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and a Hitherto Unknown Glass Chalice

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OVER THE YEARS, there have been many reports of glass in Egypt that is dated earlier than about 1500 B.C.¹ Several of these objects—including the famous “Bull Mosaic” of Princess Khnumet² and the lion’s head amulet inscribed for Nubkheperre³—are now known to have been made of materials other than glass. The remaining pieces that are known to us do not appear to represent any deliberate and regular production of glass. Instead, they may be the result of accidents that occurred during the making of faience or frit.

There are two pieces of glass that may be relevant to this discussion, but for the moment, their status remains unclear. They are name beads⁴ that bear inscriptions mentioning Queen Hatshepsut (1473–1458 B.C.) and her steward, Senenmut.⁵ These beads were originally thought to have been made of rock crystal. However, they are colorless glass objects that may originally have come from the foundation deposits of the Hathor shrine of Hatshepsut at Deir el-Bahri, although they were not found *in situ*. The shrine

is believed to date from the seventh year of the queen’s reign.⁶

Since raw glass of that period was naturally greenish or brownish because of impurities such as iron, it had to be decolorized in order to produce colorless objects such as the name beads. Decolorization was a sophisticated process, and virtually all of the glass known from ancient Egypt was strongly colored, usually in shades of light or dark blue. The notion that colorless glass could have been manufactured so early, in Egypt or elsewhere, suggests a remarkable sophistication in this early glass industry.

Chemical analysis of the beads has shown that they are “compositionally similar to analyses of glasses from Tell el Amarna”⁷ when compared with earlier analyses performed by Cowell and Werner.⁸ This does not necessarily mean that the glass was made in Egypt. It may simply have been inscribed there. Another piece of colorless glass dated to the Amarna period came from an inscription on a Canopic jar for a queen.⁹ Although it is similar to other glasses

Acknowledgments. I am grateful to Dr. Caroline Jackson for reading an early draft of this article, and to Cerian Whitehurst for her comments.

1. Alfred Lucas, *Ancient Egyptian Materials and Industries*, London: Longman Green and Co., 1926; H. C. Beck, “Glass before 1500 B.C.,” *Ancient Egypt and the East*, June 1935, pp. 7–21; A. Shortland, “Social Influences on the Development and Spread of Glass Technology,” in *The Social Context of Technological Change: Egypt and the Near East, 1650–1550 B.C.*, ed. A. J. Shortland, Oxford: Oxbow Books, 2001, pp. 211–222.

2. The Egyptian Museum, Cairo CG 52975, JdE 31126.

3. The British Museum EA 59619.

4. The British Museum EA 26289 (fragment) and EA 26290 (intact).

5. C. Nicholas Reeves, “Two Name-Beads of Hatshepsut and Senenmut from the Mortuary Temple of Queen Hatshepsut at Deir el-Bahri,” *Antiquaries Journal*, v. 66, 1986, pp. 387–388.

6. *Ibid.*, p. 388.

7. M. Bimson and I. C. Freestone, “Some Egyptian Glasses Dated by Royal Inscriptions,” *Journal of Glass Studies*, v. 30, 1988, p. 11.

8. M. R. Cowell and A. E. Werner, “Analysis of Some Egyptian Glass,” *Annales de l’Association Internationale pour l’Histoire du Verre*, v. 6, Cologne, 1973 (Liège, 1974), pp. 295–298.

9. The British Museum EA 9558.

from Amarna,¹⁰ there are some compositional differences.¹¹ In particular, the colorless glass from the jar has twice the amount of lime that is found in the name beads.

It may be that we are seeing here an early stage in which glass was imported into Egypt and a later stage of local production, with the change having occurred during the Amarna period. Alternatively, this may represent an Egyptian industry that was already established by the time of Hatshepsut, an industry that later changed its recipes in order to make better use of local raw materials.¹²

Whatever the case may be regarding the production of these glasses, it is interesting that both the beads and the Canopic jar, which was intended for a royal wife, have royal connections. The same is true of a light blue glass bead of unknown provenance¹³ that bears the name of Ahmose (1550–1525 B.C.) on one side and that of Amenhotep I (1525–1504 B.C.) on the other side.¹⁴ This object has been regarded by Brovarski, Doll, and Freed as possible evidence for a co-regency by these two rulers, the first of the New Kingdom, and they claim that “X-ray spectrometry yielded findings consistent with the analysis of known 18th Dynasty parallels.”¹⁵ That the piece is seen as evidence for a co-regency implies that it is of early date and may be contemporaneous with the rulers whose names it bears. This would suggest that, from the very beginning of the Egyptian New Kingdom, glass and royalty were interlinked. If the object was

indeed made in Egypt, the industry would have been established much earlier than is now believed. However, the authors do not cite the X-ray analyses to which they refer, and the fact that the piece corresponds to other 18th-Dynasty glasses does not necessarily mean that it was made in Egypt.

The question of the establishment of glass-making or regular glassworking is a vexed one, and it will be examined in more detail elsewhere.¹⁶ There is, however, a general consensus that glass came to Egypt as a developed craft, perhaps a century old,¹⁷ so that “with dramatic suddenness, glass makes its appearance also in Egypt.”¹⁸ The idea that the craft was imported from beyond Egypt seems to have come from Petrie, who stated that “as soon as Egypt overran Syria, artificers were brought in, about 1500 B.C., and glass making became a flourishing and varied industry.”¹⁹ This view was accepted by Harden,²⁰ who specifically mentioned the borders of Mesopotamia, a region that is usually referred to as the kingdom of Mitanni.

The idea that glass was imported from this region was strengthened, on linguistic grounds, by Oppenheim,²¹ who emphasized that two Akkadian words previously identified as “precious stone” (*mekku* and *ehlipakku*) may refer to glass. In the Amarna letters, *ehlipakku* was sent from Mitanni to Egypt. The Egyptian king was always the one who required *mekku* or *ehlipakku*, and it is clear from one of the letters²² that the two words refer to the same thing. Indeed, Petrie

10. Based on comparison with analyses by Cowell and Werner [note 8].

11. Bimson and Freestone [note 7], p. 12.

12. Cf. T. Rehren, “Rationales in Old World Base Glass Composition,” *Journal of Archaeological Science*, v. 27, 2000, pp. 1225–1234.

13. Museum of Fine Arts, Boston 1978.691.

14. Edward Brovarski, Susan K. Doll, and Rita E. Freed, *Egypt's Golden Age: The Art of Living in the New Kingdom, 1558–1085 B.C.*, Boston: Museum of Fine Arts, 1982, p. 169.

15. *Ibid.*

16. Paul T. Nicholson, *Report on the Excavations at Amarna 045.1 and the Place of Glass in Egypt's New Kingdom*, London: Egypt Exploration Society, forthcoming.

17. Veronica Tatton-Brown and Carol Andrews, “Before the Invention of Glassblowing,” in *Five Thousand Years of Glass*, ed. H. Tait, London: British Museum, 1991, p. 26.

18. A. Leo Oppenheim, “Towards a History of Glass in the Ancient Near East,” *Journal of the American Oriental Society*, v. 93, 1973, p. 262.

19. W. M. Flinders Petrie, “Glass Found in Egypt,” *Transactions of the British Newcomen Society*, v. 5, 1925, p. 72.

20. Donald B. Harden, “Ancient Glass, 1: Pre-Roman,” *The Archaeological Journal*, v. 125, 1968, p. 48.

21. Oppenheim [note 18].

22. The British Museum EA 148. For a translation, see William L. Moran, *The Amarna Letters*, Baltimore and London: Johns Hopkins University Press, 1992, p. 235.

states that there “was little difficulty in attributing to the Syrians the glasswares which were imported into Egypt prior to 1500 B.C.”²³

Such early glass products are illustrated at a number of sites. The most famous of these is the illustration in the *Annals of Thutmose III* at Karnak. Here, the king lists glass after gold and silver, suggesting its importance.²⁴ Some of the glass is seen as circular pieces of fairly consistent size, perhaps ingots, while other pieces are shown as irregular lumps. The apparent raw glass is described as “Menkheperre lapis lazuli”²⁵ to distinguish it from genuine lapis lazuli. Bianchi and others speculate that the king may have been so impressed by this new material that he chose to add his throne name to it.²⁶ In addition to deep blue glass imitating lapis lazuli, there is green glass shown as round cakes. These are given a description which incorporates the king’s throne name, “Menkheperre turquoise/malachite.”²⁷

Bianchi and others convincingly argue that the green/light blue glass is meant in opposition to the blue glass, which must have been considerably darker (although its color is now lost on the Karnak relief), and this would be expected, since it is meant to represent lapis lazuli.²⁸ They estimate that 60 kilograms of the dark blue glass is represented as ingots, with an additional 55 kilograms appearing as lumps, for a total of 115 kilograms. The lighter blue/green glass is

estimated at 83.72 kilograms.²⁹ The authors note that this distinction is interesting, since most of the vessels from the time of Thutmose III (1479–1425 B.C.) are light blue rather than dark blue, and thus the finds may be unrepresentative.³⁰

Shortland uses the evidence from the *Annals of Thutmose III* to argue that most of the early glass was light blue rather than dark blue³¹ and to obtain a figure of 10,913.8 *dbn* or 993 kilograms for the light blue glass. This is an astonishing amount, and it suggests that glass was being produced, albeit outside Egypt, on an unprecedented scale at that time. However, Shortland’s reading of the figure is not generally regarded as correct. The real quantity is probably 913 *dbn*, the 83.72 kilograms cited by Bianchi and others.³²

Shortland is correct, however, in noting that the most common body color of glass vessels during the reign of Thutmose III was light blue.³³ He follows Nolte in attributing 12 glass vessels or vessel fragments to that reign (see below).³⁴ Two of these almost certainly came from the same vessel,³⁵ while another sample, although relevant to this discussion, is believed to be glassy faience rather than glass.³⁶ This means that there are actually only 10 examples of glass vessels from this reign.

To summarize, there seems to be general agreement that deliberately produced glass, wherever

23. W. M. Flinders Petrie, “Glass in the Early Ages,” *Journal of the Society of Glass Technology*, v. 10, 1926, p. 230. Although the text of this reference is attributed to Petrie, it is a summary prepared by a member of the audience at a Society meeting held in London on June 1, 1926, and it contains numerous errors.

24. Birgit Nolte, *Die Glasgefäße im alten Ägypten*, Berlin: Bruno Hessling, 1968, pp. 12–13.

25. Hsbḏ-Mn-hpr-R’.

26. Robert S. Bianchi and others, *Reflections on Ancient Glass from the Borowski Collection*, Mainz: von Zabern, 2002, p. 20.

27. Mfk3.t-Mn-hpr-R’.

28. Bianchi and others [note 26].

29. *Ibid.*, p. 21.

30. It should be remembered, however, that the (dark) blue ingots may represent Egyptian blue rather than glass. Their identification with glass has become more widely accepted since the discovery of the Ulu Burun shipwreck and its cargo.

However, the ship is later than these reliefs, and it may well have been exporting glass from Egypt rather than importing it. See P. T. Nicholson, C. M. Jackson, and K. M. Trott, “The Ulu Burun Glass Ingots, Cylindrical Vessels and Egyptian Glass,” *Journal of Egyptian Archaeology*, v. 83, 1997, pp. 143–153.

31. Shortland [note 1], p. 213.

32. Bianchi and others [note 26], p. 20, n. 52. In Sir Alan H. Gardiner’s *Egyptian Grammar* (3rd ed., Oxford: Griffith Institute, 1957, p. 513), sign T14, the throwstick that can be used to denote “foreign,” has been mistakenly read by Shortland as the finger (D50) meaning “10,000.” I am grateful to Drs. Ian Shaw and Kasia Spakowska for confirming that the Shortland reading is likely to be incorrect.

33. Shortland [note 1], pp. 215–216.

34. Nolte [note 24], pp. 46–50.

35. The Egyptian Museum, Cairo 24960 and Brooklyn Museum of Art 53.176.4.

36. The Metropolitan Museum of Art 26.7.1175.

TABLE 1

<i>Number</i>	<i>Shape/Type</i>	<i>Body Color</i>	<i>Technology</i>
Munich ÄS630	Chalice	Light blue	Core-formed
Ashmolean E2451	Chalice	Light blue	Core-formed
MMA 23.9*	Lotus chalice	Light blue	Cast and cold-worked
BM 24391	Kohl pot with lid	Light blue	Drilled and cold-worked
UC 19657	Kohl pot (no lid)	Light blue	Drilled and cold-worked
MMA 26.7.1179	Kohl pot (no lid)	Light blue	Drilled and cold-worked
Cairo 24959	Kohl pot (lid only)	Dark blue	Cold-worked
Cairo 24961	Handled vessel	Light blue	Core-formed
Cairo 24960 and Brooklyn 53.176.4	Rounded vessel	Light blue	Core-formed
BM 47620	Jug	Light blue	Core-formed with powdered glass decoration
MMA 26.7.1175*	Krateriskos	Marbleized	“Glassy faience”—probably core-formed

* Indicates Wadi Qirud provenance.

it was made, first appeared in Egypt about the time of Hatshepsut/Thutmose III, is associated with royalty, and is usually colored light blue.

The Thutmose III Vessels

The vessels conventionally dated to the reign of Thutmose III are shown in Table 1.³⁷

The security of the dating of some of these objects may be open to question. The most securely dated vessels are those that came from the tomb of the king's foreign wives in the Wadi Qirud (these are indicated by an asterisk in the table). They consist of a marbleized vessel of glassy faience,³⁸ which, although relevant, is not made of glass; a lotus chalice bearing the incised cartouche of the king;³⁹ and, according to Nolte,⁴⁰ a kohl vessel.⁴¹ However, the latter, which was originally acquired by Hood about 1860, was purchased by The Metropolitan Museum of Art in 1926. Lilyquist does not list this last vessel as part of the tomb's contents, which would be reasonable if it was not located until August 1916, as she states.⁴² It is her view that the vessel is a miniature ointment jar and “certainly not

from the Wady Qurud [*sic*].”⁴³ Therefore, all that can be said of the piece is that it was purchased in Qurneh about 1860, and that its style is not dissimilar to that of other vessels dating from the time of Thutmose III. Therefore, we have only one vessel from the Wadi Qirud tomb that is actually made of glass.

The tomb of Thutmose III, located in the Valley of the Kings (KV34), was discovered by Victor Loret on February 12, 1898.⁴⁴ There is evidence that the tomb had been heavily plundered.⁴⁵ Four pieces of glass are associated with

37. The table is adapted from Shortland [note 1], p. 215.

38. The Metropolitan Museum of Art 26.7.1175.

39. The Metropolitan Museum of Art 23.9.

40. Nolte [note 24], p. 48.

41. The Metropolitan Museum of Art 26.7.1179.

42. Christine Lilyquist, *The Tomb of Three Foreign Wives of Tutmosis III*, New York: The Metropolitan Museum of Art, 2003, p. 27.

43. I am grateful to Dr. Lilyquist for confirming this view in an e-mail communication of January 3, 2005.

44. C. Nicholas Reeves, *Valley of the Kings*, London and New York: Kegan Paul International, 1990, p. 19.

45. *Ibid.*, p. 23.

this tomb. A dark blue glass lid from a kohl pot⁴⁶ and a light blue core-formed handled vessel⁴⁷ definitely came from that site, as did a light blue fragment from a core-formed vessel with a yellow and dark blue decorative band.⁴⁸ The last of these pieces is now in Cairo. It is generally believed to have come from a vessel in the collection of the Brooklyn Museum of Art⁴⁹ that is the same in color and decoration, although it does not join with the Cairo fragment. If it is part of the same vessel, it must have come from the original burial.

There is, however, a fifth piece of glass that has also been linked with this tomb. It is an exceptionally well preserved juglet that is now in The British Museum.⁵⁰ The object is light blue and decorated in dark blue, yellow, and white. The yellow was used to enamel a floral motif on the vessel and to add an inscription for Thutmose III. According to Cooney, there is no record of the acquisition of the juglet by the museum,⁵¹ although Budge states that it probably came from the king's burial.⁵² Cooney concurs with this view and suggests that the object came to the museum between 1870 and 1872, during which time the royal cache (DB320) was being looted.⁵³ The unusual decoration, which is arguably more "Near Eastern" than Egyptian, as well as the light blue body color and the inscription, supports a date contemporaneous with Thutmose III, and although the provenance cannot be accepted without question, it does appear that the juglet belonged to the king.

Another vessel that bears the name of the king is now in the Staatliche Sammlung Ägyptischer Kunst, Munich (Fig. 1).⁵⁴ It is a light blue/turquoise core-formed chalice decorated in dark blue and yellow, and it bears the cartouche of the king in dark blue. The cartouche is at a slight angle, and the hieroglyphs are grouped toward the top edge of the name-ring. The rim is uneven. This object was originally part of the Dodwell Collection,⁵⁵ and it was purchased in 1832, probably at Thebes.⁵⁶ It is not possible to assign a firmer provenance to the piece, although Nolte believes that it is contemporaneous with Thutmose III and not a later piece that belonged to

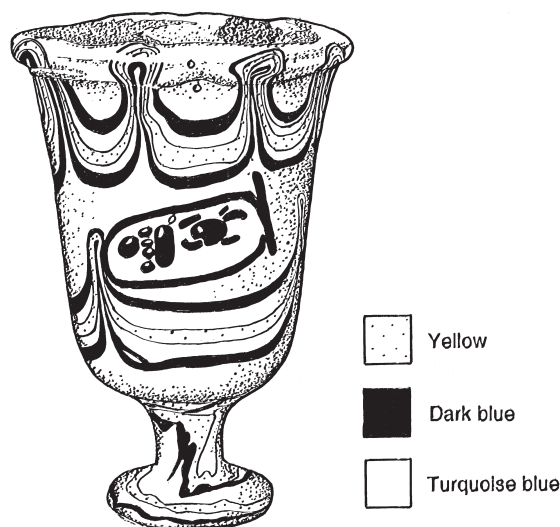


FIG. 1. *The Munich chalice* (ÄS630). H. 8.1 cm. (Drawing: Kate Trott)

the priest-king Menkheperre of the 21st Dynasty.⁵⁷ Although the quality of the glass seems altogether better than that of comparable later glasses, the piece is unprovenanced.

Similar in form is a plain light blue chalice from the Ashmolean Museum of Art and Archaeology in Oxford.⁵⁸ It is heavily weathered, and the original surface is largely obscured. Where the surface has flaked off, the original bright blue color shows clearly. The piece came from

46. The Egyptian Museum, Cairo 24959.

47. The Egyptian Museum, Cairo 24961.

48. The Egyptian Museum, Cairo 24960.

49. Brooklyn Museum of Art 53.176.4.

50. The British Museum 47620.

51. John D. Cooney, *Catalogue of Egyptian Antiquities in the British Museum*, v. 4, *Glass*, London: British Museum Publications Ltd., 1976, pp. 70–71.

52. E. A. Wallis Budge, *The Mummy*, Cambridge: Cambridge University Press, 1925, p. 391.

53. Cooney [note 51].

54. Staatliche Sammlung Ägyptischer Kunst, Munich ÄS630.

55. Percy E. Newberry, "A Glass Chalice of Tuthmosis III," *Journal of Egyptian Archaeology*, v. 6, 1920, pp. 155–160.

56. Nolte [note 24], p. 48.

57. *Ibid.*, p. 49.

58. Ashmolean Museum of Art and Archaeology Oxford, E2451. I am grateful to Dr. Helen Whitehouse for allowing me to examine this piece.



FIG. 2. *The Ashmolean chalice (E2451). H. 7.6 cm. (Photo: P. T. Nicholson, reproduced courtesy of the Ashmolean Museum, Oxford)*

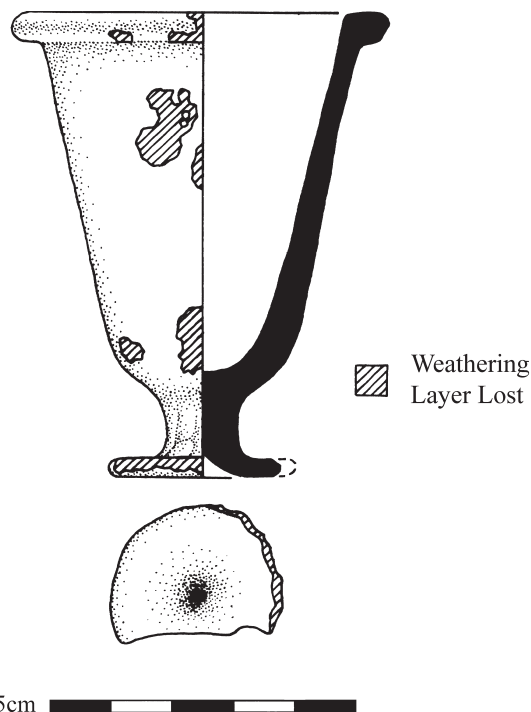


FIG. 3. *The blue chalice from Tomb 058, Gurob (Ashmolean Museum E2451). (Drawing: Frances Taylor, reproduced courtesy of the Ashmolean Museum, Oxford)*

Tomb 058 at Gurob (Figs. 2 and 3).⁵⁹ Loat, the excavator, offered little comment on the chalice, and its dating to the time of Thutmose III seems to have been based on a comparison with the Munich vessel, made by Fossing.⁶⁰ This was taken further by Nolte, who believes the two objects may have come from the same workshop.⁶¹ Thus, although the chalice has a provenance, its dating relies, in part, on an unprovenanced piece. The comparison seems to be a fair one, but one must proceed with caution.

The last objects in the Thutmose III group are two kohl pots. One of them⁶² came from Riqqeh cemetery B, and although this piece is illustrated in the report on the excavation,⁶³ the remaining contents of the tomb have not been published. The dating is thus based on the fact that stone kohl pots of this type were popular during the reign of Thutmose III. The vessel has provenance, but the dating cannot be relied upon.

That same dating was then used to provide a date for an unprovenanced piece in The British Museum,⁶⁴ a light blue vessel whose rim, foot, and lid are decorated with gold leaf. This vessel was acquired by the museum in 1892.⁶⁵ The kohl pots must be regarded as having the least satisfactory dating of all.

To summarize, then, the two kohl pots rely entirely on style for their dating; the Ashmolean chalice depends on the Munich chalice, itself un-

59. L. Loat, *Gurob*, London: Quaritch, 1905, p. 7 and pl. IV:43.

60. Paul Fossing, *Glass Vessels before Glass Blowing*, Copenhagen: Ejnar Munksgaard, 1940, p. 8, n. 6.

61. Nolte [note 24], p. 49.

62. Petrie Museum, UC 19657.

63. Reginald Engelbach, *Riqqeh and Memphis*, v. 6, London: British School of Archaeology in Egypt, 1915, p. 16 and pls. 12 and 14.

64. The British Museum 24391.

65. Nolte [note 24], p. 47.



FIG. 4. Entry in John Gardner Wilkinson's catalog notebook at Harrow School (1864). Note that the vessel is shown as complete. (Photo: P. T. Nicholson, reproduced courtesy of the keepers and governors of Harrow School)

provenanced (although it is usually attributed to the time of Thutmose III); and the British Museum juglet has no firm provenance, although both the attribution and the dating seem very probable. The ointment vessel in the Metropolitan Museum⁶⁶ is no longer regarded as from the Wadi Qirud burials, and so it cannot be dated with certainty. Lilyquist says that this piece is "more mannered" than the example from Gurob,⁶⁷ which might suggest a slightly later date. The Metropolitan Museum's lotus chalice is therefore the only *certain* glass vessel from the tomb of the foreign wives. This leaves four fragments, three of which are certainly from the tomb of the king himself.⁶⁸ The fourth fragment⁶⁹ is almost certainly from that tomb because it seems to have come from the same vessel as one of the three certain pieces.

*A Third Core-Formed Chalice of Thutmose III?*⁷⁰

Sir John Gardner Wilkinson (1797–1875) is rightly regarded as one of the great pioneers of Egyptology. From 1821 to 1833, he lived in Egypt, resided at Thebes, and made meticulous notes on the monuments around him. He paid particular attention to tombs. Indeed, he lived in Tomb TT83 (that of Amethu, known as Ah-

mose) at Qurneh.⁷¹ He also compiled a carefully catalogued collection of antiquities that were given to various institutions, including The British Museum and Harrow School, where he had studied as a boy.

The Harrow collection was published by E. A. Wallis Budge (1857–1934) in 1887,⁷² but Wilkinson's handwritten notes are often more illuminating than Budge's rather bald description of some of the pieces.⁷³ This is certainly the case with the piece in question, a small glass vessel

66. The Metropolitan Museum of Art 26.7.1179.

67. Lilyquist [note 42].

68. Cairo 24959, 24960, and 24961.

69. Brooklyn Museum of Art 53.176.4.

70. I first saw this piece at an illustrated lecture on the Harrow collection presented by Dr. Ian Shaw, who kindly put me in touch with Dr. Carolyn Leder, curator of the museum. I am indebted to Dr. Leder for her kindness in allowing me to examine the piece and for making the notebook available to me. I also thank the keepers and governors of Harrow School for allowing me to prepare this article.

71. For a description of the dwelling, see Jason Thompson, *Sir Gardner Wilkinson and His Circle*, Austin: University of Texas Press, 1992, pp. 100–114. This same volume contains details of Wilkinson's life in Egypt.

72. E. A. Wallis Budge, *Catalogue of the Egyptian Antiquities from the Collection of the Late Sir Gardner Wilkinson*, Harrow: J. C. Wilbee, 1887.

73. For a general description of the collection, see Ian Shaw, *Sir John Gardner Wilkinson: The Egyptian Collection*, Harrow: The Herga Press, 1991. The vessel is briefly noted on p. 23.

that bears the number HE121.⁷⁴ It is described in Wilkinson's catalog (Fig. 4)⁷⁵ as follows:

549. Cup of colored "glass porcelain" (see fig. 453 in p. 43). These are usually an opaque glass. From Thebes, of Egyptian time. Height 2½ inches. Some of these vases appear to be the false "murrhina" mentioned by ancient Greek and Latin scholars—an imitation of the stone which was doubtless fluor-spar, so common in Derbyshire, but nought from other countries in old times, as we learn from Pliny. In those the arrangement of the colors differed from the present specimen, having broader and more decided lines and hard zigzags, as may be seen in the bottles marked fig. 335, 339 in vol. II of this catalogue under the head of glass.⁷⁶

With the word "porcelain," Wilkinson is apparently referring to faience, but this piece is clearly made of opaque glass. And although it is provenanced as "Thebes," no additional information is supplied, so it is not possible to tie it to any particular tomb. However, there are certain features suggesting that the cup, or chalice, may well date from the time of Thutmose III. First, the body of the vessel is light blue, the most common color of vessels that are normally ascribed to this king's reign. The chalice (H. 6.0 cm, rim D. 4.6 cm) is somewhat smaller than the Ashmolean⁷⁷ and Munich⁷⁸ examples, although its overall shape and technology are closely comparable.

As might be expected of core-formed objects, the interior of all three of these vessels is more poorly finished than the exterior, and in all of them, especially the Harrow and Munich pieces, the rim is somewhat uneven. The Munich vessel⁷⁹ is carefully decorated with swags of dark cobalt blue and yellow. There is one yellow swag just below the rim, and another on the lower body. These yellow swags are set between dark blue ones that run above and below them so that there are four dark blue swags on the body. The stem and foot have a swirl of blue and yellow. Set between the swags on the body is a "horizontally" positioned cartouche of Thutmose III. Despite the fairly careful decoration of the body,

the cartouche itself is slightly inclined and not centered between the swags. The hieroglyphs it contains are also off-center, and they are much closer to the top edge of the cartouche than to the bottom. Lilyquist and Brill noted that, for such a high-quality vessel, the cartouche is poorly placed,⁸⁰ and Goldstein suggested that the cartouche may have been applied by lampworking.⁸¹ The lack of a firm provenance for the object means that one must be cautious in employing it for purposes of comparison.

The same overall difficulties can be seen on the Harrow chalice (Figs. 5 and 6). Once again, there are two trails of yellow glass, one just below the rim and the other extending between the middle and lower body. These, too, are set between dark cobalt blue trails. The workmanship here, however, is much less careful. On the upper yellow trail, there are indications that it may have been intended to form swags rather than a combination of wavy lines and zigzags, but at no point does it form the careful loop into the outturned rim that is evident on the Munich piece. Although the Harrow vessel has one dark blue band above the uppermost yellow one, there are four or five such bands between it and the next yellow band. Another two dark blue bands are located below the lower yellow one. In places, both the yellow and dark blue bands have a double line. The foot is swirled with dark blue in a manner similar to that seen on the Munich example. There is no cartouche

74. This is the current number. It also has the numbers E549 and B716.

75. This handwritten catalog, on which Budge eventually drew, was prepared in 1864. It is still housed in the Harrow School Museum.

76. See note 72. Wilkinson notebook (1864), p. 51.

77. Ashmolean Museum E2451.

78. Staatliche Sammlung Ägyptischer Kunst, Munich ÄS630.

79. I have not received replies to my requests to examine this piece. My description is therefore based on published sources only.

80. C. Lilyquist and R. H. Brill, *Studies in Early Egyptian Glass*, New York: The Metropolitan Museum of Art, 1993, p. 26 and n. 37. I am grateful to Dr. Tom Hardwick for drawing my attention to this reference, and to Dr. Lilyquist for discussing the piece with me.

81. S. Goldstein, "Glass," in Brovarski, Doll, and Freed [note 14], p. 163.



FIG. 5. *The Harrow chalice (HE121)*. H. 6.0 cm, D. (rim) 4.6 cm. (Photo: P. T. Nicholson, reproduced courtesy of the keepers and governors of Harrow School)

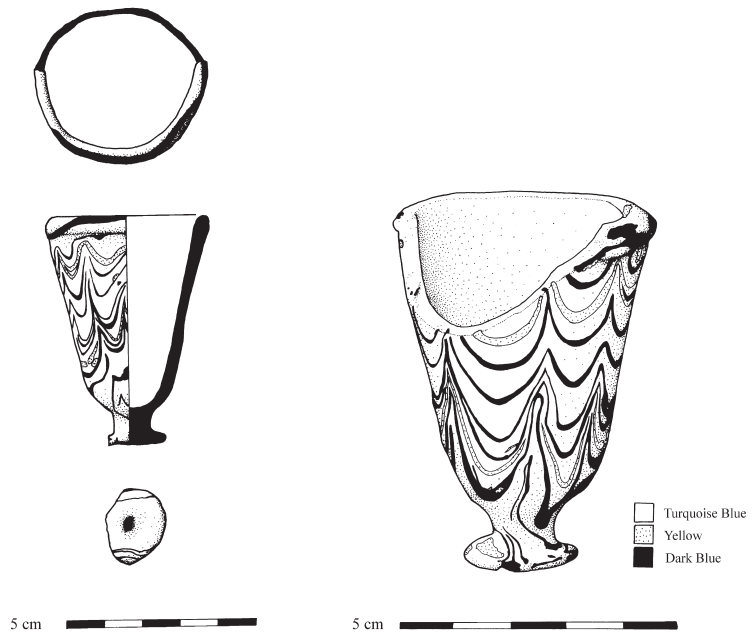


FIG. 6. *The Harrow chalice (HE121)*. (Drawing: James Newbould, from a sketch by P. T. Nicholson; reproduced courtesy of the keepers and governors of Harrow School)

or other inscription on the Harrow chalice. The marvering of the piece is not completely uniform, and although the object is almost circular, it appears to be slightly faceted.

When viewed from above, it is clear that the glass on the lowermost part of the body, where it meets the foot, is very thin, even translucent, making this part of the chalice relatively weak. It is therefore remarkable that the damage sustained by the object is to the rim.

The underside of the base has a small indent or kick, and this same feature can be observed on the Ashmolean piece.⁸² Mark Taylor has informed me that this may have been made deliberately, and that it was sometimes formed by adding glass to create a foot.⁸³ The trailing on the Harrow chalice extends onto the foot and was apparently shaped with it, which may suggest that it was pulled from the body of the vessel.

There is no mention in Wilkinson's notes that the chalice was broken, and his own colored

sketch shows it as complete. At some point after it entered the Harrow collection, a large piece of the rim was lost and another was repaired. The repair appears to be old, and the piece has been in its present condition for as long as any members of the museum staff can recall. Since Budge makes no mention of the damage,⁸⁴ it seems reasonable to assume that the breakage occurred after 1887 and before about 1970. The missing fragments have not been located.

It is interesting that Wilkinson believed that the chalice was made in imitation of the decorative stone *murrina*, mentioned by Pliny.⁸⁵ The identification of this material with fluorspar was a matter of some contention in the late 19th cen-

82. I am unable to comment on the Munich chalice.

83. Mark Taylor and David Hill, glassmakers in Quarley, near Andover, Hampshire, U.K. They have carried out extensive experiments pertaining to the technology of Roman and ancient Egyptian glass.

84. Budge [note 72].

85. Pliny, *Natural History* 37:18–22 (Penguin translation).

tury, and Wilkinson's attribution, although unpublished, seems to be one of the earliest.⁸⁶ More important was the early recognition that glass was perhaps made in the style of stone. This makes a link between the working of the two materials more likely, as can be seen in the cold-worked kohl vessels described above.

Before concluding this section, we should consider the question regarding the authenticity of the chalice. Wilkinson does not provide the date of acquisition, nor does he mention purchasing the piece from anyone. Had he bought the object from a well-known dealer such as Bernardino Drovetti (1776–1852), who was active in Thebes during Wilkinson's stay there, he would probably have said so. Major dealers were not above embellishing their finds or even forging them. The fact that this unusual object has technological and typological features in common with the Ashmolean chalice, which comes from a secure archeological context, suggests that it is authentic.

What can we say, then, concerning the date and provenance of the Harrow chalice? Its small size, forming method, and colors all point to a date during the reign of Thutmose III. The form was never a common one, and chalices of later date are clearly different in execution and/or color.⁸⁷ It is unlikely that we will ever be able to identify its provenance more closely than "Thebes." Since the Wadi Qirud does not seem to have been plundered before its discovery in 1916 while the tomb of Thutmose III was robbed before its archeological investigation, and since there is an established link between royalty and glass, it is at least possible that the royal tomb was the original source of the object.

Conclusions

Clearly, the status of some of the Thutmose III glass is uncertain, and in the absence of analytical studies of all of the pieces, considerable caution must be exercised. However, it may be possible to make some observations on technological grounds and to group the pieces accordingly.

The two kohl pots,⁸⁸ whose attribution to Thutmose III is arguably least secure, seem to have been cast and then drilled. Thus, their technology is closely akin to the working of similar stone vessels, whose form they imitate. The same holds true for the kohl or ointment vessel that was originally thought to have come from the Wadi Qirud,⁸⁹ but whose provenance and date have since been shown to be uncertain. The lid from a kohl pot found in the tomb of Thutmose III⁹⁰ is also cold-worked, suggesting that it belongs to this group. The elegant lotus chalice⁹¹ from the Wadi Qirud burial is also cast and cold-worked.

The British Museum's juglet⁹² has no parallel in glass, although its shape is similar to that of the apparently much larger vessel shown in the Tomb of Rekhmire (TT100).⁹³ Its very accomplished decoration, of a type not otherwise known in Egypt, suggests a non-Egyptian source. It is core-formed, however, and so it was treated in a manner distinct from stone.

Also core-formed are the two chalices now in Munich and the Ashmolean Museum. Although one of these has a cartouche, the workmanship is much less confident than that which is evident on the juglet. To these two we may now add the Harrow chalice with its typical light blue color, small size, and swag decoration. These three pieces do seem to form a group, although, as has been shown, their dating is not as secure as one might wish. The other core-formed vessel frag-

86. See Paul T. Nicholson, "Hodder Westropp: Nineteenth-Century Archaeologist," *Antiquity*, v. 57, 1983, pp. 205–210, esp. p. 206.

87. For example, The Corning Museum of Glass 59.1.17, of Nolte's Werkreis 2b of Amenhotep III–IV; Virginia Museum of Fine Arts, Richmond 59.29.1, of Werkreis 6 of Tutankhamun to Pinedjem II; and the undated Egyptian Museum, Cairo J.29845, which Nolte [note 24, p. 139] says is quite unlike the Thutmose III vessels.

88. The British Museum 24391 and UC 19657.

89. The Metropolitan Museum of Art 26.7.1179.

90. The Egyptian Museum, Cairo 24959.

91. The Metropolitan Museum of Art 23.9.

92. The British Museum 47620.

93. Norman De G. Davies, *The Tomb of Rekh-Mirē' at Thebes*, New York: The Metropolitan Museum of Art, 1943, p. 28 and pl. XXI.

ments,⁹⁴ like the chalices, are of good workmanship, but not as good as that of the British Museum's juglet.

It might tentatively be suggested that what we see in these Thutmose III glasses is an early stage in the working of glass in a manner comparable to that of stone, with cold working perhaps from imported ingots. The cold technology was gradually replaced by hot working inspired by vessels such as the juglet. This vessel may have been imported into Egypt, or it may have been made in Egypt by foreign craftsmen who were brought in to establish such an industry. In the two core-formed chalices and the core-formed vessel fragments from KV34,⁹⁵ then, we see the earliest steps in a native Egyptian core-formed glass industry.

It is, of course, possible that some of these steps went on almost simultaneously, but the fact that the cold working of vessels, and particularly the drilling of them, ended after this time may be significant. Unfortunately, only a few of the important vessels attributed to the reign of Thutmose III have undergone analysis. These objects lend some support to this view. The Brooklyn fragment,⁹⁶ for example, contains cobalt that is likely to have come from the Egyptian oases.⁹⁷

While I would agree with Shortland⁹⁸ that these pieces (leaving aside the problems of date and provenance for some of them) represent the earliest experiments in glass production in Egypt, it still appears to me that these experiments may have been inspired by foreign glassworkers.

This leaves the Hatshepsut and Senenmut name beads in an uncertain position. Their shaping technology suggests that they were worked in imitation of stone, while their colorless quality suggests sophisticated glassmaking. Perhaps glass was already being made from very high quality raw materials during the reign of Hatshepsut, while the use of cold technology was retained. With the succeeding reign and increased foreign influence, it is possible that the working technology—and perhaps the production technology—was changed, and from this point, we see the development of the Egyptian core-formed glass industry.

94. Brooklyn Museum of Art 53.176.4 and Cairo 24960.

95. Cf. Shortland [note 1], p. 220.

96. Brooklyn Museum of Art 53.176.4.

97. Shortland [note 1], p. 218; Lilyquist and Brill [note 80], pp. 36–37. I would agree with Shortland that the piece is probably Egyptian.

98. *Ibid.*