Late Roman Glass at the University of Pennsylvania Museum: A Photo Essay

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The Roman glassmaking industry took root in the late 1st century BC and became established through the 2nd century AD. Business-minded Romans adopted the earlier Hellenistic technology of casting and the novel eastern Mediterranean technologies of free-blowing and mold-blowing to fully develop the commercial potential of glass. The growth of the industry was facilitated by the far-reaching Roman trade network which played a vital role in moving not only glassware itself but also glass craftsmen and their ideas the length and breadth of the Empire.

The same forces guided the evolution of Roman glassmaking during the subsequent two centuries, but with some important qualifications. Some broad-impact changes in glassware decoration can still be attributed to innovations that were “traded out” of the eastern Mediterranean and adopted by the major western workshops (Figs. 1, 2). However, as the provincial cities of the western Empire grew and local leaders usurped more political power, regional productivity and trade flourished and the glassmaking industry tended to fragment. In the first half of the 1st century AD there are many examples of glass vessel types with distributions that were Empire-wide, sometimes far beyond. By the end of that same century, however, there are new types made in the Rhineland or north-central France that are simply not found at sites south of the Alps (Fig. 3) (Price 1978).

In subsequent decades, a host of smaller independent glassmaking workshops sprang up, each thriving well enough by servicing local domestic needs with utilitarian tableware and storage vessels. The hub of the local market would have been either a small military settlement or a self-sufficient villa, the likes of which proliferated in the agricultural landscape of the western Empire in the early 3rd century AD (Branigan and Miles 1989; King 1990). When, in the wake of Alexander Severus’s death in AD 235, the Roman world fell into a 50-year period of political confusion and fiscally crippling wars, glassmaking shed some of its industrialized character. Thereafter, native stylistic traditions re-emerged, region to region.

The story of change for the eastern Mediterranean provinces over this same period is rather different. The economic strength of the Hellenistic world in Egypt and Asia Minor, and along the Syrian-Judean coastline, had provided for the stable growth of crafts such as glassmaking in the 2nd and 1st centuries BC. These provinces did not experience the intensity of the Augustan industrial revolution that transformed the landscape of Gaul and Spain. So the kind of smaller workshop that developed only from the early 2nd century AD onwards in the western Empire was already firmly established in the eastern Empire by that time. These workshops, like their western counterparts, drew their trade from nearby Roman military settlements and native market towns.

Events of the last decades of the 3rd century AD did, however, put at risk the stability of every craft and industry throughout the Empire. Reports of Germanic raiders appearing deep in the heartland of Gaul and of streams of refugees pouring into the cities in search of protection set off a sense of panic and doom, even though the lives of very few Romans were actually touched by such events. Meanwhile, measures taken to combat economic inflation by coin debasement backfired and left many a craft and industry—glassmaking included—struggling to define realistic market prices for their products amid uncertainty, but usually escalating costs for raw materials (Howgego 1995).

Emperor Valerian’s capture by the Sasanians of Shapur I at Edessa in AD 260 raised the specter of inva-
FIG. 2. This moldblown flask is in the form of a monkey seated on a wicker chair and holding a pipe. It was found in a burial beneath the Magnesiastrasse of Cologne, and dates to the first half of the 4th century AD. Though almost certainly made somewhere in the Rhinelander, the image has been traced to Egypt and to Alexandria caricatures of Mercury, the Roman god of merchants. Böckstein-Germersheim Museum, Cologne, inv. 855, Gla 292. Drawing by Konstanze Schmidt after Harden 1987, entry 94. H. 16.7 cm

FIG. 3. GLOBULAR JARS, such as this one with its characteristic folded tubular collar, have been found in many later 1st-early 2nd century AD contexts in Britain, central and northern France, and the Netherlands, but rarely elsewhere. Courtesy of the Rijksmuseum, Amsterdam. H. 14.9 cm

FIG. 4. FLASK WITH THICK PINCHED-TOOTH BLUE THREADS applied down each side of the amber body, 4th century AD, provenance unknown. The fine ribbing on the body was created by partially inflating a bulb of glass inside a ridged mold, then fully blowing out the vessel's form so that the ribbing became decoratively contoured. UPNM ev. 56.35-52. Gift of George and Henry J. nice (1988). H. 17.2 cm

FIG. 5. SMALL OIL LAMP WITH TWO LOOP-HANDLES, light green body with dark green zigzag meander motif and spiral threads, 4th century AD, provenance unknown. Vessels of this kind may have been bowls that had all manner of domestic use. However, the find of a rim and upper body fragment in tomb 301 at Beth Shan (Israel) with a bronze ring still connected to one looped handle suggests that such vessels were used as hanging lamps (Fitzgerald 1931: pl. 40,21). There are also a number of early Byzantine artistic representations of lamps that would support this attribution (Higashi 1990). UPNM ev. 4919. Purchased from Viter and Co. (1971). H. 11.0 cm (in rim)

FIG. 6. SQUAT AMBER JUG WITH A TREDOLT MOUTH, thick turquoise handle, and similarly colored coils applied beneath the rim and a base ring, 4th century AD, possibly from Apoll (Syria). Color combinations of turquoise or amber (as here) and dark blue on colorless seem to have been particularly popular. UPNM ev. 45136. Purchased from Viter and Co. (1971). H. 12.4 cm

FIG. 1. THE "SNAKE THREAD" MOTIF is thought to have originated in the eastern Mediterranean in the 2nd century AD and to have been adopted by glassmakers in the Rhinelander soon thereafter. The body and "snake thread" decoration on this flask, found at Idalion (modern Bali) in Cyprus, are both pale green. The motif became very fashionable by the mid-3rd century AD, by which time the trailed threads were multi-colored—often amber and blue, sometimes opaque white—and the designs even more abstract than the one shown here (Harden 1987; Fleming 1997). Courtesy of the Trustees of the British Museum, inv. GB 1871, 1-21.1. H. 15.1 cm

sion at the eastern frontiers as well. So, despite the price controls on goods and services that Emperor Diocletian tried to enact in his Edict of AD 301, the economies of the eastern provinces became quite volatile (Duncan-Jones 1982; Shulman 1988). Only some three decades later, when Constantinople had founded Constantinople as the new administrative heart of the Roman world, did stability return to the region.

I have drawn illustrations for the following vases solely from glassware of the eastern Mediterranean that dates to the time of Constantine and his successors. This is from necessity rather than choice, as the Museum's collections do not contain vessels from the western Empire dating to the Late Roman period. To follow the story of glassmaking in the northwestern and western provinces over this period, the reader might consult a general book on the cultural history of those times—e.g., Cornell and Matthews' Atlas of the Roman World (1982)—in tandem with one focusing specifically on glassware, such as Harden's Glass of the Caesars (1987).

Since the individual vases are oriented primarily toward describing how the various glass vessels were used, let me make some separate observations here about their decoration. To my eye, it displays a remarkable consistency, being based on and again on just four distinct design motifs:

- A pair of pinched-tooth trails draped down either side of the body of the vessel (Fig. 4),
A zigzag meander comprising a single thread of glass wrapped around the vessel's body (Fig. 5).

Two, sometimes three, thicker coils wound around the vessel just once, at various points (Fig. 6). Such coils usually served as a colorful accent to a rim or neck, but sometimes one was applied functionally, as a base.

A tightly wound spiral placed close to the top of the vessel's neck (Fig. 7). A loosely wound spiral was sometimes used on its own (Fig. 8), but I have not treated this motif here, since it has antecedents at least as far back as the 1st century AD, no doubt because of the simplicity of the technique.

All these motifs are used singly in the 4th century AD. If there were any regional distinctions in their original use, they soon disappeared in the trade of ideas that flowed almost as easily as the glassware itself along the major roads and caravan routes of the East. Within a century or so the motifs were mixed together in all sorts of ways (Fig. 9).

These motifs were definitely the product of prevailing fashions, regional or otherwise: each was applied to vessels of many different shapes and sizes. Above, I illustrated the zigzag meander as applied to an oil lamp, but it was used to decorate everything from unguentaria to wine goblets (Fig. 10a–c). The persistence of these motifs over time—the tightly wound spiral extended well into the 6th century AD (see Fig. 26)—demonstrates how the material products of a craft can mirror stability in the political climate surrounding it.
"Xi Rho" Bottle
32-15-58

The conversion of Constantine in AD 314 was the catalyst for Christianity's swift rise to primacy in the Roman world; however, pagan values continued to exert much social influence for at least a century thereafter. Even in Rome, where the Church thrived on the strength of the martyrologies of Peter and Paul by Nero, the mystery cults of Isis and Bacchus still flourished, and some of the city's wealthiest families aggressively promoted traditional deities such as Ceres and Cybele. And in the Rhineland, scenes engraved on glass and depicted in relief on Roman metalwork are as often classical myths as they were biblical miracles (Harden 1987). Even within families, some members embraced the new faiths, others rejected it (Toynbee 1971).

Away from the cities with their fine new churches, in rural areas where the primary concerns were crop and human fertility, the local deities protecting such matters received due worship. For example, at Karanis in the Fayum region of Egypt, where pagan temples were closed in the 3rd century AD, figurines of the deities Isis and Serapis and of cultic animals such as the crocodile (for the god Sobek) are found a century or more later, among all the normal domestic furnishings of village houses (Higashi 1990). Full adherence to Christian beliefs about life after death negates the need for any "afterworld" tomb furnishings, yet most Romans continued to be buried with the everyday necessities of toilettries and tablewares (Fleming 1997).

**Fig. 12.** This pottery oil lamp, with a molded cross motif, was found in the same grave as the bottle (Fig. 11).

UPM no. 12-15:4. Engraved by Gerald M. Fitzgerald (1929). L. 8.0 cm

**Fig. 13.** Juglet with seven indentations around the colorless body, a thick blue-green handle, and similarly colored threads applied under the rim and on the neck; mid to late 4th century AD, Beth Shean (Israel), northern cemetery, tomb 295 (second grave on left of main chamber).


**Fig. 14.** Small, light blue cup; mid to late 4th century AD, Beth Shean (Israel), northern cemetery, tomb 295 (first grave on left of main chamber).


**Fig. 15.** Cosmetic flask, yellowish green body and dark blue-green tooled-thread decoration; mid to late 4th century AD, Beth Shean (Israel), northern cemetery, tomb 295 (second grave on right of main chamber).


**Fig. 16.** Two-handled jar, purple body; light green handles; mid to late 4th century AD, Beth Shean (Israel), northern cemetery; tomb 295 (fifth grave at end of main chamber).

CONE BEAKER
87.29-1

Scholars are sometimes inclined to assign a name to an artifact that implies a confident understanding of its function. Thus the label ‘conical beaker’ for a vessel of the kind featured here (Fig. 17) goes beyond the obvious aspect of its shape and categorizes it as an item of tableware. To a point, such a label is valid. There are a number of ancient artistic representations of beakers of exactly this conical form being used for wine (Fig. 18). And an engraving on a glass platter found in a 4th century AD catacomb at Beth Shearim, in Syria, depicts such a vessel alongside a pitcher and a two-handled bottle that may be associated with a Talmudic ritual blessing over wine (Avigad 1976). Several domestic contexts of the same date in the farming village of Karanis in Egypt have yielded conical vessels stored among everyday flasks, plates, and bowls (Gadza 1983).

It is also Karanis, however, that provides circumstantial evidence for an alternative label: ‘conical lamp’ (Higashi 1990). During the first half of the 4th century AD village-wide building activity turned many ground-floor rooms into subterranean grain storerooms. Trapdoors were added for access and to provide ventilation, but these rooms were now windowless and dark. It is surely no coincidence that the archaeological record of these events is marked by the deposition of many pottery oil lamps and a rich scatter of fragments of conical glass vessels. Someone could find his way about such a storeroom with a pottery lamp, but would work there by the light of several longer- and brighter-burning glass lamps set in ring brackets on the walls.

Three centuries later, this simple rural lamp had evolved into the common bowl-and-stem type that fits neatly into the holes of a polycandelon and shed light down into a Byzantine church or an Islamic mosque (Figs. 19, 20a). It also may have played some part in the development of the kind of bucket-shaped lamp with an interior wick-tube (Fig. 20b) that became common in eastern mosques from the 12th century AD onwards.

FIG. 17a, b. LIGHT GREEN CONICAL VESSEL WITH OPAQUE BLUE BLOBS
4th century AD
Provenance unknown
H. 22.0 cm

The blue blob decoration on this vessel was popular throughout the eastern provinces (Harden 1936, Weinberg 1988). It later became fashionable in the western Empire for a whole range of tableware and drinking vessels (Harden 1987).

UPA 87.29-1. Donated by Mrs. M. N. Stokley (1972).
Drawing (b) by Veronica Scola

FIG. 18. WORDS OF GOODWILL were added to this scene of five men tipping wine from conical beakers in a wall painting from a 4th century AD tomb at Rome’s port town of Ostia.
Courtesy of The Vatican Museum, inc. 10776

FIG. 19. BIRD’S-EYE VIEW OF A BRONZE POLYCANDELOn for 16 lamps. 7th century AD.
Courtesy of the Trustees of the British Museum, inc. RC 529

FIG. 20a, b. (a) BOWL-BODIED LAMP, (b) BUCKET-SHAPED LAMP. These two vessels were found during excavations in 1935 at the Church of St. John the Baptist at Samaria (Jordan). (For parallels at other eastern sites, see Crowfoot and Harden 1911.)
Drawing by Veronica Scola after Crowfoot et al. 1937: fig. 99.1 and 99.4
(a) H. 12.9 cm, (b) H. 8.5 cm
**Multiple Flask with Spatula**

MS 5105

Facial beauty was something that every well-to-do Roman woman strived for, and a daily ritual of bathing and cosmetic toilettry preceded her round of social engagements. One maid would pluck out offending gray hairs; others would then pile the hair high and arrange the ringlets to current taste. Yet another maid would powder and rouge the cheeks and outline the eyes in black (see Scarborough Fig. 2, this issue).

The lead sulfide mineral galena was popular in the ancient Mediterranean world for the last of these tasks (Pausanias 1900). Because lead is highly toxic, it is a precarious substance to spread on one’s face, or for a maid to crush and handle as part of her routine duties. It seems, however, that health concerns were outweighed by a love of the subtle silvery luster that characterizes galena (Fig. 22).

For the most part, it is pure conjecture how galena was prepared as a cosmetic; my guess is that the powdered mineral was mixed into an ointment in a small glass pot (Fig. 23), then applied in fine smears off the maid’s fingernail. (Most likely, many other dressings and cosmetic substances—balm for bug stings, tinted pastes to hide skin blemishes—were handled this way as well.) During the 4th century AD, however, there seems to be a specific association between cosmetic galena and a novel twin-chambered flask that became, over the subsequent century or so, one of the most common items among tomb goods in the eastern Empire. The flask featured here (Fig. 21) still contains the bronze spatula that was used to portion out the galena. Other flasks of this kind have been found with a roll-tipped applicator, suggesting that one chamber was used to store the mineral, while the other was where it was turned into a paste.

Though many of these flasks are decorated with two of the usual eastern motifs of the time—the pinched-tooth trail and the zigzag meander—others depart strongly from this norm (Fig. 24). Many have a pair of added handles. These handles were not of much intrinsic significance perhaps, except that sometimes they greatly complicated access to the chambers beneath (Fig. 25). We lack any precise metal versions of these flasks that would have been in the cosmetic kits of wealthier ladies, so we cannot invoke mimicry as an explanation of their huge popularity. And that popularity apparently did not extend beyond the eastern Mediterranean; I know of no instance of such a flask (or a form derived from it) being found in the western Empire. Within the broad history of Roman glassmaking, this type of flask is the enigma of its day.

**Fig. 21a, b**

*Pale green twin-chambered flask with green spiral threads, and bronze spatula*

Late 4th-5th century AD

Provenance unknown

H. 11.9 cm

The chambers of the flask were created by simply folding a glass tube in two, then crimping it at the crease to form the base.

UPM no. MS 5105. Purchased from Victor and Co. (1919). Drawing (b) by Jennifer Hask

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**Fig. 22. Nodule of Galena**

Roman women used the lead-based mineral to accent their eyes. Antimony-rich minerals such as stibnite could also have been used as cosmetics, with a similar visual impact. Both antimony and galena are poisonous.

Carolina Biological Supply Co., Burlington, NC, item G2049380

**Fig. 23. Light green ointment pot**

3rd-4th century AD, Beth Shean (Israel), northern cemetery, tomb 295.

UPM no. 321-78. Illustrated by Gerald M. Fitzgerald (1920). H. 13 cm

**Fig. 24. Flask with free-flowing coils**

Laid over the neck, light green body and coils, late 4th-5th century AD, provenance unknown.

UPM no. MS 231. Gift of John Harrison (1895). H. 9.4 cm

**Fig. 25a, b. Twin-chambered flask with ornate double-looped handle.** Both the body and decorative elements are blue-green, late 4th-5th century AD, possibly from Nazareth (Israel). See Harris (1987: entry 77) for an equally impractical form of handle.

UPM no. MS 5107. Purchased from Victor and Co. (1916). Drawing (b) by Jennifer Hask. H. 22.4 cm
Pliny the Elder, the 1st century AD encyclopedia, bemoaned the way that the Roman elite squandered their wealth on exotic incense for ostentatious funeral rituals. In a similar vein, his contemporary, the satirist Martial, ridiculed many Roman public figures, women and men, for smothering their hair and bodies with costly scented oils (Donato and Soefied 1989). The anonymous authors of *Scriptores Historiae Augustae* expressed shock at the eccentricity of the Emperor Elagabalus (reigned AD 218–222) who filled an entire pool with perfumed wine for him and his couriers to bathe in (Mackie 1982). Yet a passion for fine cosmetics remained one of the constants of Roman daily life in all parts of the Empire (Fig. 27).

Slender-necked unguentaria that became fashionable during the 6th century AD are among the most aesthetically appealing products of the glassmaker's craft. They were functionally effective, too, since the narrowness and length of the neck discouraged evaporation of the vessel's contents. The unguentarium featured here (Fig. 26) also has a heavily recessed base which, as the scented oil was being poured out, would have held back coarser perfume ingredients in much the same way as the base of a wine bottle entraps fermentation sediments.

The tightly wound spiral at the neck is a decorative motif popular for some two centuries by the time it is applied here (see Fig. 7 and Fleming 1997). At reoccurs among the various flasks and jugs that were used daily in the preparation and mixing of cosmetic ingredients in the home (Figs. 28, 29). The motif seems to simulate a length of cord binding down a temporary seal of leather or cloth.

**Fig. 26a, b**

*Pale green long-necked unguentarium, with green thread decoration*

6th century AD

Provenance unknown

H. 25.7 cm

The closest parallel for this vessel is from a rock-cut tomb at El-Jish in Israel (Mishalvsky 1939).

UPM no. 1927. Purchased from Victor and Co. (1943). Drawing (b) by Jennifer Black.
FIG. 27. Saffron.
Inflation may have been rampant in the latter half of the 3rd century AD, but the relative value of luxuries versus necessities tended to stay steady, century after century. In Dioecletian’s Edict for price control of AD 301, saffron, the ever-popular spice-used-perfume ingredient, was selling at about 2000 denarii per Roman pound. In the job market, that figure would hire a farm labourer or a camel driver for eighty days; in the food market, it would buy enough beef for most families for more than a year (Shelton 1980).
Courtesy of A-Z Botanical Collections Inc., London

FIG. 28. SHORT-NECKED BULBOUS FLASK
with a high raised shoulder, light green body and spiral decoration; 6th century AD, provenance unknown.
UPM no. MS 5265. Purchased from Victor and Co. (1921). Drawing by Jennifer Hook. H. 15.0 cm

FIG. 29. CONICAL-BODIED JUGLET with light green body and spiral decoration; 6th century AD, provenance unknown.

FIG. 30. THIS UNGUENTARIUM is typical of the kind found at many late 4th century AD Italian sites (Grose 1977).
A skilled glass-blower could turn one out in moments by inflating the bulb, pinching it close to the blow-tube and stretching out the neck; then quickly shearing it free at the rim. Provenance unknown.
UPM no. 43-15-1. Gift of Miss WWW. Wilcox (1943). H. 8.7 cm

FIG. 31.

EPilogue

The vessels featured in the previous vignette are somewhat later than the “Late Roman” scope of the article overall—they are strictly early Byzantine. Including them gives me a chance to look at how far the glassmaking industry had evolved after its emergence late in the 1st century BC. The visual impact of such a retrospective is quite dramatic when it harks back to another unguentarium, the small bulbous vessel with which Roman glassmakers first explored the potential of free-blowing for mass production (e.g., Fig. 30). The linking of the two unguentaria through a sequence of shapes that are typical for intervening times (Fig. 31) allows us to appreciate how societal taste must have instigated change time and again, just as it does today. It is search for an understanding of the cultural dynamics of such change that is the challenge and pleasure of modern archaeological research. 2