GOLD-GLASS BEADS: A REVIEW OF THE EVIDENCE

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The study of gold-glass beads was given a considerable boost in the 1970s by Weinberg's report on their manufacture in Hellenistic Rhodes and by Alekseeva's and Boon's studies on finds from southern Russia and Britain, respectively. Nothing comparable has been published in the intervening years, but scattered new information has appeared. This paper aims to survey and review the available data on manufacturing technique, style, provenience and chronology. An attempt is also made to fit gold-glass beads into the general framework of glass history. The main focus is on the finds of the Mediterranean and related regions in pre-Islamic times. Note is taken of the continuation of the use of gold-glass beads in Medieval Europe. Conclusions drawn are usually only tentative — if not hypothetical — as sufficiently well-documented source material is scarce.

INTRODUCTION

"Gold-glass" is the generic term commonly used for any bead composed of two layers of glass with metal foil between them serving as the principal ornamentation. Other terms such as "gilt-glass," "sandwich gold-glass" and "gold-in-glass" are synonymous. Early gold-glass beads were decorated with gold foil, and the various terms alluding to gold came to be used for this class as a whole, irrespective of the fact that with the passage of time, silver and various substitutes were employed as well (the term "silver-glass" is used whenever silver-colored varieties are specifically referred to). Gold-glass beads obviously copied beads of precious metals and it has been suggested that their popularity in Egypt in the Roman period led to a reduced use of gold and silver beads proper (Shiah 1944:407).

GOLD-GLASS BEADS IN GLASS HISTORY

Basing themselves on studies made already in the 19th century, early glass historians, such as Kisa (1908:128) and Eisen (1927:8-9, 44, 194), reported on gold-glass beads, regarding them as part of the story of glass. With time, the glass historians concentrated more on vessels, and the study of gold-glass beads was largely left either to the often cursory interest of various excavators or to a few archaeologists with a special interest in beads, foremost among them Boon (1966, 1977) and Alekseeva (1978:27-32). Jewelry historians, irrespective of specialization, have primarily focussed on precious metals and, in no instance, taken an in-depth interest in glass beads.

Most kinds of ornamentation used on glass beads, such as eyes, trails and speckles, as well as molded, tooled and cut patterns, have known precursors in the second millennium B.C., but, to our present knowledge, gold-glass does not. Colorless translucent glass was known in the second millennium, as was gold and glass in combination, including glass beads covered with gold foil. However, at that time transparent stone — rather than glass, a new material, relatively speaking — was still an important medium employed to protect and enhance delicate ornamentation. A pair of elaborate gold earrings from the 14th-century-B.C. tomb of Tutankhamun are richly decorated with colored glass. However, whether the ear-stud covers, with a portrait of the Pharaoh painted on the interior surface of the frontal ones, are of quartz or glass remains uncertain. A recent British Museum catalogue of Egyptian jewelry describes the covers as being quartz (Andrews 1990:111-112, no. 92). An earlier study by Mavis

Bimson (1974) of the British Museum research laboratory identifies them as glass!

Some rock crystal ornaments with decorative gold-leaf inlay are rather close in concept to the gold-glass beads. These include specimens found in 9th- to 7th-century-B.C. contexts in Euboea, an island off the east coast of Greece, and Cyprus, and are supposedly of Phoenician origin (Higgins 1980:223, Pl. 171, no. 5.16, Pl. 186, no. 31.19, Pl. 234, e,f). It is also likely, as suggested by Barag (1990), that in some instances glass was used as a cover for gold or any other delicate ornamentation already in the 9th to 5th centuries B.C. (primarily on some of the Phoenician ivories and on Phidias' statues at Olympia). From the 4th century B.C. there are several well-documented finds of glass placed over ornamental metal. The royal tomb at Vergina in northern Greece, presumed final resting place of Philip II, father of Alexander the Great, contained examples of glass placed over patterned gold inlaid in wooden furniture and over plain gold and silver inlaid in a ceremonial shield (Andronicos 1984:123-124, 137, Figs. 75, 140). A number of finger rings found at various sites in the Greek colonies have bezels with patterned gold foil set between two layers of glass (Williams and Ogden 1994:nos. 108, 159-160).

As yet no gold-glass beads — or gold-glass vessels (bowls with a cut-out pattern of gold foil between two layers of colorless glass) — have been dated prior to the 3rd century B.C. (Harden 1968; Oliver 1969). Some written sources have been interpreted as stating that gold-glass vessels were carried in a procession of Ptolemy II Philadelphus in Alexandria in 274 B.C. (Harden 1968:41). Shiah (1944:408), when discussing gold-glass beads from Egypt, claimed that the earliest dated examples known were found with coins of the same Ptolemy. However, the bead strand referred to by Shiah (Bd. 577, now UC.40563, at the Petrie Museum, London) includes no gold-glass beads proper, only two glass beads covered with gold foil. Numerous gold-glass beads, as well as some gold-glass vessel fragments, were unearthed at Rhodes in ca. late 3rd-century-B.C. contexts (Weinberg 1971:147-148, Figs. 1-2, Pl. 82a). Although most new glass-vessel techniques have forerunners among beads and other minor objects of glass, it is not certain in this case which came first: gold-glass vessels or gold-glass beads.

Gold-glass beads were produced over a period of some 1500 years, with only minor differences. In order to distinguish between early and late beads, one has to pay close attention to slight variations in manufacturing technique and style.

TECHNIQUES OF MANUFACTURE

Both layers of most gold-glass beads were made by drawing. There are only some very rare exceptions to this rule (*see* "The European Epilogue" below, and the caption of Pl. IA). Some longitudinal striations can almost always be observed on the outer layer; some of them rather faint, others strong. The same is true of the interior layer, whenever it happens to be exposed. Drawing, as a common beadmaking technique, was introduced sometime prior to the introduction of gold-glass beads. The insertion of a bubble of air into the glass before the actual drawing of the tube can be accomplished by variations of either rod-forming, tooling or blowing techniques. An examination of finished beads rarely enables us to establish which of these methods was used. Gold-glass beads have sometimes been described as "blown and drawn" (e.g., Callmer 1977:51-53 *passim*). However, this can be misleading and should be avoided.

The following reconstruction of the manufacturing process is suggested: A drawn tube was, after cooling, covered with a very thin layer of metal foil, probably attached with the aid of an adhesive. Another, slightly larger, premanufactured tube was then slipped over the first (these tubes are likely to have been premanufactured in some quantity so that well-fitting examples would always be on hand). A section of the double tubing was subsequently reheated while held on a rod or wire. Some caution was needed as the gold would suffer damage if overheated. The use of the rod or wire ensured the artisan a certain distance from the heat and kept the perforation open.

When the ends of the beads are examined, one finds that they differ and it is clear that they were finished in various ways. Some beads with neatly smoothed ends were finished individually by hot-working. This does not exclude the use of some tool for dividing the tube into beads. Any patterned

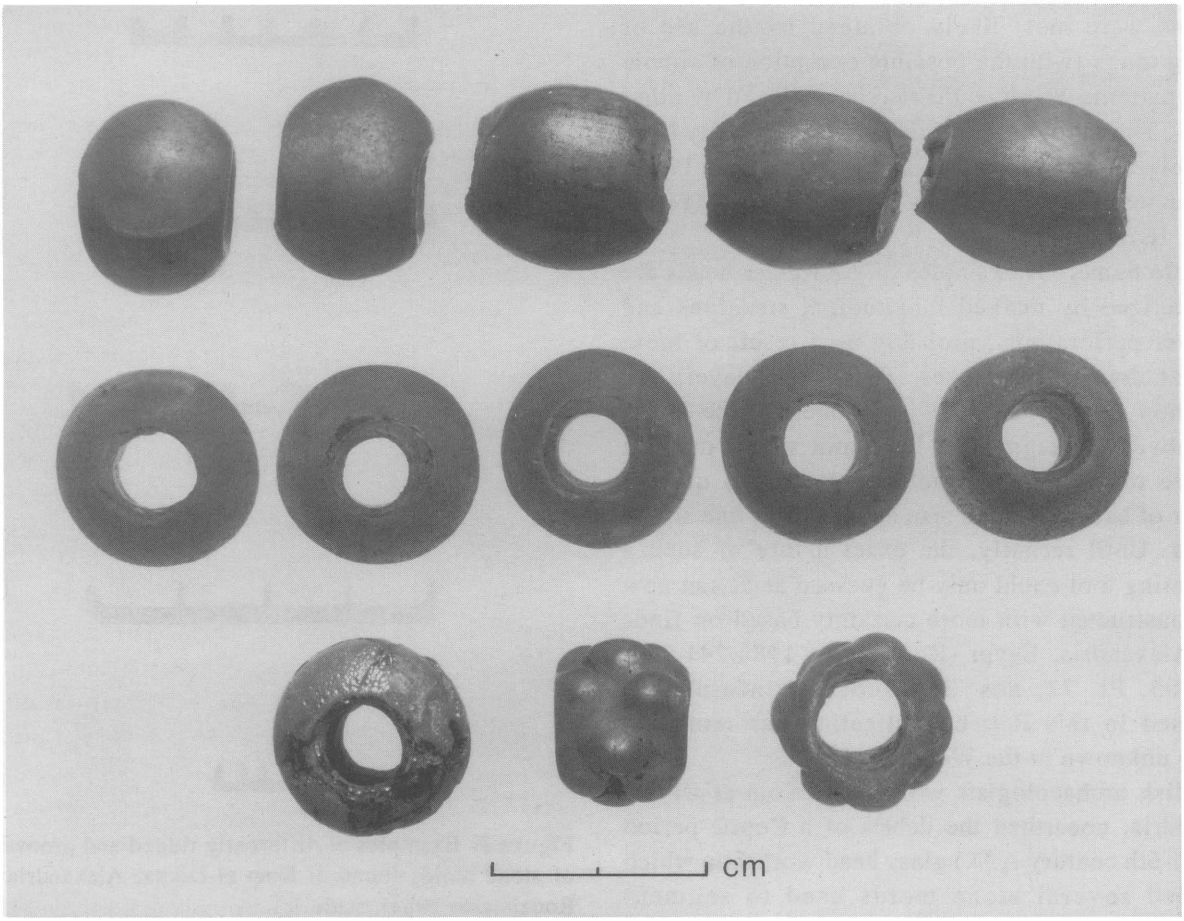

Figure 1. Various gold-glass beads finished individually by hot-working (Israel Museum, Jerusalem)(all photos by Zev Radovan).

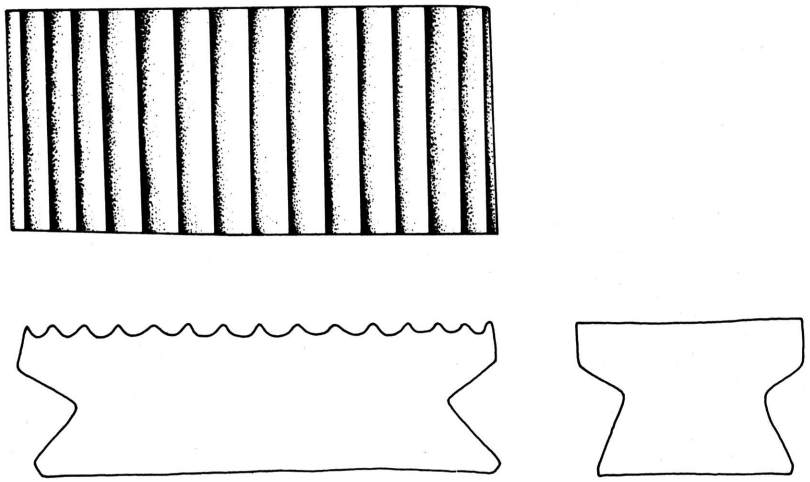

Figure 2. A well-preserved stone sectioning mold for the production of 14-segment bead tubes from Kom el-Dikka, Alexandria (after Rodziewicz 1984; all drawings by Pnina Arad); scale 1:1.

surfaces were most likely obtained by the use of shaping tongs (with the possible exception of simple ribbed patterns which could also be achieved by other means). The individually finished beads usually have relatively large perforations and the two glass layers often appear to be of roughly equal thickness (Fig. 1 and Pl. IB).

More numerous examples of gold-glass beads are characterized by marked longitudinal striations and narrower perforations, probably as a result of more efficient drawing processes. Their outer layers are frequently thinner than the inner ones. These beads were obviously segmented by a tool which made it possible to divide the combined tube into quite a number of beads of equal size and shape in one single process. Until recently, the exact nature of such a segmenting tool could only be guessed at. It can now be reconstructed with more certainty based on finds from Alexandria, Egypt (Rodziewicz 1984:241-243, Fig. 265, Pl. 72, nos. 359-366; the information contained in this Polish publication has remained largely unknown in the West).

Polish archaeologists working at Kom el-Dikka, Alexandria, unearthed the debris of a Coptic-period (ca. 4th-6th century A.D.) glass bead workshop which included several stone molds used to segment "ordinary" single-layered drawn beads. The report

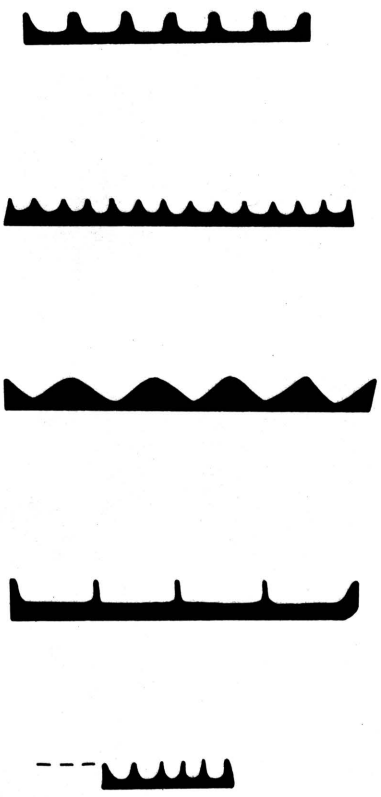

Figure 3. Examples of differently ridged and grooved tops of stone molds found at Kom el-Dikka, Alexandria (after Rodziewicz 1984); scale 1:1.

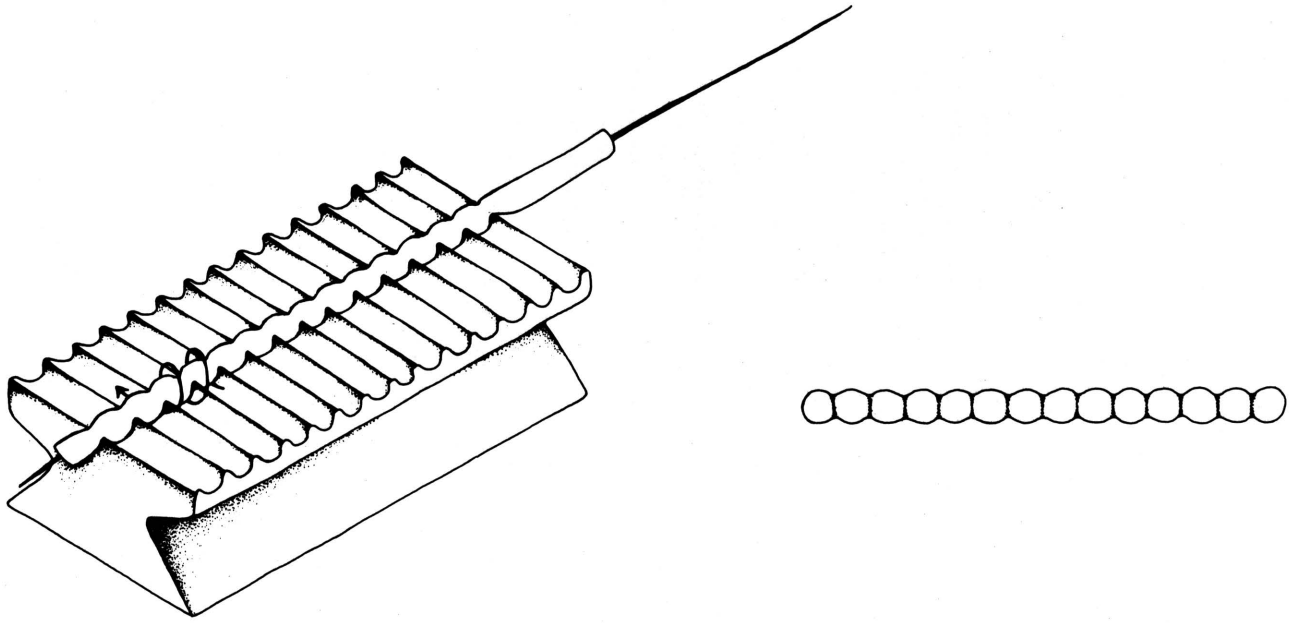

Figure 4. The rolling of a double gold-glass tube on a mold (left) similar to the one shown in Fig. 2 to produce the 14-segment bead tube on the right.

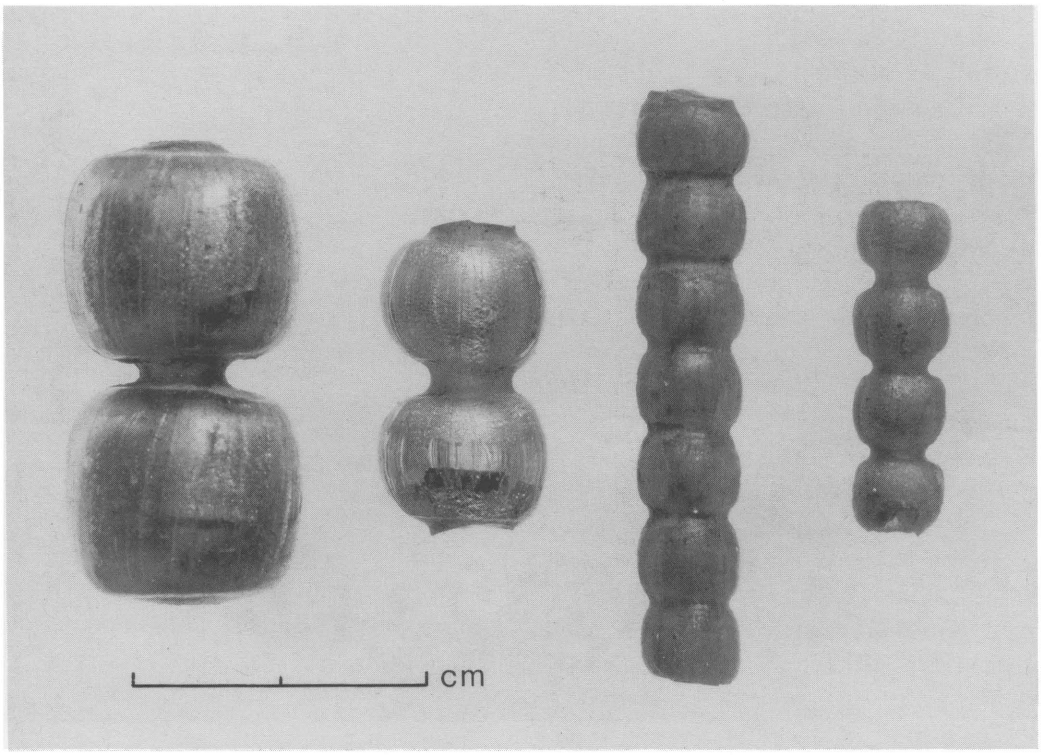

Figure 5. Segmented gold-glass beads of different sizes and shapes; the small-sized beads were very possibly used unseparated (cf. Pl. ID, small necklace in top center)(Israel Museum, Jerusalem).

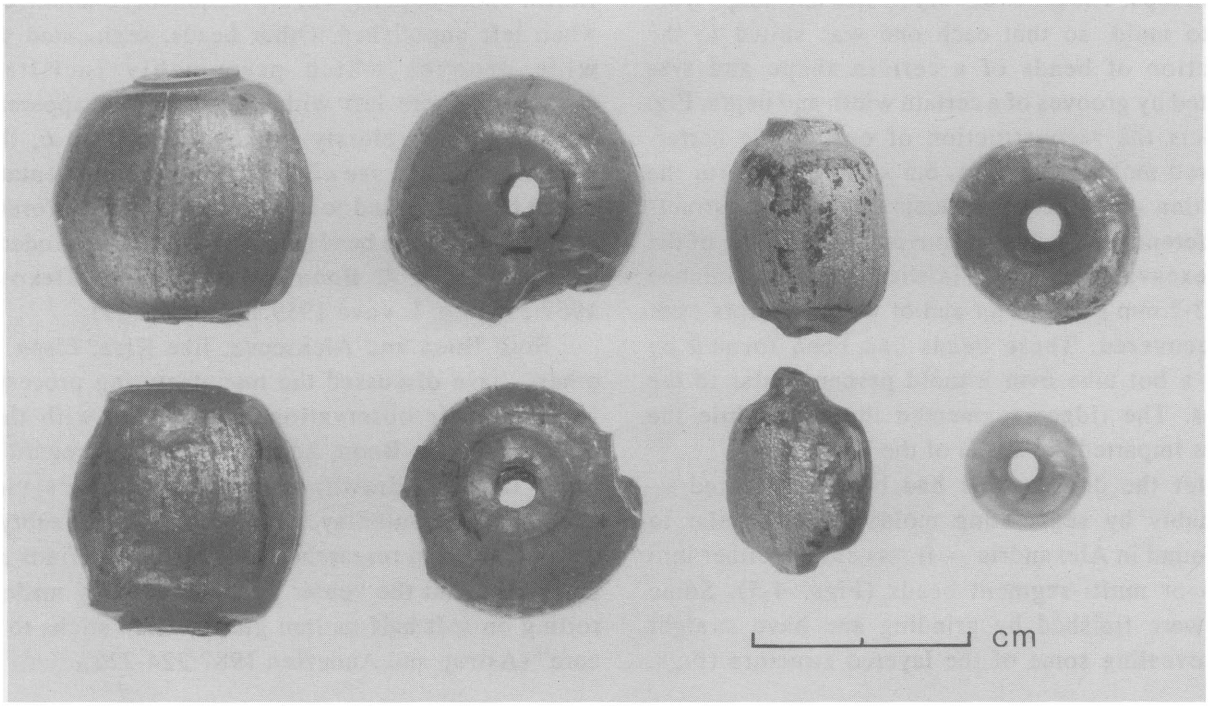

Figure 6. Differently cold-finished gold-glass beads; note the beads with jagged edges in the third column from the left (Israel Museum, Jerusalem).

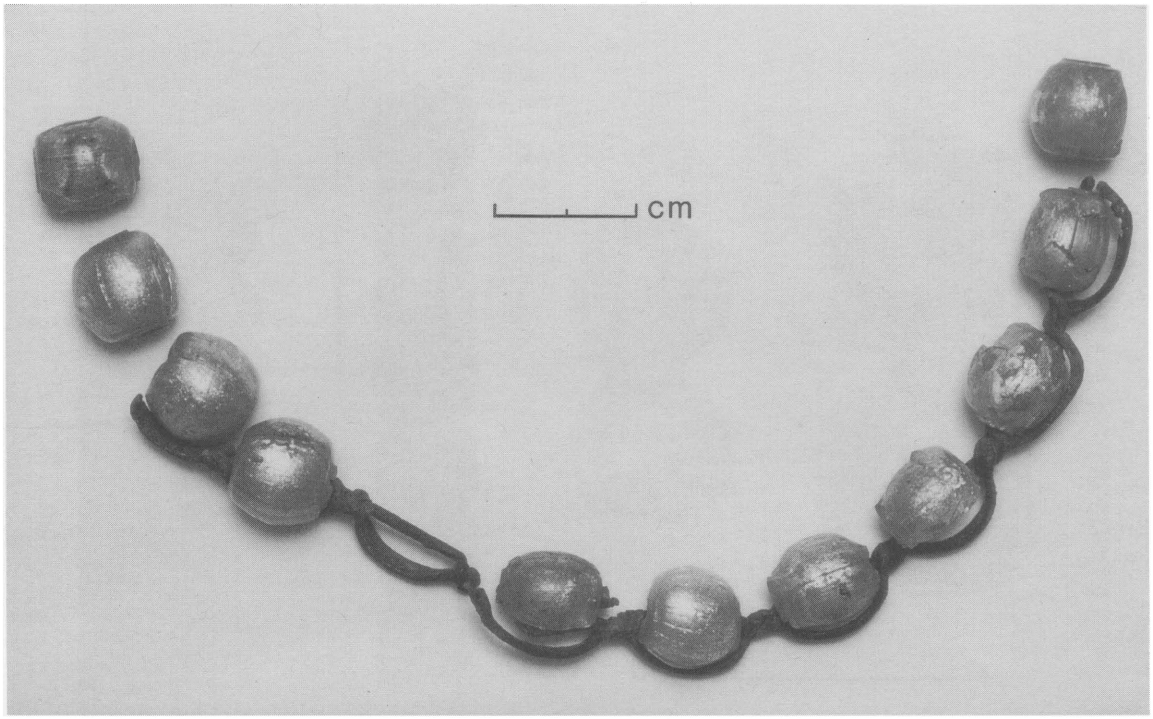

Figure 7. Gold-glass beads 6-8 mm long on the original decorative leather string; probably Roman (Egypt?) (IMJ 84.35.97, gift of the Meyerhoff family, Baltimore, to "American Friends of the Israel Museum").

provides information on eight different freestanding molds made of granite, schist or limestone with grooved tops. The grooves vary in size and shape from mold to mold, so that each one was suited to the production of beads of a certain shape and size separated by grooves of a certain width and depth. Fig. 2 depicts the reconstruction of one of the better-preserved molds, with a ca. 6.5 x 3.0 cm top for the production of 14 bead segments. Fig. 3 reconstructs the differently ridged and grooved tops of some of the other excavated molds. Finished and semifinished beads 2-7 mm in diameter and of various colors were also recovered. These beads had been formed by rolling a hot tube over a mold perpendicular to the grooves. The ridges segmented the tube while the grooves imparted the shape of the beads.

After the double tube had been segmented — presumably by segmenting molds rather similar to those found in Alexandria — it was cut up, either into single- or multi-segment beads (Figs. 4-5). Some beads were finished by grinding and have straight ends, revealing some of the layered structure (Figs. 6[two left columns]-7). Some may have been lightly polished, but many more were cut without any further finish. Those expertly cut are reasonably smooth, even when left unpolished. Other beads, segmented with wide grooves which presumably facilitated separation, were left with ragged edges, apparently having been carelessly broken apart (Fig. 6, third column from left; *see also* Fig. 14). The segmentation of the tube often led to a widening of the perforation at the center of the bead (Fig. 8) (Astrup and Andersen 1987:224, Fig. 4; Boon 1977:Figs. 1-3; Dekowna 1967:Fig. 3,b; L'vova 1959:Fig. 5, no. 11).

Both Boon and Alekseeva, like Kisa, Eisen and others, have discussed the manufacturing processes. Most of their observations are in line with those outlined above. Boon, however, does not regard the outer layer as drawn; and, in Alekseeva's view, drawing of the outer layer applies only to one subtype. Two Norwegian researchers of Viking Age finds also concluded that the "outer glass is probably made by rolling on soft half-molten glass, which sticks to the core" (Astrup and Andersen 1987:224-225).

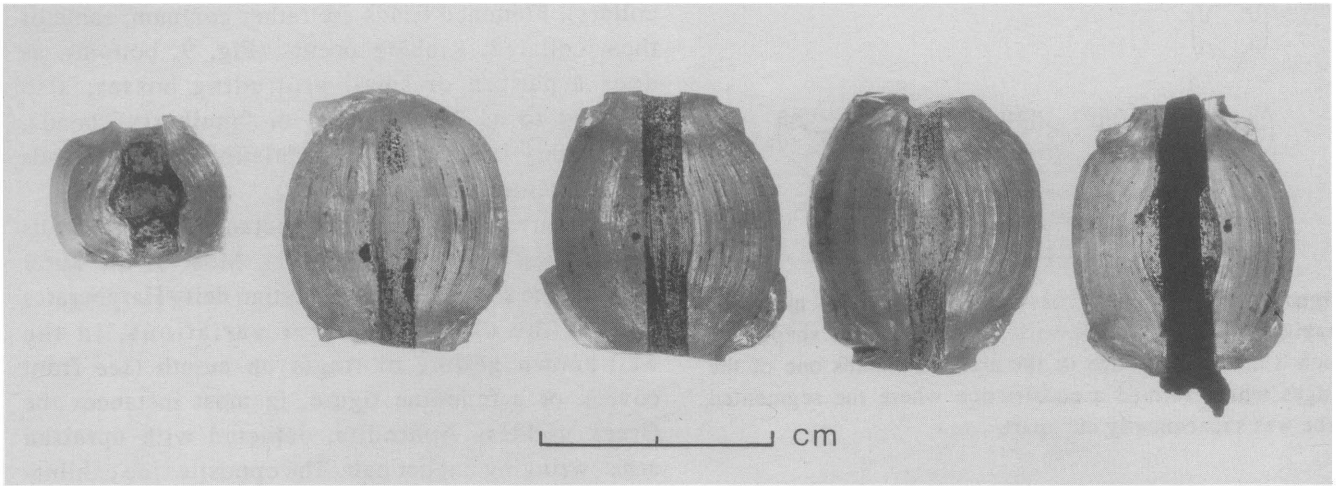

Figure 8. Broken gold-glass beads showing the typical widening at the center; the specimen on the right still has its original leather string (Israel Museum, Jerusalem).

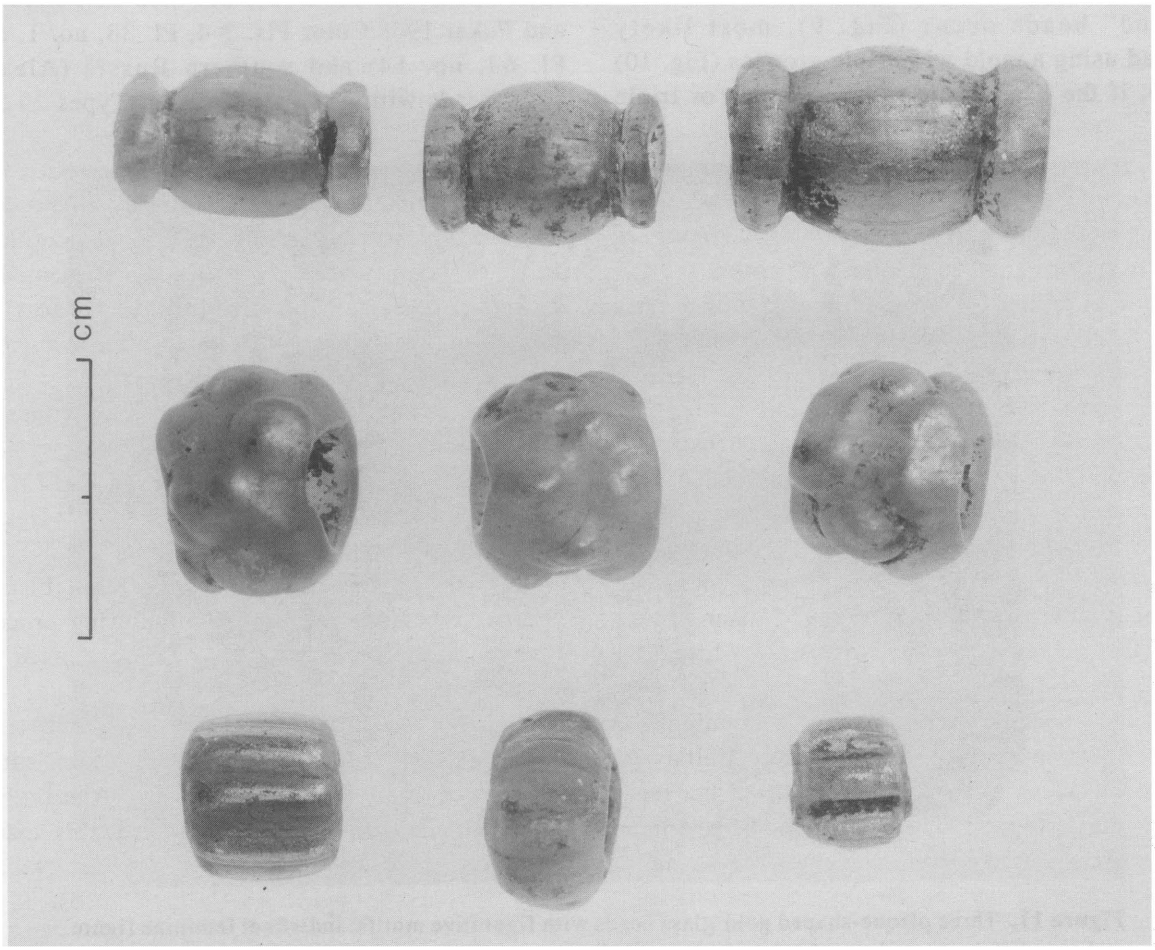

Figure 9. Examples of collared, granulated and ribbed gold-glass beads (Israel Museum, Jerusalem).

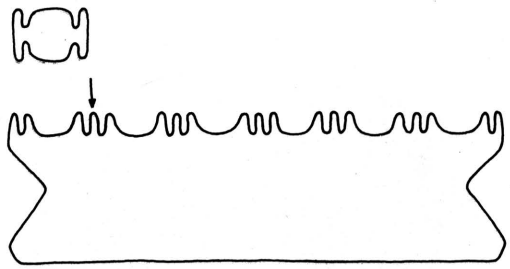

Figure 10. Suggested cross-section view of a mold for making "collared" beads with a finished bead shaped on such a mold just above it; the arrow indicates one of the ridges which formed a constriction where the segmented tube was subsequently cut apart.

SHAPES AND PATTERNS

The majority of gold-glass beads are plain, without pattern, made in various spherical and cylindrical shapes. There are, however, also beads in other shapes and/or with patterned surfaces. "Collared" beads occur (Fig. 9), most likely segmented using a mold with triple grooves (Fig. 10) (or more, if the beads were to have double or triple collars). Flattened beads are rather common, some of them collared. Ribbing occurs (Fig. 9, bottom), as does a pattern of small protruding bosses, also referred to as "granulated" or "mulberry" beads, presumably imitating true granulation on stone beads (Fig. 9, center; see also Fig. 13).

Of particular appeal are rectangular disk beads with figurative motifs (Fig. 11). Most of the latter have on one side either the Egyptian deity Harpocrates (Horus the child) in minor variations, in the well-known gesture of finger on mouth (*see* front cover), or a feminine figure, in most instances the Greek goddess Aphrodite, depicted with upraised arms, wringing out her hair. The opposite side exhibits a lattice pattern of small bosses (Fig. 12). These beads, although relatively rare, are well documented. They have been found primarily in Nubia (Dunham 1957:108, bottom, Fig. 73, Pl. 66,F; Shinnie and Bradley 1980:Item 2515, Fig. 68; Woolley and Randall-McIver 1910:75), but also in Persia (Sono and Fukai 1968:Color Pls. 3-4, Pl. 38, no. 1, center, Pl. 64, no. 14) and southern Russia (Alekseeva 1978:Beads with an inlay of metal, Types 29-30, Pl.

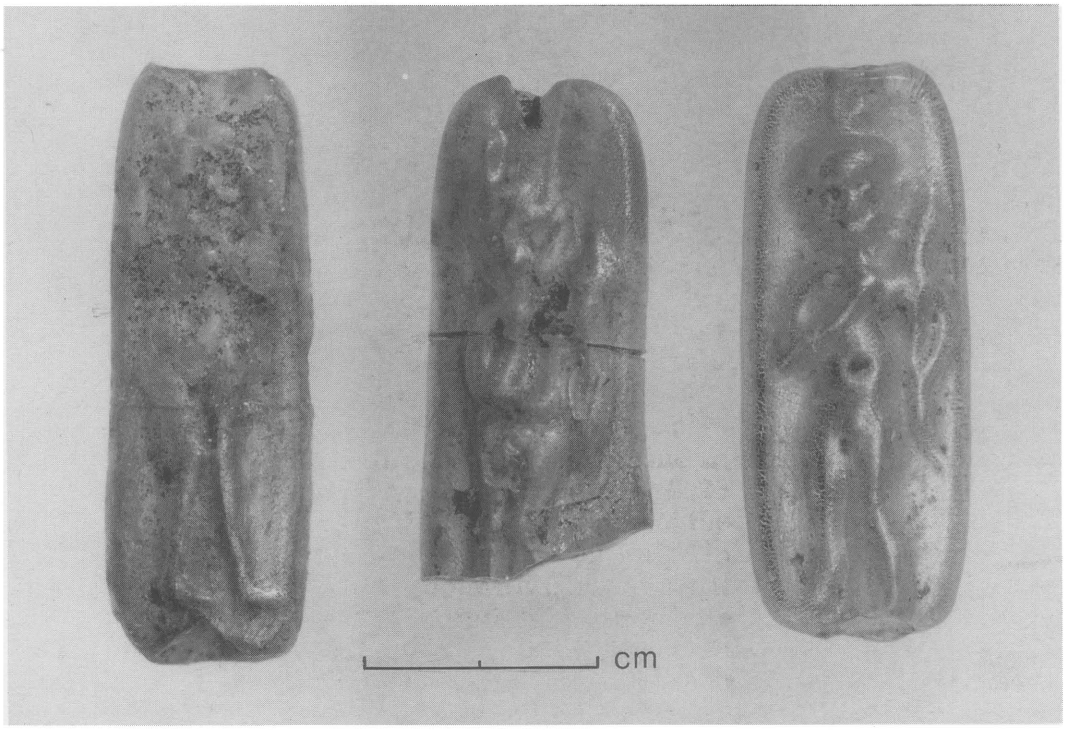

Figure 11. Three plaque-shaped gold-glass beads with figurative motifs: indistinct feminine figure and two different versions of Harpocrates with finger on mouth and "horn of plenty" at the side; said to come from Egypt (Israel Museum, Jerusalem, nos. 77.12.330 and 77.12.710, Dobkin collection; private collection, Jerusalem).

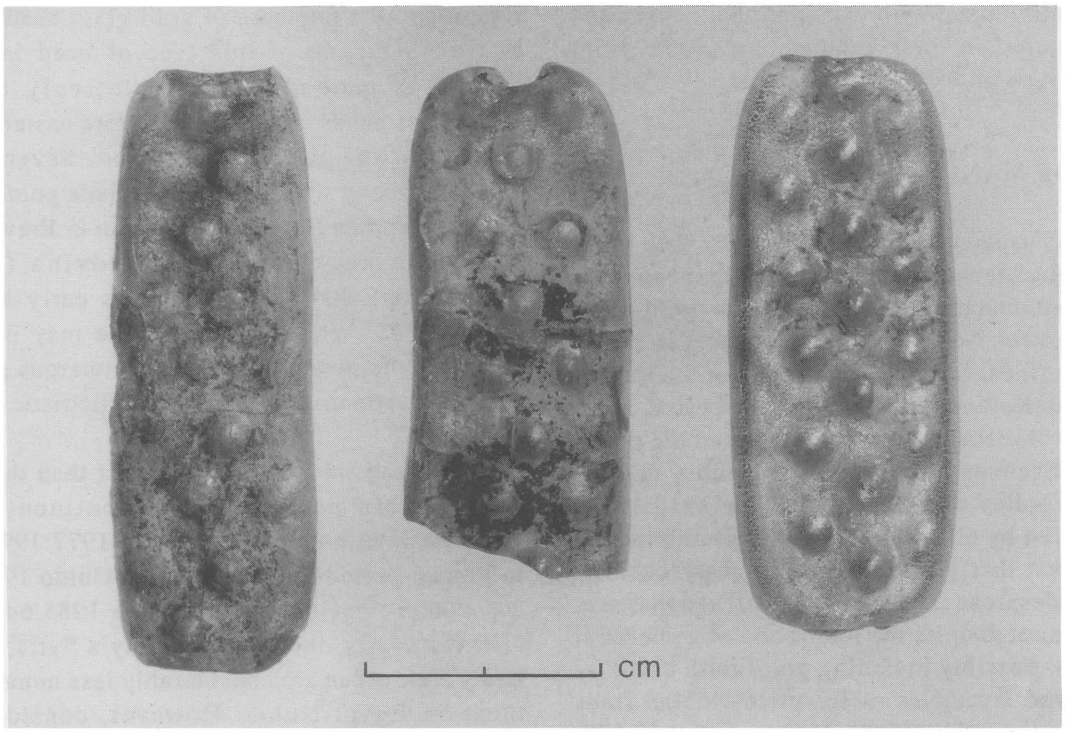

Figure 12. The backs of the beads in Fig. 11.

26, nos. 62-66). There are also other rare figurative representations. A disk bead depicting an animal (a dog?) is displayed in the Metropolitan Museum's Egyptian department, Study Gallery 28a, in addition to the more common representations of Harpocrates and Aphrodite. Also, some vessel-shaped pendants in the round are illustrated by Alekseeva (1978:Pl. 26, nos. 39-40).

COLORS AND INLAYS

The two glass layers are identical in most cases: usually colorless, translucent if not transparent, often with a greenish or yellowish tinge. There are exceptions, though, and some low-quality beads with inferior foil are made of yellow glass to make them look more golden. There are some exceptional beads made in strong colors and some such pieces were found at Rhodes (Pl. IA)(Weinberg 1971:146). There are also beads of yellowish glass over inferior metal foil which appear to be copying colorless glass with gold foil. One has also to take note of the fact that there are beads decorated with gold foil under colorless glass which do not fit our definition of gold-glass beads. Among them are the luxurious so-called "gold-band" beads — specimens with variously colored trails, including some with gold foil — and stratified eye beads with gold foil strata (e.g., Alekseeva 1975:Eye beads, Types 73, 87a, 119, 125, 133; 1978:Striped designs, Types 289, 292). One should also be aware that the Celtic or "La Tène" beads of the final centuries of the first millennium B.C. have been consistently described by their principal researchers, all writing in German, as being decorated with foil (*Folie*) when referring to a layer of yellow *glass* placed under colorless glass (Gebhard 1989; Haevernick 1960; Zepezauer 1993).

Gold-glass beads with patterned foil, of the kind found in vessels and inlays, are not known. Silver foil (or a substitute) was probably used not only to copy silver beads, but also pearls which came into use only during the Hellenistic period (Pl. IC). Of whatever metal, the foil was always very thin (according to Alekseeva [1978:27], it could be as thin as 0.0001 mm), and this has added to the difficulties of testing the composition of the metal foils. Their quality varies considerably and different substitutes were undoubtedly used. A study of medieval beads by Haevernick (1954:especially nos. 74, 107) showed the silver foil

to be frequently mixed with iron, and that copper and lead also figured in their composition. Some paint mixtures may also have been used.

ORIGINS OF MANUFACTURE

Egypt has usually been considered the birth place of the gold-glass technique, and was no doubt an early and important manufacturing center for gold-glass beads and vessels. Neighboring Nubia has also provided very rich finds. Only the excavators of the Roman cemeteries at Karanog and the Coptic-period royal cemeteries at Ballana and Qustul suggested the possibility of indigenous manufacture in Nubia (Emery 1938:182; Woolley and Randall-McIver 1910:17), a view not shared by others. It is now becoming increasingly apparent that glass beadmaking was considerably more widespread than once believed and that one, therefore, cannot dismiss the likelihood of some local production — possibly including gold-glass beads — south of Egypt. Examples of Egyptian-Nubian finds appear in Brunton (1930:27, Pl. 46, nos. 144, 146-148, 153, 156, 182, 194-200), Dunham (1957:for example, 80, Fig. 51, 21.12.193a-b, Pl. 65R; 104, Fig. 71, 21-2-558, 564d; 118, Fig. 78, 22.1.22h; 1963:for example, 178, Fig. 132f, rows 4, 6, 822.2.559a-d; 184, Fig. 134a, bottom, 22.2.598k), Emery (1938:Pl. 43, Types 1, 30, 40-42, *see also* Pl. 47A), Holland (1991:113, Pl. 79), Shiah (1944:400-402, 407) and Woolley and Randall-MacIver (1910:74-77, Pl. 40).

Hellenistic Rhodes is the only identified site for the early manufacture of gold-glass beads. Only a preliminary report has as yet been published, but it suffices to show the importance and scope of the finds (Weinberg 1971). Greece and the Aegean region were seen in the past as playing only a very peripheral role in glass history, but a different reality is now emerging — and not only as concerns gold-glass. However, very little is known regarding the continuation of gold-glass bead production and use in Rhodes and/or other parts of Greece.

The southern Black Sea littoral has yielded numerous gold-glass beads of Hellenistic-Roman times. More than 9500 specimens were inventoried by Alekseeva (1978:27-32), and she dates some of them as early as the 3rd century B.C. Many of these closely resemble the Egyptian finds and quite a few may well have been imported from Egypt and elsewhere. However, glass beads were certainly made in the region and the numbers of gold-glass beads are such that a production of this type of bead in southern Russia is probable from relatively early on. Gold-glass beads also appear in more easterly regions already in the Hellenistic period. Several locally excavated bead strands, which include gold-glass, are in the Armenian Historical Museum in Erevan. Some, such as a necklace from Golovina (personal observation), have been dated as early as the 4th century B.C. While the exact date may be open to question, the presence of rather numerous gold-glass beads in Armenia during the Hellenistic period is certain.

European finds in regions other than those of the southeastern portion of the continent are less numerous and not as early (Boon 1977:197; re finds in Roman-period Europe, *see also* Guido 1978:93-94, 205-206; Tempelmann-Maczynska 1985:64-65, Type 387). Similarly, the finds in today's Syria, Lebanon, Israel and Jordan are considerably less numerous than those in Egypt-Nubia. However, considering the quality, versatility and volume of Roman-period Syrian glass production, which in all probability included high-quality beads, it would be surprising if gold-glass beads were not made there, notwithstanding the lack of published sources. Persia is another country likely to have produced gold-glass beads and the evidence, although not rich, points to a rather early date (Fukai 1977:Pl.50, top rows; Sono and Fukai 1968:Color Pls. 3-4; these few sources are boosted by evidence from the antiquities trade). India is among the countries suggested as home to gold-glass bead manufacture (Dikshit 1969: 56-58). Although indications of specific production sites are lacking, we believe that gold-glass bead production had spread to several sites in the Mediterranean region and other parts of Europe and Asia by the Roman period, if not already earlier.

It is necessary to stress that any lack of evidence is never quite so negative on closer inspection. Gold-glass beads do not weather well. The layered structure of the glass and the flimsiness of the foil are contributing factors. Many examples, on losing their original brilliance, were certainly overlooked; quite apart from the fact that excavators never paid much attention to bead finds, if not of exceptional style or date. This is especially true in those regions where there are any number of more spectacular finds to

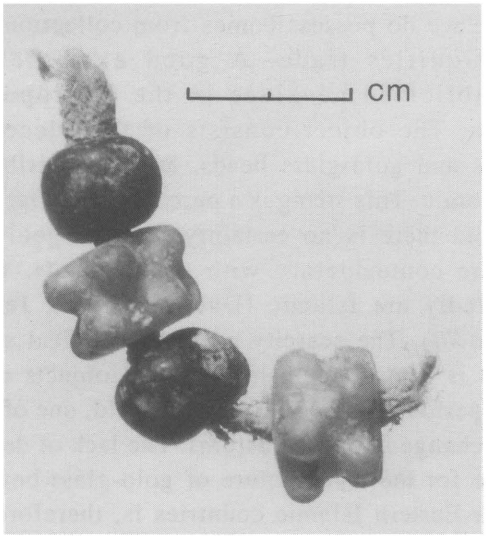

Figure 13. Two of the "granulated" gold-glass beads from En Gedi, found on the original linen string (courtesy of the Israel Antiquities Authority).

focus on (note the different states of preservation of the gold-glass beads in Pl. ID).

Boon (1977:197-200) has shown Roman gold-glass bead finds in Britain to be quite numerous, contrary to what might have been expected. Likewise, a closer scrutiny of bead groups in Israel has revealed that gold-glass, although never common, was not quite as rare as once assumed. Not surprisingly, several finds are from arid zones, such as En Gedi, Massada and Moa. Other find sites include Hanita, Nahariya, Shikmona, Mishmar HaEmek, El Makr and Shubeika. Only the finds from Hanita and En Gedi have been published (Barag 1978:45, Fig. 18, nos. 113-114; Hadas 1994:11, 56, Fig. 27, Color Pl. 10). At En Gedi, an oasis on the shores of the Dead Sea, gold-glass beads were found with other beads of glass and stone (Pl. IIA) in well-preserved wooden coffins dating to around the beginning of the 1st century B.C. Among the gold-glass beads, 15 dainty pieces had a pattern of "granulation" in two or three rows. Three glass beads were decorated with gold foil without an outer layer of glass. A few of the beads, gold-glass among them, were still on the original linen string (Fig. 13). Published beads from Jerusalem, Huqoq and Ashdod are very possibly gold-glass, although not described as such (Baramki 1935:Pl. 80, no. 5; Dothan 1971:Pl. 94, nos. 17-21; Ravani and Kahane 1961:121-122, 130-132, Pl. 18, no. 6). Still, by any reckoning, the absolute numbers of gold-glass beads found in Palestine are too small to indicate local production. However, if once the very idea of any such production was beyond consideration, this is no longer so (regarding finds in the eastern Mediterranean region, other than Palestine, *see* Baur 1938:546; Chehab 1986:Pl. 32, no. 4[?]; Negro Ponzi 1971:No. 46[?]; Smith 1973:Pl. 80, Ck; Strommenger 1980:Fig. 61).

Trade versus local production is a pertinent question at most times. The disk beads with figurative motifs discussed above are a good example of the issue. This is an easily distinguished homogenous type, which, although never common, has been rather narrowly dated. The beads have been found in regions quite distant from one another. They may all have been made in one center and exported elsewhere, or made in different locations by similar methods, possibly using imported molds. The existence of long-distance international contacts is certain, but it will always be difficult to establish when trade exchanges consisted of raw materials, implements and/or the artisans themselves, rather than finished goods.

To throw light on the origins of gold-glass beads, a compositional analysis was made of Roman period finds: one from Caerleon, Britain, one from Faras, Nubia, and one from Panticapeum, southern Russia. Test results showed the British and Nubian beads to be so close in their constituents that the glass might be from the same source (Dekowna in Boon 1977:202-206). However, it seems doubtful that even tentative conclusions can be drawn from so small a sample.

CHRONOLOGICAL DEVELOPMENT

The gold-glass beads found at Rhodes, representing various stages of fabrication, are very significant, showing this production as an already-stablished craft, past the experimental stage, at a time approximately fixed by Weinberg (1983) as the late 3rd century B.C. Accordingly, gold-glass beads were first made sometime prior to this time, although they only became commonplace somewhat later.

The earliest gold-glass beads have a strong golden color and were almost certainly made with good gold foil. They have plain surfaces, without patterns, and are of slightly irregular sizes and shapes, indicating that they were shaped individually, with smooth hot-finished ends. Pattern-molded surfaces appeared relatively early. There was more diversity during the

early Roman period than at any other time, with various patterned types being produced. However, this period also saw the introduction of new techniques which, in time, would lead to increased production, but less diversity.

The luxurious beads with figurative motifs appeared for a relatively short time: from the middle of the 1st century B.C. to the middle of the 1st century A.D. The patterns of small bosses (granulation) known from the late Hellenistic and early Roman periods went out of fashion during the 1st century A.D., but cruder beads with larger bosses came into use. Some ribbed beads continued to appear. Already in the Roman period, most gold-glass beads can be described as mass-produced, being strongly striated with narrow perforations. "Collars" came into fashion and silver foil was used, but remained for a long time less common than gold foil. Many beads were left segmented, not broken or cut apart. Silver-glass, collared and segmented beads become well-known during the Roman period, but may have forerunners at the end of the Hellenistic period.

One can be rather certain that the technical differences between beads finished individually by hot-working and beads shaped in multiple numbers using segmenting molds are temporally indicative: the first type is mainly Hellenistic and early Roman; the second is mainly Roman or later. However, considering the time and space involved, there would have been some exceptions to the rule, as well as "hybrid" types, and our information is still too spotty to permit other than very general conclusions.

The production of gold-glass beads continued in the Near East during the late Roman-Byzantine period. There is not much variety and patterned surfaces are rarely seen. Quality is frequently low with an increasing number of beads carelessly broken apart. However, there are reasonably well-made beads as well, as exemplified by the finds at Ballana and Qustul in Nubia (Emery 1938). It is interesting to note that some of these particular gold-glass beads were used as part of elaborate trappings for buried horses! (Emery 1938:201, cat. no. 84).

THE ISLAMIC NEAR EAST

There is no definite information on gold-glass beads in the Near East during the Islamic period. The evidence we do possess comes from collections and the antiquities trade. A good example is a well-publicized necklace in the Metropolitan Museum. The object consists of trail-decorated pendants and gold-glass beads, and is described as early Islamic. This string is a purchase (Pfeiffer Fund 1973) and there is no certainty that the gold-glass beads are contemporary with the pendants, which undoubtedly are Islamic (Dubin 1987:92; Jenkins 1986:no. 77). The scarcity of archaeological source material is typical of many kinds of objects of the Islamic period. The reasons are manifold, one of them being a change in burial customs. The lack of definite evidence for the manufacture of gold-glass beads in the Near-Eastern Islamic countries is, therefore, not decisive. Egypt and Syria are likely to have continued their gold-glass bead production during the early Islamic period. Even so, it seems safe to assume that the majority of the gold-glass bead-producing centers were located outside the eastern Mediterranian countries during this time.

THE EUROPEAN EPILOGUE

The medieval European gold-glass bead finds are extremely numerous when compared to the contemporary eastern Mediterranean ones. This rich material, a continuation and outgrowth of the Greco-Roman beads, reached regions that previously had hardly been associated with this type of bead.

The Migration-period graves (primarily 5th-7th centuries A.D.), known for their abundance of glass beads generally, contained gold-glass beads (there is no synthesizing study of Migration- period beads, but, as they figure in every relevant excavation report, albeit with few details, there exists a vast fund of data which cannot be detailed here; *see* Boon 1977:201-202). From the 6th century onward, silver-colored foil became very common, often outnumbering gold. The finds from parts of Germany, northern France and Belgium are so numerous that Boon (1977:201) sees local production as "certain." Gold-glass beads are by no means restricted to northwestern Europe, being found in various parts of central and eastern Europe as well. They are well-known from Viking-Age Scandinavia, primarily the 9th-10th centuries (Callmer 1977:Bead group E, "drawn multibeads;" the distinction between

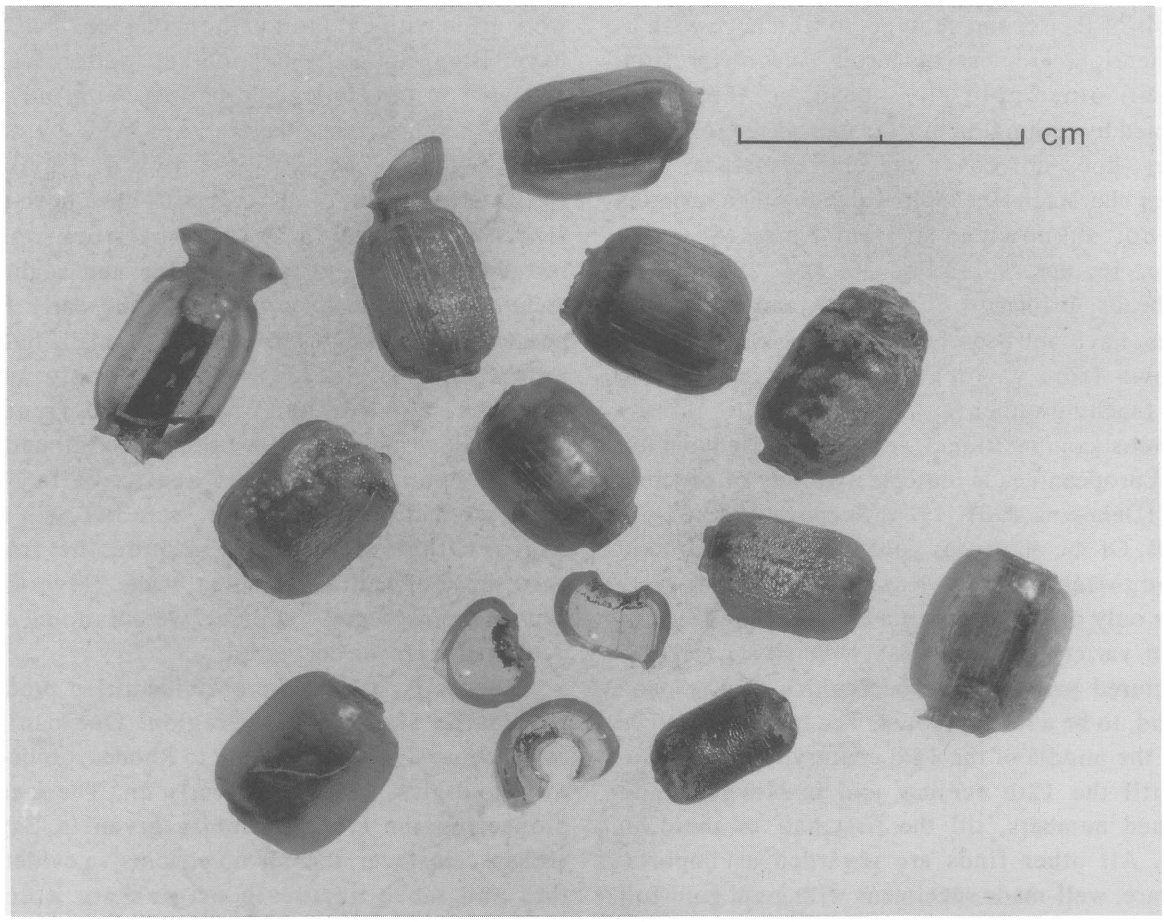

Figure 14. Hollow gold-glass beads: brownish-yellow outer tube over a narrow inner tube covered with a dark metallic layer (right); a deliberately broken bead (left)(Israel Museum, Jerusalem, no. 86.67.22).

segmented beads with and without foil is not always clear in this publication). The beads were very popular in Russia and some other eastern European countries, from the Baltic to the Black Sea, with a quantitative edge to the south. A peak was reached in the 11th century. Numbers decreased thereafter, but in some regions the beads continued into the 13th century. Quality is often inferior, rarely reaching above the mediocre. Patterned surfaces are rare.

Two subtypes can be distinguished from the others on technical grounds. The first, "hollow" gold- glass beads, consists of two tubes, as is commonly the case, but the interior tube is narrower than usual and the two tubes touch only at the point of segmentation. The glass is brownish yellow and the metal foil is silver colored (Fig. 14). These are some kind of "economy" beads which achieve a reasonably good simulation of true gold-glass. It is an ubiquitous variation seen occasionally in the Near East, but better known among European finds. Crude examples of this subtype were uncovered at Staraja Ladoga, Sarkel-Belaia Bezha (L'vova 1959:326-327) and the Varninsky burial site (L'vova 1983:especially groups 204, 207), all dating to the 8th-11th centuries (see also Haevernick 1954:nos. 128-131). Earlier beads of this subtype have also been reported. Many were found at Panticapeum; they were attributed by Alekseeva (1978:Glass with a layer of metal, Types 31-33, Pl. 26, nos. 72-78) to the early centuries of the Roman period in spite of the fact that she described them as "undocumented." One seemingly similar bead, found at Vitudurum, Switzerland, was also recorded in an early Roman context (Rütti 1988:94-95, no. 1920). There is, accordingly, a definite possibility that this subtype, best known from Medieval times, but with earlier forerunners, was already present in the early Roman period.

Beads of the second subtype, to which we wish to draw attention, are less numerous and differ from almost all other gold-glass beads as they were rod-formed by folding. In most instances the foil, gold or silver, does not cover the entire surface. This particular characteristic applies also to other varieties and is not unknown in ancient times (Scapova 1972:Fig. 16, nos. 9-11, Fig. 33, nos. 29-30). The folded beads, primarily of the 11th and early 12th centuries, have not been found in the Near East, but are known from various excavations in Eastern Europe, reaching rather far north.

Various compositional analyses carried out on eastern European beads indicate a variety of possible sources (Dekowna 1967, 1980; Scapova 1972:82-88, 176-180). Of the numerous gold-glass beads found in pre-Mongolian Russia, Russian archaeologists consider only one type, albeit a common one made of a certain variety of lead glass with silver foil and manufactured primarily in the regions of Kiev and Novgorod, to be a local product. The type began to be made in the middle of the 11th century, continuing in Kiev until the 12th century and in Novgorod, in diminished numbers, till the first half of the 13th century. All other finds are regarded as imports. Rather rare, well-made specimens with good gold-foil are believed to have been imported from one of the Islamic eastern-Mediterranean countries until the 11th century. As for the rest, including the folded beads, "Byzantium," famous for its gold-glass mosaics, is frequently suggested as the most likely source. Byzantine Corinth and Sardis, among the very few sites with published beads, have not provided any confirmation.

Eastern European gold-glass beads have been the subject of considerable interest on the local level and there is a large amount of literature in the Slavic languages, often difficult to come by in the West (on the major sources, *see* Callmer 1977, especially note 190). It is important to realize the scope of the European finds. Comprehensive studies of the European gold-glass beads and of those of Southeast Asia would be very welcome.

CONCLUSION

We estimate that the gold-glass bead industry was introduced in the early 3rd century B.C. Early beads were made with gold foil to the exclusion of silver and have plain surfaces, but molded patterns already appeared in the Hellenistic period. With only a few exceptions, both glass layers were made by drawing from the very beginning onward. During the Hellenistic period, beads appear to have been mainly finished individually by hot-working. The introduction of improved drawing and segmenting techniques, at some point during the early Roman period, subsequently led to certain small, but often unmistakable, changes: more strongly striated surfaces, smaller perforations and frequently cold-finished ends. A few beads have ground ends, having been skilfully cut apart, while others, carelessly cut or broken apart, were left with ragged edges. Other differences include the frequent occurrence of multi-segmented beads. Silver-colored foil and ornamental "collars" were introduced, but patterned surfaces decreased.

Rhodes is, as yet, the only identified production site in the Mediterranean region. One can safely assume that Egypt, in addition to Rhodes, produced its own gold-glass beads from early on. The credit for pioneering the type is usually given to Egyptian artisans. However, there is no conclusive evidence for this and more northerly origins are a definite possibility. Regions estimated as being home to gold-glass bead manufacture by the early Roman period, and possibly well before, include the Black Sea littoral, Persia and Syria. A further spread of the industry is likely to have occurred during the Roman period.

Gold-glass bead production continued in the eastern Mediterranean and related regions during the late Roman and Byzantine periods, and is likely to have lasted sometime into the Islamic period. However, the medieval European finds are considerably more numerous. This is especially true in Eastern Europe where gold-glass beads lasted into the first half of the 13th century in some regions.

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