

Fig. 1 A chart of mosaic cane patterns, arranged by types. Composite canes on the left side, cased canes on the upper right side. Molded canes on the middle to lower right side. See text for explanations. All photos by Pat Craig.



CANE MANUFACTURE FOR MOSAIC GLASS BEADS: PART I

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INTRODUCTION

I have studied mosaic glass beads, paying particular attention to the cross-section pieces, derived from complex canes, which frequently serve as decorative applications. Many hundreds of beads have been carefully examined, which span the range from ancient to modern times and which originated in such countries as Egypt, India, Afghanistan, Japan and Italy. A microscope has been used and photographic enlargements of beads have been made to study with greater detail and accuracy the component parts, such as canes. Cane pieces can appear distorted; when the canes are fractured into pieces, the break may be uneven and distort the pattern. Also, when a cane piece is applied to a bead and is heated to fusion, the pattern "runs." Cane sections, sold as "raw material" to craftspersons are relatively undistorted. These were examined for a clearer understanding of technique and designs. A fairly thorough review of the pertinent literature on glass technology was conducted. I have concluded that no single account presents a comprehensive view of cane manufacture. In fact, many sources of information abound with generalization and oversimplification and most of these entirely omit important techniques, as well as variations of techniques. Therefore, it is worthwhile to produce a structured classification of types of canes, including typical subtypes and examples of common design motifs. To my knowledge, no such classification has been attempted before now—certainly not pertaining to cane patterns derived solely from mosaic glass beads.¹ I will present the classification, and will conclude with some comments on the literature and on the popular conceptions of terms commonly used (in Part II).

UNDERSTANDING THE CLASSIFICATIONS

Figure 1 is a chart which presents the classification of glass canes used for mosaic work. Each circle represents a cane, as seen in cross section (or cane slices as they would appear prior to application onto a bead). *Every cane example has a number (from 1 to 56); and also a capital letter which indicates the major type of manufacture (A, B, C, or D).* Some cane examples may also have a lower case letter, which indicates that the cane is a *hybrid* of two or more major cane types. The arrangement of the canes begins with the simplest (1A), and builds in complexity, following in numerical sequence, which ends with the final example (56Da). This article is concerned with both technical aspects of manufacture and typical design variations. Major cane types and important pattern types are rendered in black and white, for easy reference, and generally begin a row of typical pattern variations. These are referred to as *guide canes*, and will be used to introduce the typical variations, rendered in color. *The chart is read from left to right, following the numbers. A few arrows are*

placed in the chart to help the reader follow the turns or jumps, which might otherwise be confusing.

The canes that are depicted in this article are all derived from typical African trade beads, probably made in Venice 100 to 300 years ago. I feel it would be too confusing to ask the reader to sort out examples from different sources and times, and prefer to keep the classification as simple as possible. On the other hand, there are several good reasons for choosing canes of Italian production. The art of making complex canes for mosaic work was devised in ancient times. When Venetian glassmakers were exposed to ancient glass products, they became inspired to copy the techniques, and produced similar products. This may have occurred as early as the late 1400's,² but certainly occurred by the mid-1800's.³ Since Venetians revived or reinvented the techniques from antiquity, we can be fairly safe in using Venetian products as parallel examples of those ancient techniques. The mosaic glass products fabricated in other countries are also founded on ancient traditions; Venetian examples also parallel these. Lastly, the Venetians invented entirely new variations of old techniques—a fact that has largely gone unnoticed until now—and these innovations have not been utilized where ancient traditions are still followed. In other words, Italian cane production alone represents the entire range of manufacturing techniques.

I will first discuss the four major types of cane techniques. The reader may follow the developments by referring to the guide canes in the chart. Then specific examples of hybrid canes and typical patterns will be discussed.

THE FOUR MAJOR CANE TYPES, & THEIR MANUFACTURE

Type A—SIMPLE CANES

A simple cane is composed of one color of glass, and has no discernible intended pattern. It is produced as follows: the glassmaker takes up a quantity of molten glass from a crucible, using a long iron rod called a *work iron*. This molten glass is called a *gather*. The size of the gather may be increased by being dipped into the molten glass again, as needed. The work iron is twirled to collect the glass, and is constantly rotated to hold the gather in place. The glassmaker shapes the gather by rolling it across a flat iron surface called a *marver*. Most canes are round in cross section, though the worker may produce any basic shape desired by simple manipulations; such as pressing the gather for a flat or square shape. The gather is reheated to a ductile state at the furnace, a second work iron is attached to the extreme end, and this is handed to a second worker. The two persons walk away from each other, and thus elongate the gather, which rapidly cools. This process is called *cane drawing*. A gather of glass about the size of a loaf of bread can easily be drawn to 300

Fig. 2. A group shot of African trade beads, showing the range of patterns from eye canes, to multiple eyes, striped eyes, molded flowers, and molded stars. These are examples of beads which use the canes numbered 6, 39, 42, 48 and 53 in the chart. None are composite canes. (Shown approximately natural size.)

Fig. 3. A mosaic glass bead decorated with monochromatic cane pieces. The natural diameter is ca. 3/4" across. There is no design to the arrangement of the cane pieces.

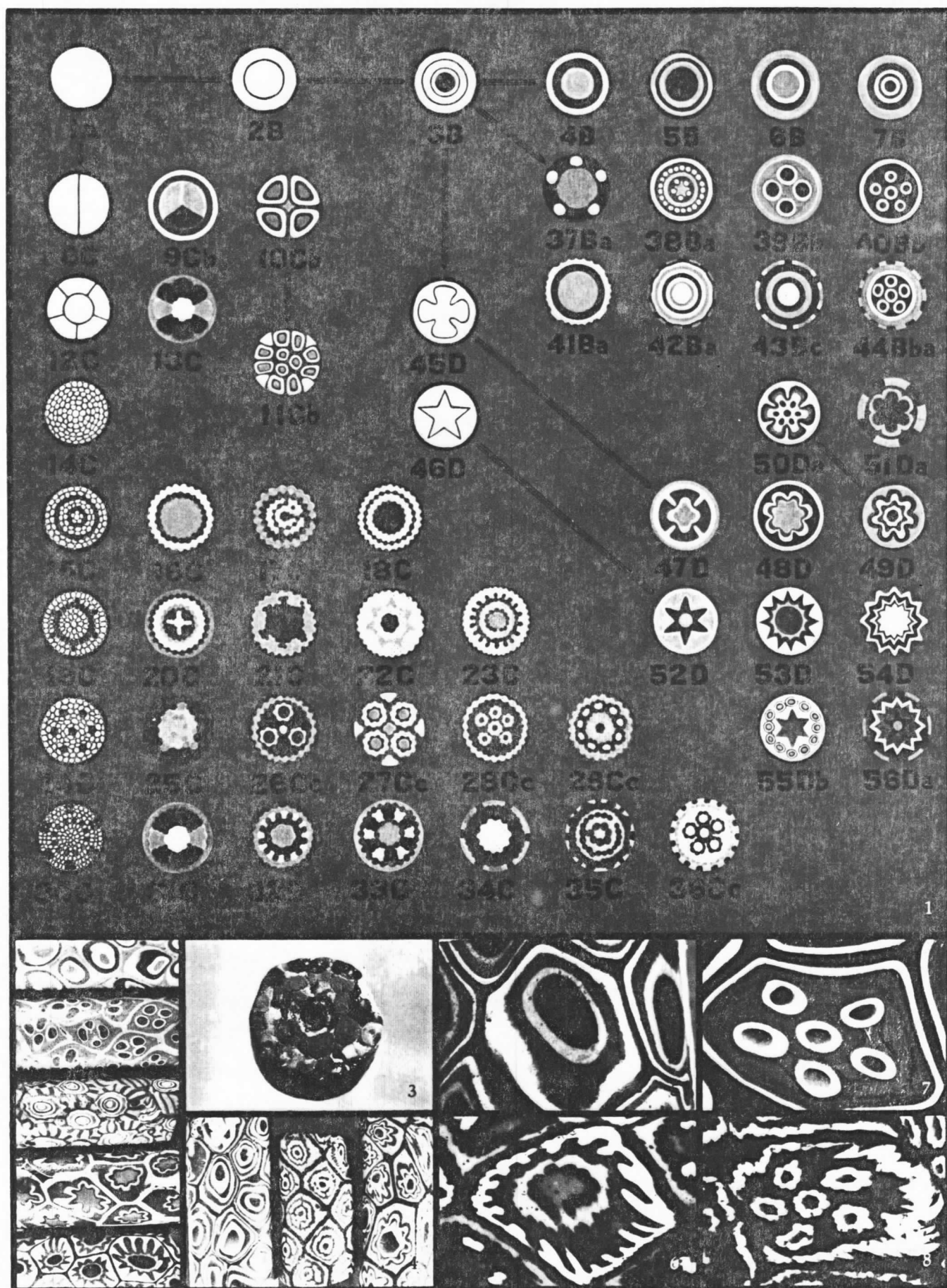
Fig. 4. A comparison shot of three beads, showing the use of cane examples 7, 17 and 49. All have the same color scheme. 7 is a cased eye cane, while 17 is a com-

posite eye cane. 49 is a molded flower cane, made the same as 7, except that the gather was molded after the red layer was applied. (Approximately natural size.)

Figs. 5 & 6 A comparison between two canes of the same color scheme. 5 is a cased eye cane, while 6 is example 23 in the chart—a composite star pattern. The difference in techniques is obvious.

Figs. 7 & 8 A comparison between two similar patterns, with the same color scheme, representing multiple eye spots. 7 is a cased cane, example 40 in the chart; while 8 is a composite cane, example 28 in the chart. Note the distinct rod units of 28.

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COLOUR

yards long, and becomes very thin.⁴ The drawn gather is broken into lengths that are easy to handle; the result is a batch of monochromatic canes. We have said that simple canes are of one color, and have no intended pattern. It ought to be understood that occasionally the appearance of a pattern occurs when the colorants of the glass are not well distributed. Thus, the process of taking the gather and twirling it gives the cane a swirled center; while the adding of material, in conjunction with marvering gives a layered appearance to the outside of the cane. This feature is particularly noticeable in opaque brick red glass (and sometimes in opaque green), and is important because it allows us to see details of layers and distinct units of complex canes. The reader is advised to pay particular attention to the red areas of canes depicted.

Simple canes seldom find application as cross-section pieces applied to a bead. However, Fig. 3 presents such an unusual bead, and the red canes show the features we have just discussed. Simple canes more commonly serve as the raw material for the production of wound beads, and for polychrome decorations on wound and drawn beads—uses which do not concern us here. Pertinent to our topic, simple canes may be compounded to make the complex canes we will next discuss. (The simple guide cane is number 1.)

Type B—CASED and MULTICASED CANES

The easiest method of compounding a simple cane is by *casing* the base gather with glass of a contrasting color. Casing may be accomplished by any of several well described methods,⁵ but we will deal with the most common and likely one. A simple gather of molten glass is dipped into glass of another color, and this compound gather is marvered to assure a good shape and cohesion of the layers (and may be reheated if needed, and is drawn as before). A cane produced in this manner presents, in cross section, a central dot surrounded by a ring of another color. If the gather is dipped into a number of different colors of glass (with the requisite marvering and reheating), the result is a *multicased cane*, which has a dot surrounded by several rings or bands. For our purposes, we need not distinguish between multicased and cased canes, as long as it is understood that one is the elaboration of the other. All are included in Type B. (Refer to numbers 2 and 3.) We may note that the technique of casing produces a single design effect—a dot with rings—which is easily likened to an *eye pattern*. The technique defines the pattern.

Type C—COMPOSITE and MULTICOMPOSITE CANES

When two or more distinct parts are fused together to make a single cane, the result may be referred to as a *composite cane*. When there are many parts fused together, we may speak of a *multicomposite cane* (and the unit parts are best regarded as *rods*). There is no clear dividing line between composite and multicomposite canes, and we will refer to both as composite or Type C canes, for the sake of simplicity. The simplest composite canes have two, three, or four elements fused together. Through interaction with one another the units change drastically in shape, where they touch, from round to angular sections (just as all fused elements are distorted when they melt into one another). (Refer to 8.) When about four or more units are fused together, there is usually an additional central rod unit, resulting in the *rosette motif*, which has wide application in canes as a pattern, or as parts of a pattern. (Refer to 12.) The multicomposite canes have a complex structure, which looks something like a honeycomb; and there are commonly 100 or more distinct rod units. (Refer to 14.)

The reader may wonder how rod units are compounded to create composite canes. Most likely there are several approaches that have been utilized by different glass-makers at different times and places. No single technique will account for all the variations that have occurred. Relatively simple composite canes (and some complex ones) are compounded from the center to the outside. First, the central units are arranged as desired, and are slowly heated in preparation for fusing (as cold rods cannot be put directly into the furnace). This simple bundle of rods is then heated to fusion (and may be marvered, if desired). Subse-

quently, more rod units may be added to the circumference of the work, to develop bands of patterns of various sorts. The bundle must be reheated occasionally so that the added units will stick to the previous layers, and become integral parts. Ultimately the bundle is heated to ductility, and is drawn out. Another method of compounding rods involves arranging all the elements as desired, in a cold state, within a cylindrical mold (or, more properly, a *form*). In this instance, the work proceeds from the outside to the middle. First, the wall of the form is lined with a ring of rods, which ultimately become the outside of the cane. Another layer of rods is added, and another. Each new ring of rods is smaller than the previous one, and demands fewer and fewer elements, all the way to the center. When the form has been filled as desired, it is placed near the furnace to be heated. It's technically important that the rods have enough space between them to allow for expansion, but they must not be so loose that the arrangement becomes disturbed by the rods getting out of place (though this does happen sometimes). The form, with its rod bundle, may be placed directly into the furnace for fusing, or the worker may wrap a molten band of glass around the protruding rods, to secure the arrangement, and withdraws the bundle from the form. In either case, the bundle is attached, in some manner, to a work iron, so that the glassmaker can handle it.⁶ (These steps are not well described in the literature, and other possible manipulations may occur, which have not been deduced.) Upon being heated, the rod bundle may be marvered and drawn as usual. The author speculates that most multicomposite canes made by Europeans (drawing upon the Venetian traditions) were arranged in the cold state, in a form. This conclusion is reached by careful examination of many canes, and may be extrapolated from related glass literature.⁷ On the other hand, we may generalize that ancient glassmakers, and those recent glassmakers who follow ancient traditions, more often fabricated composite canes in the warm state from the middle out.⁸

Regardless of the method used, the pattern developments of composite canes are basically the same. (Note that it is not possible to marver any internal layers of canes made in forms.) In both kinds of composite canes, pattern motifs are introduced by changing the colors of the rods within the rings or bands of units, and in adjacent bands. The remaining guide canes in the composite section serve to illustrate important pattern motives.

COMPOSITE CANE PATTERNS

The easiest method of making a pattern in a composite cane is by changing the colors of the rods as the bands are added. The result is a concentric ring design, which somewhat resembles the pattern of cased canes, though the structure is much more complex. Because rod elements have been fused together, the line of demarcation between the bands is bumpy or wobbly looking, compared to the smooth lines of cased canes. (Refer to 15, and compare to 3.) Again, we may regard this motif as an *eye pattern*.

Some basic patterns are created by elaborating one band, with rods of the same color placed in the next adjacent band. The effect is of a round figure with protruding *rays*. There may be a few rays, or many. This sort of pattern is easier to comprehend from the drawing (Fig. 13) than from a description. These figures seem to resemble stars or flowers, but I emphasize the subjectivity of my interpretation. (Refer to 19.)

An extremely popular motif, found in many variations, is created by using a few rods of one color, set into a ground of rods of another color; resulting in the effect of *multiple dots*, or *eye spots*. (Refer to 24.)

When a single band of rods has two colors which alternate, we have the effect of *striped bands*. (This is somewhat similar to the ray effect, except that, in this case, the striped band is of different colors than the adjacent bands. Thus, striped bands appear to be a distinct pattern, rather than as part of a previous band.) Striped bands of rods may appear in inner, middle, or outer layers of canes. Also, the rods may alternate in color in groups or clusters, making bolder striped effects. When the outermost layer of the cane has alternating rods, the striped pattern would be quite ob-

vious were the cane to be viewed from the side (and this is completely analogous to the stripes found on tube drawn beads). (Refer to 30.)

These pattern motifs are the ones easiest to idealize and classify. Naturally, since a composite cane has so many possible variables, it would be impossible to include every sort of design that might be produced. We have not, for instance, included human facial images, other representational figures, nor the rather different sorts of forms that would be developed from rod elements of unusual shapes. The author feels, however, that these really complex forms seldom occur in the design of canes used to decorate beads; and further, composite canes seem to be far outnumbered by other types of canes (namely, cased and hybrid canes—and in more recent times, molded canes).

Type D—MOLDED CANES

Molded canes are basically an offshoot of cased canes; but, there are important reasons for regarding them as a separate type unto themselves. (Note that we reach molded canes by going from 3 to 45 and 46.) The procedure for molded canes: a molten gather of glass (which may be simple or cased) is forced into an open mold, which alters the shape from round to the shape of the mold. Practically speaking, although the mold might have virtually any shape, the two most common ones are of conventionalized flowers and stars. When the gather has been molded, it is withdrawn from the mold, and is allowed to cool and harden a bit; and it is then cased with glass of another color. This serves to fill in the gaps between the *rays* or *petals*, and brings the gather back to a plain round shape (whereupon it may be molded again, or otherwise compounded, or drawn out).

What about the molds used for shaping canes? In all likelihood, molds have one feature in common; the sides of the mold slant at an angle, such that the aperture is larger at the top than at the bottom of the mold. There are two good reasons for this. First, when the gather has been forced into the mold, it is much easier to withdraw it if the sides slant (since by pulling up just a little, the gather breaks contact with the mold). Second, the gather may be shaped several times in the same mold if the sides slant. The gather is often cased and molded several times, and becomes larger with each additional layer. If a mold with parallel sides were used, there would have to be a series of molds to accommodate the enlarging gather. With a slanting mold, the first gather is shaped by being forced deep into the mold, to the smallest part. After this has been cased, it need not be forced into the mold as deep as the first time. Finally, when the gather has reached maximum size, it demands only shallow forcing into the mold to alter the shape. The fact that the gather has become thicker at one end than at the other is not a problem. The worker may marver the thicker end harder than the rest, to equalize the diameter. However, the important factor is that the gather must be drawn out anyway, and the whole thing becomes greatly diminished in size. (Imagine, then, that the gather has been stretched to 150 yards. One end may be eight millimeters wide, while the other end is eleven millimeters wide. The difference in the proportions of the gather becomes completely unimportant.)⁹ A drawing of a cane mold for a star shape is depicted in Fig. 9.

EXAMPLES OF HYBRID CANES AND TYPICAL PATTERN VARIATIONS

Having dealt with the four major cane types, I turn to the subtypes, or hybrid canes, and discuss specific examples of canes and patterns. The guide canes 1, 2, and 3 lead us to four typical examples of Type B Cased Canes (numbers 4, 5, 7, and 7, Fig. 4). These increase in complexity from four layers to seven layers. The motif of rings around a central dot suggests an *eye pattern*, especially when the dot is dark in color (as in 7). (Hybrids of cased canes will be discussed in numerical sequence after composite canes.)

Returning to guide cane 1, an arrow leads us down to Type C Composite Canes, beginning with number 8. In my experience

simple composite canes of any description are fairly rare. The few that have been seen are all hybrids, in that they have cased outer layers (as in 9); or, they are constructed from a few cased elements (as in 10 & 11). I have seen one example similar to 8, which has outer star molding and casing. The central motif may be called a *tri-color*, though we are at a lack to suggest any meaning to the design. It seems obvious that 10 and 11 are intended to be multiple eye patterns. Note that the color sequence of these two canes is the same as that of 4. We may say that four pieces of cane 4 were used to make cane 10, while 11 pieces of cane 4 were used to make cane 11.

We return to the left side of the chart to view guide cane 12, the Type C Rosette Composite. Relatively few canes of this pattern type have been found; more often, the rosette is a composite element in multicomposite canes. Number 13 is practically a multicomposite cane, and will be discussed with the similar cane, 31.

Guide cane 14 constitutes a Type C Multicomposite Cane. Number 15 introduces the concentric bands, which imitate cased layers and resemble eye spots (Exemplified in 16 to 18). Note that 16 also repeats the color sequence of 4; while 17 repeats 7. And note too that 17 has a pattern mistake due to some blue rods getting out of place.

Number 19 introduces the rayed figures, 20 to 23, which the author feels resemble stars. (Figs. 5 & 6 present a comparison shot of number 23 and a cased cane made with the same color sequence.) As mentioned, when canes are fractured into sections, the pattern is distorted if the break is uneven. Combined with the fusing process, this elongates the rays, and gives a starlike appearance.

Number 24 brings us to multiple dot motifs (25 to 29). Note that the more complex examples have dots which are compounded into rosettes. We may speculate that these units were themselves preconstructed, and set into the rod bundle, though separate elements may have been arranged as seen, when the bundle was constructed. When multiple dots are well spaced they resemble the eye spots of other canes, while rings and clusters of multiple dots resemble a flower or groups of flowers. (Compare 27 with 10 and 11.)

The final row of composite canes consists of striped motifs, introduced by 30. Number 31 is a more complex version of 13. Whereas 13 contains about forty-seven units, 31 has about 103 units; 13 has eight *petals*, each one a simple rod, while 31 has eight petals, each composed of eight rods. These two variations of the same pattern were both found in a string of beads in my collection, acquired as examples of composite canes. All beads appeared to have been repetitions of the same pattern until a careful examination was made. Another discovery was made with a microscopic examination. In some cases, within a few canes like 31, a single red petal was composed of eight rods—which were themselves composed of twenty-four rods. In other words, a red petal in 13 is composed of a simple rod, while a red petal in most complex examples of 31 is composed of eight rods: though in a few examples of 31, a single red petal is composed of 192 rods! (This phenomenon is depicted in Figs. 10-12.) The re-

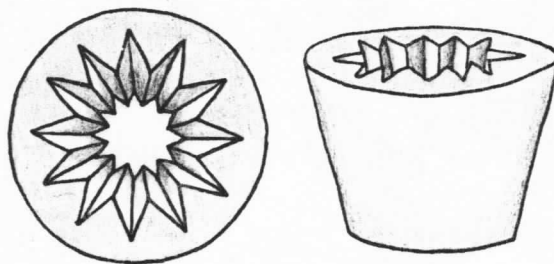


Fig. 9 A drawing of a mold used for creating a twelve pointed star cane, plan and lateral views (based on a mold seen by Peter Francis in Italy).

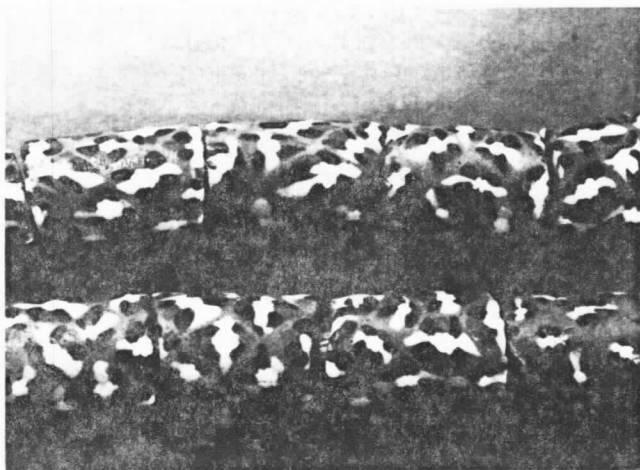


Fig. 10 Beads showing cane example 13 & 31.

maintaining selection of cane examples in this section are typical variations of striped layers, probable composed of simple rod units. When the striped bands appear in the inner layers, the appearance of a floral motif is suggested. Numbers 34 to 36 have striped outer layers, and 36 also has a cluster of rosettes which suggests a flower.

Since 9 and 11 were composite canes which have casing or cased elements, they are thus *hybrid canes*; cased canes may be hybridized by the addition of pre-formed elements which are added to their structures. Such canes are placed in the chart directly below ordinary cased canes. Notice immediately the similarity to composite canes with dotted or striped motifs. Numbers 37 to 40 are examples of multiple dot combinations; spaced, in rings, and in clusters. In addition, while some dots are simple, others are cased. Number 40 is remarkably similar to 28 (and enlargements of these beads are featured in Figs. 7 & 8). Numbers 41 to 44 are canes with outer stripes. These outer stripes are barely visible when the cane is viewed in cross section, while they are quite obvious if the cane is viewed from the side. When a cane piece is applied to the bead, it melts and becomes distorted, as the structure collapses, and fills in the gaps between it and neighboring cane pieces. The result is that the sides of the cane can be seen at the same time as the top; and when the cane has outer stripes, these take the appearance of expanded rays. (This is graphically shown in Fig. 13. The photographic enlargement of two canes in Fig. 14 shows how closely spaced canes remain fairly undistorted, while the same cane can bow out and become

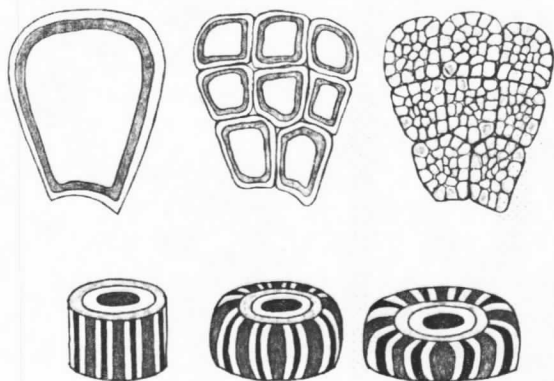


Fig. 12 Closeup of single red petal, much enlarged. The first petal is a simple red cane. The second, eight canes which are each composed of 8 red canes. The third petal is composed of 8 canes, which are composed of 24 canes, making a total of 192 canes.

Fig. 13 A drawing showing how a striped cane becomes distorted when fused onto a bead, so that the resulting appearance of a *rayed figure* occurs. (Similar to example 43; and to example 42, pictured in Fig. 2.)

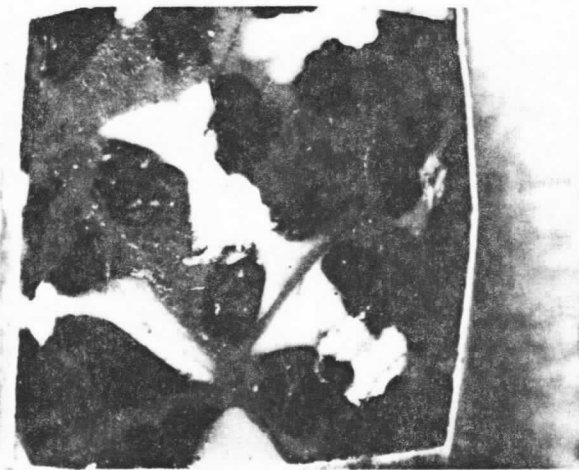


Fig. 11. Closeup of cane examples 13 & 31.

markedly different if space allows. This particular example is not in the chart.) Number 43 may have stripes of composite construction. That is, the black and white units may have been pre-formed by fusing rods together to make a flat bar, which is added to the multicased gather. Stripe elements may be manually placed onto a gather; or, the elements may be placed around the wall of a form, into which the prepared gather is pressed, to pick them up.¹⁰ Number 44 is a combination of multiple dots and outer stripes, similar to 36. (Number 42 is shown in Fig. 2.)

Guide canes 45 and 46 lead us to the group of molded canes, which are subdivided into flower patterns (47 to 51) and star patterns (52 to 56). These patterns increase in complexity in three ways: 1) they may have few petals or rays, or many; 2) they may have few layers, or many; and 3) they may be compounded by the addition of elements such as multiple dots or outer stripes, which makes them hybrid canes (and these developments are reflected in the arrangement of the cane examples). Note that 50 is a flower which has internal dots, while 55 is a star which has a surrounding ring of 12 cased dots. Note too that 54 is red, white, and blue twelve pointed star, which is completely analogous to the star pattern of a typical chevron-star bead of tube drawn manufacture. (The molded beads, number 48 and 53, are pictured in Fig. 2.)

As mentioned, the classification contains examples of all major types, and typical combinations of patterns that are usually found in canes on beads. Conceivably, there are other combinations which the author hasn't seen. The classification

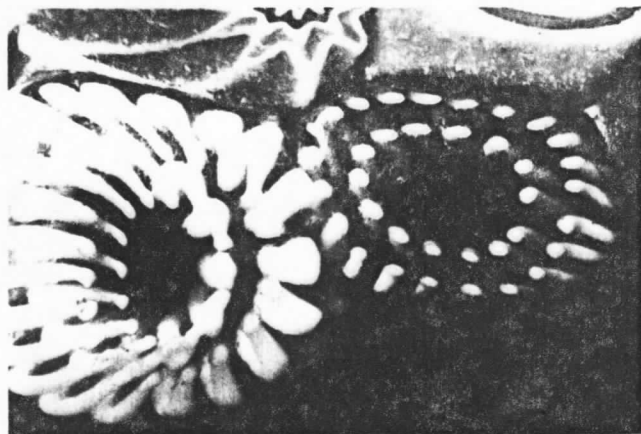


Figure 14. An African trade bead with two "lace glass" canes, of white filaments encased in clear glass. The canes are closely related to the common *filigree* glasses made all over Europe in the 19th C., but are used here in cross section. The left cane piece is relatively undistorted; while the right cane had more space to spread out with the fusing—and has become greatly distorted. (Not included in the chart, but related somewhat to number 38.)

is open-ended and might be expanded to include these other combinations. These could be classified as Cd canes (and might contain internal composite or molded elements, and would be classified as Bc and Bd canes, respectively. Molded canes might have internal elements which were themselves composite or molded, and would be classified as Dc and Dd canes, respectively. These are only a few of the possibilities.

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2. Nesbitt, A., *Glass*, pp. 74, and 77.
3. Barovier, R., "Roman Glassware in the Museum of Murano and the Murano Revival of the 19th Century," *Journal of Glass Studies*, Vol. XVI, pp. 111-109.
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5. Pellatt, A., *Curiosities of Glass Making*, pp. 114-115.
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- Vavra, J.R., *5000 Years of Glass-making*, pp. 105-111.
- Kidd, K.E., *op. cit.*, p. 16.
7. Sauzay, Vavra, Kidd, *opera cit.*, and numerous other references.
8. This is implied by many accounts, and is supported by a personal communication from Peter Francis (February, 1982) regarding a forthcoming publication of his. See also, Ukai, N., "Kyoyi Asao, Tombodama/Glass Bead Master," *Ornament*, Vol. 4, No. 3, p. 15.
9. Pellatt, *op. cit.*, p. 105, and Kidd, *op. cit.*, p. 14. These two works refer to molding a gather. While Kidd's treatment probably approaches the actual process better than any previous account, there are problems with some details. The author's account is an entirely new synthesis. Our conceptions were considerably enhanced by personal communications and feedback from Peter Francis and Elizabeth Harris, who are gratefully acknowledged.
10. Pellatt, *op. cit.*, pp. 108-109, and many other accounts.
11. Bergstrom, E.H., *Old Glass Paperweights*, p. 21, Pl. III.
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GABRIEL: Continued from p. 35

It is hard to determine how long glass beads have been used. Archeological finds of small beads carved out of rock crystal indicate a history of hundreds of years. In the past century, glass beads were imported from Italy. In the beginning of this century, they were traded from India. Now the source is Europe: Czechoslovakia, Sweden and Germany.

The pote sellers and bead stringers are part of a minority of Muslims in Nepal; Musalman, who deal in glass beads, braid tassels and glass bangles.

With all the western influence in life style, architecture and dress recently in Nepal, it is reassuring to note that this traditional ornament continues to enjoy popularity.

* Madison, OH

FOOTNOTES

¹ other spellings: tillari, tilhari, tilahari

² other spelling is potay which is closer to American pronunciation.

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CANE MANUFACTURE FOR MOSAIC GLASS BEADS: PART II

Jamey D. Allen *

SOME OBSERVATIONS ON THE MOSAIC GLASS LITERATURE

Spatial considerations do not permit a thorough review of the literature pertaining to mosaic glass, but the author would like to make some general observations. From the earliest accounts of the 1800s,¹² to the most recent treatments,¹³ the descriptions of mosaic glass techniques, and cane manufacture have stressed some methods, and have mostly omitted others. This is due to the fact that many authors deal mainly with ancient production methods, and presume that these prototypes cover the techniques of later times. This approach is expeditious, but completely ignores the innovative developments made by Europeans (particularly Venetians). The cane technique which has received the most exposure is our Type C, composite canes.¹⁴ Some authors also include Type B, cased canes, and relate or imply the hybrid canes, but these are in the minority.¹⁵ The number of accounts which mention cane molding, our Type D, are astoundingly few, and do not present many details of the process itself, nor its evolution.¹⁶

It is well known that mosaic glass canes were produced all over Europe in the 19th C. and had a wide use as decorative elements on a great many glass products.¹⁷ A few authors have suggested that cane production in Italy goes back to the late 1400s or early 1500s, and feel that these techniques fell into "disuse," or were "lost," until the 19th C. revival.¹⁸ These speculations have not been given much attention; perhaps because so few "important specimens" of this production are known in modern times. However, there is good evidence to support early cane production, in the forms of various documents which specifically mention now well known types of productions. Taken as a whole, these clearly show experimentation with ancient techniques; ranging from *agate glass bowls (calcedonia)*, to many kinds of *net and lace glasses (retorte and reticello)*.¹⁹ We can also include as evidence dated finds of mosaic glass beads. It is entirely possible that mosaic beads were made in Italy continuously from Roman times to the well documented period after the Renaissance.²⁰ The author noted earlier that cane example 54 of our classification is analogous to the tube of typical chevron beads (*perle a rosette*). The only difference is that a chevron bead begins as a hollow gather, rather than as the solid gather for cane section application. The fact that chevron beads are documented from the 1500s²¹ indicates quite well that the Italians had mastered cane making; and further, had devised *molding* a gather to create an internal design.²² The author has found no evidence that canes were ever constructed by molding in earlier times (though it has been suggested that some *elements* of canes might have been molded). Even patterns that are typically molded nowadays were made from composite parts in early times (conventional stars, for instance). Venetians too created stars from triangular rods around a core rod, but these are in the minority. In fact, composite canes are far outnumbered by cased, molded and hybrid canes. It was neces-

sary to do a great deal of looking around to find the composite examples presented. By contrast, we could have easily included 10 times the number of Types A, B, D, and hybrid canes presented. Thus, the emphasis on composite canes as representing cane manufacture *in toto* is very much a distortion. Yet, prior to this writing, many readers who have had any exposure to the literature would accept the proposition that all the beads pictured in Figs. 3 and 4 of the color plates were produced from composite canes; whereas only the middle bead in Fig. 3 is composite (see Part I, *Ornament* 5(4):6, 1982).

An article which appeared fairly recently in *Ornament* goes completely overboard in the opposite direction, by claiming that composite canes are "Asian," while Europeans made molded canes.²³ This implies that our composite canes could not be of European origin; though in all other respects these beads are identical to the other beads presented, in terms of pattern designs, color schemes and general shape. The idea that composite canes are Asian is a misunderstanding. All intricate cane production is derived from the ancient production centered in Egypt, and dispersed to the then known world. Seligman and Beck²⁴ have demonstrated that ancient Egyptian and Mediterranean beads made their way to China and the Orient rather early. Just the same, mosaic glass production is more in the nature of a "revival," than a continuing art form from early times, with only few exceptions.

A DEFINITION OF MOSAIC GLASS AND DESCRIPTIVE TERMS

Mosaic glasses ought not to be confused with *glass mosaics*. The latter are large scale wall and floor coverings made from glass cubes set into an adhesive medium; while the former are small scale, or miniature products, also made from separate parts arranged into a pattern, but *fused* into one solid piece. This distinction has been recognized at least since 1849.²⁵ The broadest definition of mosaic glass might include nearly every polychrome glass item made; though this is much too inclusive. Generally, when we have elements fused together, such that there is an intended structure — and especially when this resulting item is used as a "raw material" for some other product — then we are dealing with mosaic glass.²⁶ There are several distinct types of mosaic glass elements and products, though this article has dealt only with the construction of complex canes.

Canes with internal patterns were probably developed to satisfy the need for prefabricated repetitions of one pattern (most likely, eye studs for application onto beads — occurring as early as about 400 B.C.).²⁷ Originally, only a few of such cane pieces were used on any one bead. Gradually, greater numbers were used, and more complex designs were invented; and, in addition, they were used to make larger products — such as bowls and vases. These highly prized art works were often buried with their owners; and, much later,

Continued on p. 43

were rediscovered by the first “archaeologists.” The ancient names for mosaic glass products are unknown, but the Italians called the most intricate and interesting ones *millefiori* (a thousand flowers). It has been demonstrated that, although some flowers are specifically represented in glass canes, more often imitations of natural stones were intended by cane patterns. These ranged from banded agates, to coralline limestones, and fossil sea snail shell aggregates.²⁸ However, these patterns have been characterized as flowers and stars for so long, that we are stuck with the term *millefiori*; and also, recent versions very much intend to represent flowers and stars. In any case, there are three requisites to “true” *millefiori* wares. The patterns of the canes must be complex (if not floral). The canes must be used with the cross section uppermost. The cross-section pieces must compose or cover the entire surface (or most of it). While some beads are easily included in *millefiori* ware, others are not. This is why we have carefully avoided using this term until now. Beads with just a few cased eye canes, or even many, are not *millefiori*. Although these distinctions have been made a number of times by serious students of glass history and technology, many bead collectors have been slow to understand and accept them.²⁹

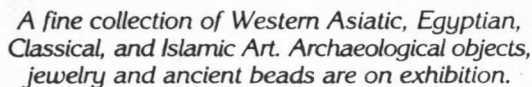
- 1) Italian mosaic glass cane production goes back to the late 1400s.
- 2) Italians probably invented cane molding though this has been overlooked.
- 3) Many historical treatments, and popular misconceptions, have greatly contributed to a distorted view of mosaic glass technology and its terms.

12. **Pellatt, op. cit.**, pp. 110–111.
13. **Kidd, op. cit.**, p. 16.
14. **Pellatt, ibid.**; **Dillon, E.**, *Glass*, pp. 33 and 50; **Willis, G.**, *The Collector's Pocket Book of Glass*, pp. 23–24.
15. **Eisen, G. A.**, "The Characteristics of Eye Beads from the Earliest Times to the Present," *American Journal of Archaeology*, Vol. XX, No. 1, p. 6; **Brill, R. H.**, "Ancient Glass," *Scientific American*, Vol. 209, No. 5, p. 128.
16. **Bergstrom, op. cit.**, pp. 14–15; **Revi, A.**, *19th Century Glass*, p. 90; **Hollister, op. cit.**, pp. 8–9.
17. **Hollister, P.**, *The Encyclopedia of Glass Paperweights*, pp. 40–43; **Mackay, J.**, *Glass Paperweights*, pp. 21–24.
18. **Buckley, W.**, *European Glass*, p. 12; **Elville, E. M.**, *The Collector's Dictionary of Glass*, p. 93.
19. **Dillon, op. cit.**, pp. 216–218; **Hettes, K.**, *Old Venetian Glass*, pp. 18 and 23; **Zecchin, L.**, "Fortuna d'una Parola Sbagliata," *Journal of Glass Studies*, Vol. X, pp. 112–113.
20. **Eisen, loc. cit.**, p. 23, and **Hollister, Encyclopedia . . .**, pp. 12–13.
21. **Smith, M. T.**, "The Chevron Trade Bead in North America," *The Bead Journal*, Vol. 3, No. 2, pp. 15–16; **Zecchin, L.**, "Maria Barovier e le 'Rosette,'" *Journal of Glass Studies*, Vol. X, pp. 105–109.
22. As with molded canes, few investigators have realized that the tubes for star beads are constructed by molding. Even Eisen, who recognized that these were an entirely new type of production than earlier beads, did not understand the molding process, and proposed a composite type manufacture; **Eisen, op. cit.**, Vol. II, p. 720.
23. **Ukai, loc. cit.**, p. 16.
24. **Seligman and Beck**, "Far Eastern Glass: Some Western Origins," *The Museum of Far Eastern Antiquities Bulletin*, No. 10, pp. 9–13, etc.
25. **Pellatt, op. cit.**, pp. 110–111; ———, "Mosaic," *Encyclopaedia Britannica*, 11th. Ed., Vol. XVIII, p. 883.
26. **Eisen, op. cit.**, Vol. I, pp. 7–8, 174, 191–197; **Harden, D. B.**, "Glass and Glazes," *A History of Technology*, Vol. II, p. 338.
27. **Eisen, loc. cit.**, pp. 6, 20–22.
28. **Dillon, op. cit.**, pp. 50–51.
29. **Beck, H. C.**, "Classification and Nomenclature of Beads and Pendants," *Archaeologia*, Vol. LXXVII, pp. 65 and 68; **van der Sleen, op. cit.**, pp. 42, 47, 103; **Harden, D. B.**, "The Canosa Group of Hellenistic Glasses in the British Museum," *Journal of Glass Studies*, Vol. X, p. 21.

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