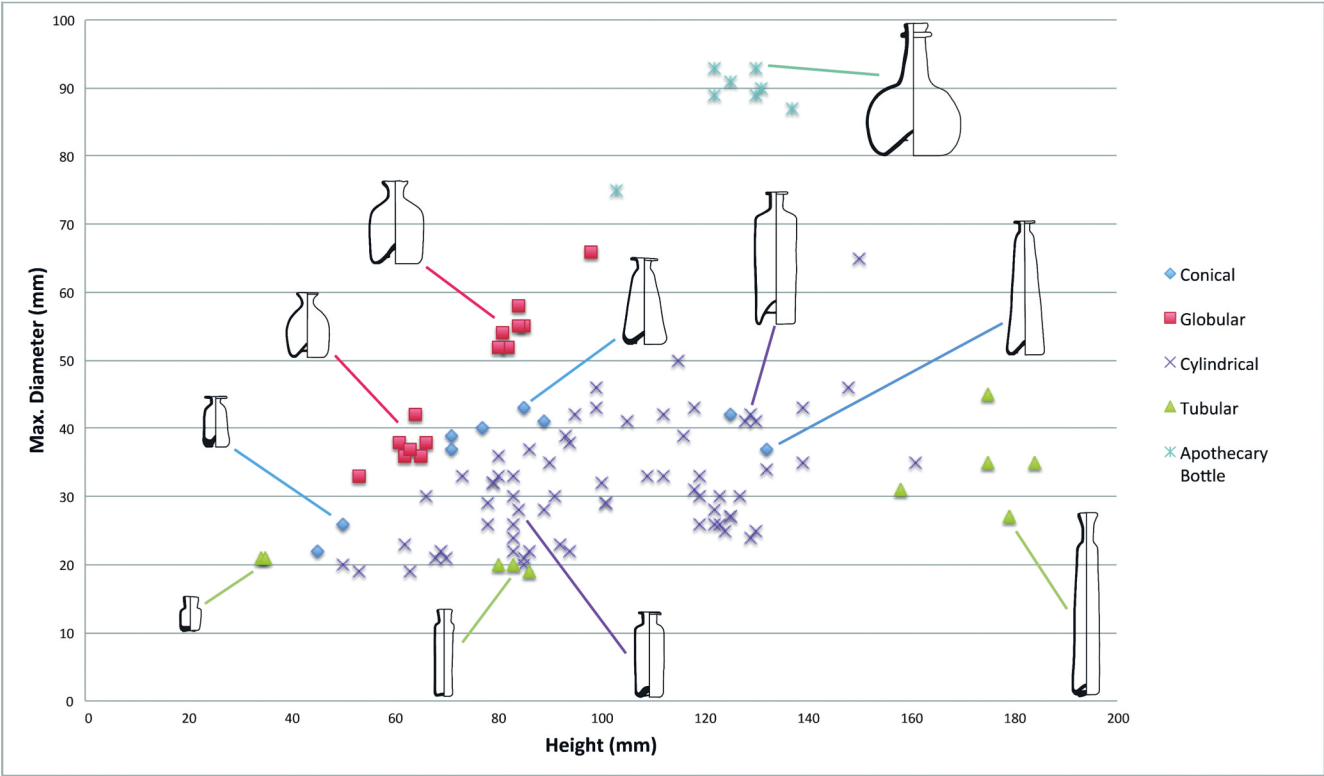


Fig. 2: scatter plot showing the different groups of phials based on their height and maximum diameter, and a representative example of each group

validity of the types. The two variables that most clearly showed the differences when plotted against each other were height and maximum diameter (Fig. 2). The total sample comprised 106 phials and nine apothecary bottles.

Globular phials (Fig. 3, Table 1)
Though many globular phials have

cylindrical bodies, they form tight size groups. These follow a particular distribution that separates them from the cylindrical phials, and shows how they maintained the same basic shape in spite of coming in different sizes. Noël Hume considers globular phials as a 17th-century type,¹⁴ while Willmott places them in the second half

of the 17th century.¹⁵ However, they appear to occupy a longer time span. While the collection studied included examples from 17th-century contexts, examples from the 18th century were more abundant, and there is one mould-made and embossed phial for a patent medicine that was in use until c. 1870.¹⁶ This may indicate that the

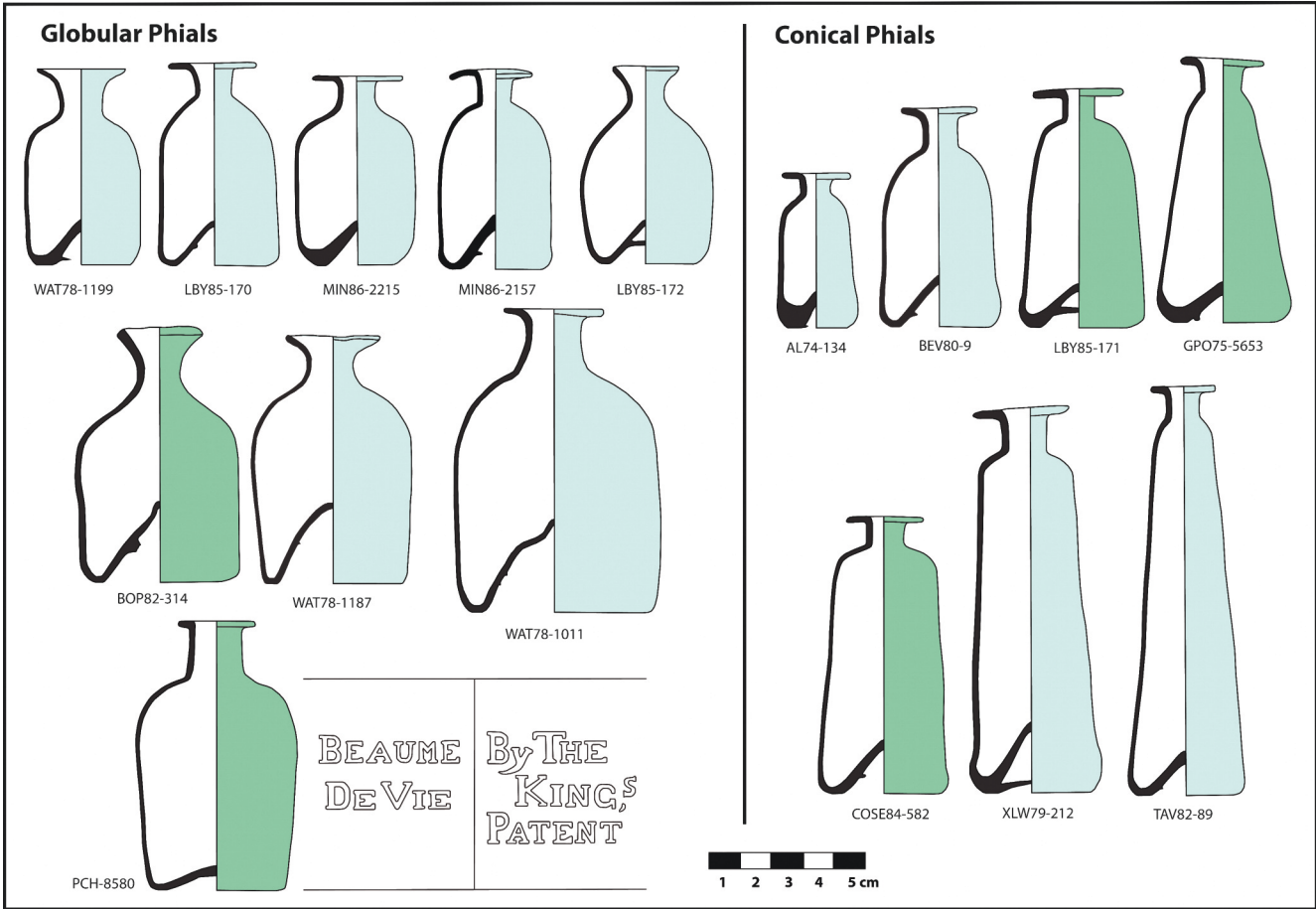


Fig. 3: examples of globular and conical phials (site code and accession number shown on each example; the colour represents the hue of the metal)

Attribute	Globular phials (15 examples)		Conical phials (9 examples)	
	Predominant characteristics	Less common variations	Predominant characteristics	Less common variations
Body	cylindrical, wide and squat	globular	tapered and elongated	
Rim	everted (rim angle: 135°-170°)	slightly everted (100°-135°); horizontal (180°); over-everted (beyond 180°)	horizontal	everted; over-everted
Lip	plain		plain	
Neck	concave	straight; tapered (upwards or downwards)	short and straight	slightly tapering and flaring upwards
Shoulder	convex	sloping	narrow or wide sloping neck; smaller in diameter than the base	
Base	kick-up base with a very high pointy kick and a pontil mark	shallow kick; no pontil mark (mould-blown)	high pointy kick with a pontil mark	shallow kick; no pontil mark (mould-blown)
Height	small (50–66 mm); large (80–100 mm)		medium (70–80 mm)	small (40–50 mm); large (120–132 mm)
Colour	aquamarine	green	aquamarine	green
Manufacturing technique	free-blown	mould-blown	free-blown	

Table 1: globular and conical phials

shape was still familiar as a pharmaceutical container long after the 17th century. Its popularity does seem to decrease from the 18th century onwards. The rim angle might help to identify 17th century examples; according to Noël Hume,¹⁷ slightly everted rims are a feature common to most bottles dated prior to 1650. The examples in this collection support this affirmation. In terms of colour and size,

there seems to be no particular preference at different times.

Conical phials (Fig. 3, Table 1) Statistically, this type is one of the most ambiguous because some examples overlap with the cylindrical phials, while others are more subtle in shape and could fit in either group. In this case, an intuitive approach is more effective, since the conical shape of the

body is quite evident and the group does show a particular distribution. Some authors consider conical or “steeple” phials as an early version of the cylindrical phials, placing them as 17th- or early-18th-century artefacts.¹⁸ If this was the case, one would expect this type to appear mostly in 17th-century contexts, gradually losing the taper, until being completely supplanted by cylindrical phials.

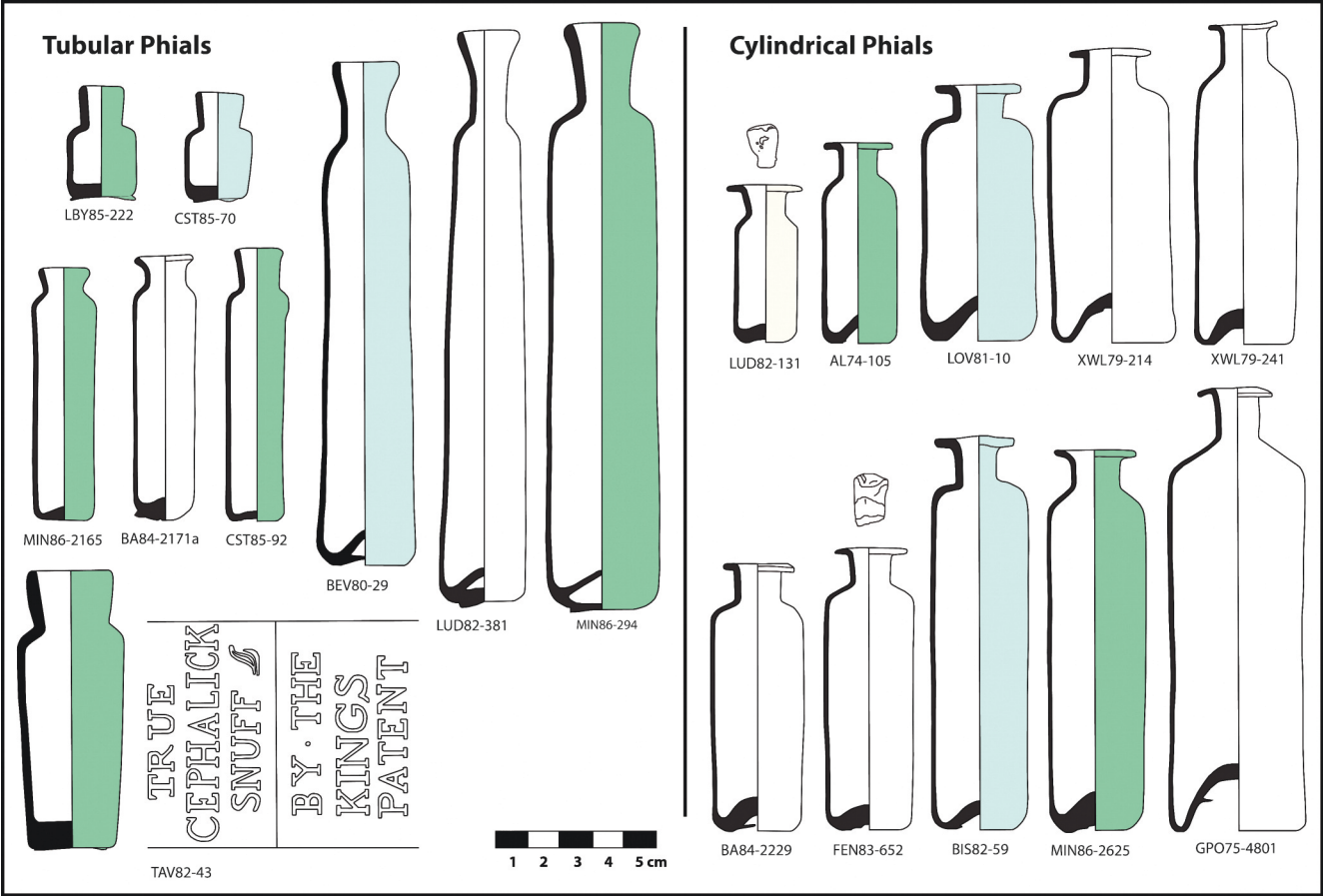


Fig. 4: examples of tubular and cylindrical phials.

Attribute	Tubular phials (11 examples)		Cylindrical phials (66 examples)	
	Predominant characteristics	Less common variations	Predominant characteristics	Less common variations
Body	long and cylindrical	slightly tapered	cylindrical tending to be long and narrow	
Rim	slightly everted		horizontal	everted; over-everted
Lip	plain	sheared	plain	
Neck	very short or no neck		straight and short	concave; slightly convex; tapered flaring upwards
Shoulder	sloping and narrow		sloping; narrow	horizontal; broad
Base	small and rounded kick-up base; Shallow kick-up base	flat base	high or shallow kick-up base either pointy or rounded	flat
Height	small (80–90 mm); large (158–180 mm)	miniature (35 mm)	small (80–90 mm); large (120–130 mm)	
Colour	green	aquamarine; colourless	colourless (can have a yellow tint)	green; aquamarine
Manufacturing technique	free-blown	mould-blown	free-blown	mould-blown

Table 2: tubular and cylindrical phials

However, many conical phials in the collection correspond to 18th-century contexts, suggesting that the shape was still produced even when cylindrical phials already predominated. Conical phials seem to become longer with time. The small specimens in the sample come from mid-18th-century contexts; the medium-sized include late-17th- and 18th-century examples; while large conical phials correspond to

the late 18th and 19th centuries. There seems to be no colour preference that changes through time.

Tubular phials (Fig. 4, Table 2)

Originally, these phials were grouped either with the cylindrical or with the conical phials. However, when plotted in terms of height and maximum diameter, they were outliers in both groups; and when these outliers were

placed together, they formed a more cohesive group between themselves. They were thus defined as a type of their own.

Tubular phials appear to have originated as large containers, with smaller versions coming later in time. Large tubular phials are the only size present during the mid- and late 17th century, continuing into the 18th and maybe mid-19th centuries. The small-

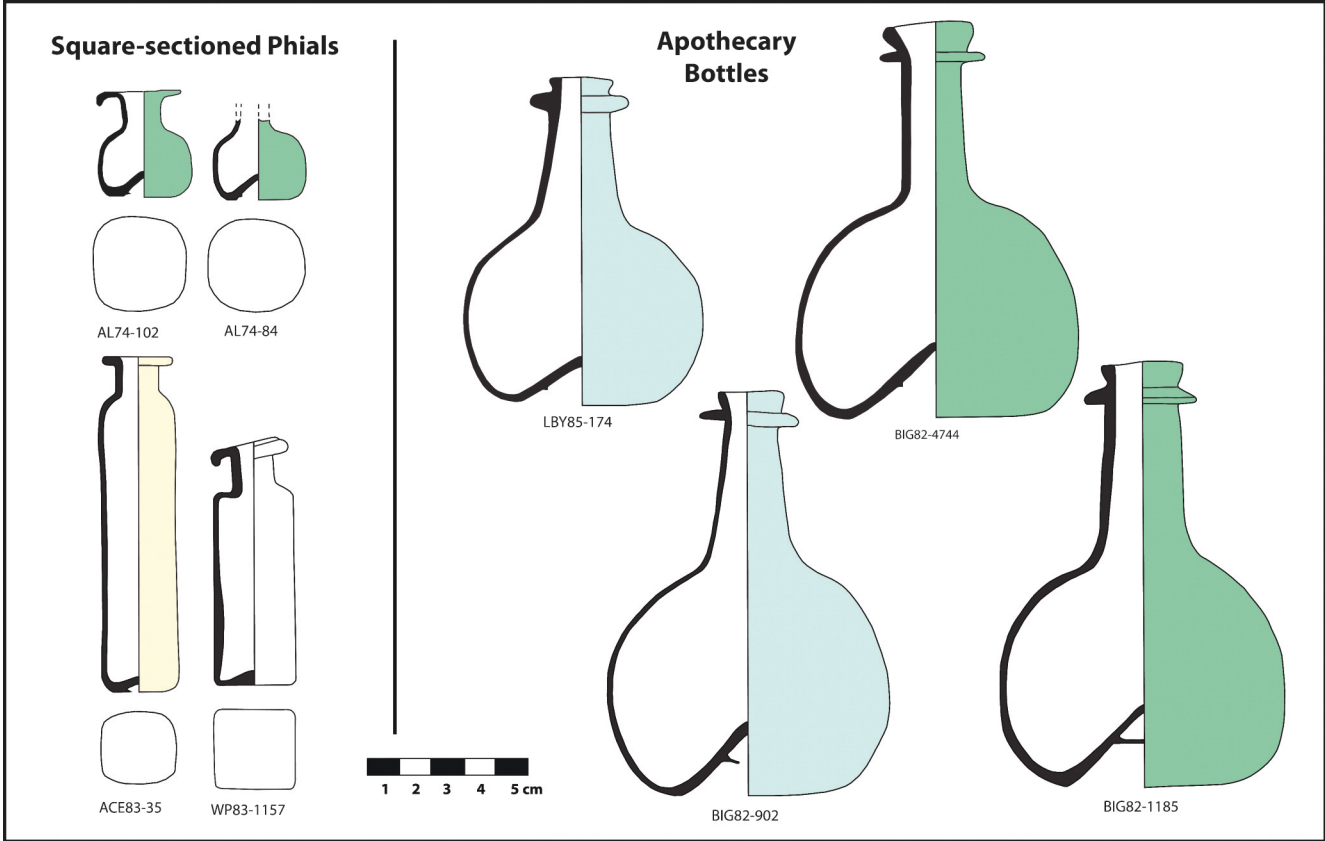


Fig. 5: examples of square-sectioned phials and apothecary bottles

Attribute	Square-sectioned phials (4 examples)		Apothecary bottles (9 examples)	
	Predominant characteristics	Less common variations	Predominant characteristics	Less common variations
Body	square in section with rounded corners. It can be squat with dimples on the sides, or rectangular in profile		round and globular (similar to “onion” wine bottles, but much smaller in size)	
Rim	horizontal		string rim	
Lip	plain	applied	plain	
Neck	short and straight		long and tubular with a tendency to flare downwards	
Shoulder	sloping	slightly sloping	convex	
Base	shallow pushed-up base with pontil mark	flat without pontil mark	high and pointy pushed-up base with a pontil mark	
Height	miniature or dimpled (around 33 mm high); large: (78–115 mm)		large (122–137 mm)	small (103 mm)
Colour	green; colourless (can have a yellow tint)		pale green; aquamarine	
Manufacturing technique	free-blown	mould-blown	free-blown	

Table 3: square-sectioned phials and apothecary bottles

sized examples appear in late-18th- and 19th-century contexts, while the miniature version is seen between mid-18th and mid-19th centuries.

Cylindrical phials (Fig. 4, Table 2)

Cylindrical phials have a very scattered distribution that speaks of the variability shown by this category. Most authors agree that this type emerged in the second half of the 17th century.¹⁹ The earliest examples in the sample come from late-17th-century contexts. This type became widely popular and began to predominate during the 18th century. By the 19th century it was fully established as the dominant type of phial. Cylindrical phials seem to become longer and slimmer with time. In the 17th and 18th centuries they tend to be wider and shorter, becoming longer and slimmer in the 19th century. The push-up seems to become rounder and shallower through the 18th century, until flat bases appear in the 19th century. Earlier phials were made in green and aquamarine glass. Around the mid-18th century colourless cylindrical phials begin to appear, becoming predominant during the 19th century.

Square-sectioned phials (Fig. 5, Table 3)

Given the scarcity of examples in the sample, a wider variety should be expected. They were not included in the statistical analysis. Miniature dimpled phials come from early-18th-century contexts; while those that are rectangular in profile correspond to the early 19th century.

Apothecary bottles (Fig. 5, Table 3)

Apothecary bottles form a clearly independent group, with only the smaller example standing out. They are easily distinguished from globular phials by their long tubular necks and string rims.

These bottles seem to appear in the late 17th century and to be common during the early 18th century, following a similar chronology to the onion bottles that they resemble in shape, which are found between 1680 and 1730.²⁰ There seems to be no chronological preference in colour.

Discussion

Small containers for medicines and drugs existed from very early times, but it seems that the more specialised phial did not develop until the second half of the 17th century.²¹ None of the examples analysed in this study came from earlier contexts, and while it cannot be considered an exhaustive sample, the material studied supports this affirmation.

The bottles produced during the 17th century were completely hand-made, and their size and shape were determined by the ability of the glass blower, resulting in variations. The thickness of the glass and the kick-up in the base were similarly unregulated.²² These containers were probably meant to be expendable,²³ so a certain degree of variability and unevenness in shape and a rough pontil mark on the kick-up would have been unimportant. However, a preference for particular sizes seems to have existed. When the statistical analysis was performed, the phial types tended to form size groups,

probably meaning that apothecaries were requesting containers of specific sizes according to the doses prescribed.

At the beginning of this study, an increasing standardisation in glass phials throughout time had been expected. The study revealed that from the 18th century onwards, the cylindrical phial clearly became the dominant form of dispensing bottle, and this type also showed a tendency to become longer and slimmer. This could be related to storage efficiency, as more phials could be fitted into available space. A greater degree of standardisation in terms of capacity was also expected, particularly during the 19th century, when domestic medicine chests were popular.²⁴ This was not the case, since bottles of the same size groups did not necessarily had similar capacities. This discrepancy could be due to the limitations of the sample, or to the fact that medicine chests were luxury items and many of them did not end up in the archaeological record; instead, they became collectibles. Hudson points out that phials were not discarded when emptied, but they would be re-filled at the pharmacy and sometimes re-labeled.²⁵ Another possibility is related to the changes in the measuring systems that occurred in pharmaceutical history.

Before the metric system was established by law in the pharmaceutical industry, other measuring systems were used that could vary in different regions; some of them were the apothecaries, troy, pennyweight, and the Imperial measurement systems.²⁶ Metrication did not become generalised until 1971,

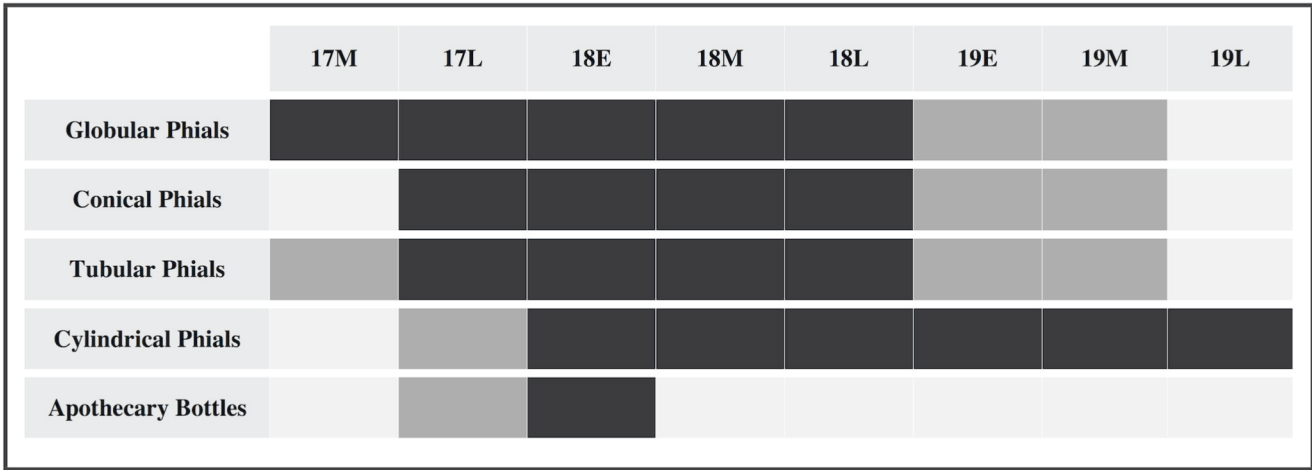


Fig. 6: distribution of phials and apothecary bottles in time (black indicates a greater abundance)

although the inconveniences of the older systems had been expressed by pharmacists and doctors since 1826. It was not until 1952 that the Association of the British Pharmaceutical Industry decided that all medicines should be sold by the metric system, and approached the Glass Manufacturers Federation requesting the standardisation of bottles suitable for metric quantities.²⁷ Since different systems appear to have been in use at the same time, and these systems were subject to adjustments,²⁸ it is possible that the expected standardisation in capacity will not become evident in medicine containers until the mid-20th century.

Conclusion

This paper proposed a typology of glass phials. It shows that the temporal distribution of glass phials extends into a broader period and may be more complex than initially thought (Fig. 6). While it is true that certain types were more popular in earlier centuries, such as the globular, tubular and conical phials, these shapes did not completely disappear when cylindrical phials became predominant, and these types might have continued to be used and produced for longer than previously assumed. The broader temporal distribution shown by most of the phial types might be related to the fact that both the apothecaries and the public associated these container forms with medical remedies, and this familiarity

allowed the older shapes to prevail. As Cowgill says, makers and users of artefacts may feel that variation in some characteristics is unimportant, but in the case of properties they consider significant, users will be interested in maintaining standards, avoiding objects that differ too much from a shared idea of what the object should be like.²⁹ Though an effort was made to include a diversity of examples from as many sites as possible, and from contexts that had the most precise dates available, a more detailed study into each type is needed to obtain a more accurate chronology. The sample used in this study contained a great number of cylindrical phials, but a larger collection with more specimens of other types would allow the confirmation or refinement of the groups identified in this study.

A much greater variety of types is also expected. The 18th century was marked by the rise of chemical and pharmaceutical laboratories on a commercial scale, and a greater variety in bottle shapes was ordered and used.³⁰ The emergence of proprietary and patent medicines in the mid-18th century encouraged the appearance of an even greater variety.³¹ Although not considered here, other pharmaceutical containers were identified, including apothecary flasks, and different kinds of mould-blown pharmaceutical containers such as rectangular, hexagonal-sectioned, and octagonal-sectioned bottles. A detailed study into these and other potential types is

needed. A further study into later containers would also allow the testing of the hypothesis that capacity standardisation might not be evident before the mid-20th century.

The research potential offered by glass phials is ample and varied. These glass containers can be studied in relation to subjects as diverse as social differentiation, the development of mass-production, and the evolution of pharmacy in terms of the medicines or preparations they contained. In the last subject, a successful analysis has already been performed by Gibson and Evans.³² Hopefully, these research possibilities mean that in the future, this material will not be considered neglected any more.

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