BEAD MAKING AT MURANO AND VENICE

B. Harvey Carroll, Jr.

With an introduction and annotation by Jamey D. Allen

"Bead Making at Murano and Venice," by B. Harvey Carroll, Jr., is a rare eyewitness account of beadmaking in and around Venice, Italy, towards the end of the First World War and documents the technology of the time as well as what impact the war had on the industry. Carroll's report takes us through the various steps in the production of drawn or cane beads and also provides a historical perspective of the industry. Although the report presents much useful information, we now know much more about most aspects of glass beadmaking and endnotes provide much additional information and clarification.

INTRODUCTION

In 1917, B. Harvey Carroll, Jr.—then the American Consul to Venice—was requested, through the U.S. State Department, by C. C. Lord and Company (manufacturers and importers of beads) to provide information regarding the manufacture of glass beads as practiced at Venice. Finding that no thorough and complete reports existed, Carroll decided to compose such a document himself, and arranged to inspect a working beadmaking factory. He also reviewed the available literature that dealt with glass manufacture and beadmaking, and incorporated this historical information into his report.

Carroll's report has never been published in its entirety, and has only been available to researchers who knew of its existence and requested a copy from the National Archives in Washington, D.C. (Carroll 1917). This is unfortunate, as relatively few reports on glass beadmaking derive from actual eyewitness observation, and some of those that do exist were not composed by observers who understood glassworking. As such, these reports lack detail, or even mislead the reader concerning glassmaking processes. It is for this reason that Carroll's report is reproduced here in its entirety, including associated documentation, for the benefit of bead researchers, collectors, and those interested in glass history and technology. While every attempt has been made to retain the original spelling, punctuation, and general format of the document, the original pagination could not be maintained and page breaks are indicated in the text in brackets (e.g., [end p. 1]).

While outstanding for its time, the report does contain some problematic passages, and endnotes have been added to clarify these as well as to expand upon the subjects covered. No illustrations accompanied the report; all those that appear herein have been added to clarify certain aspects of bead manufacture. The original report was accompanied by sample cards of beads, as well as loose beads and other items procured by Carroll at the time the report was written. These, unfortunately, have since become disassociated and an attempt is made to provide some information about them.

LETTER OF TRANSMITTAL

AMERICAN CONSULATE,
Venice, Italy, September 3rd, 1917.

SUBJECT: TRANSMITTING REPORT ON BEAD MAKING IN MURANO AND VENICE, DATED AUGUST 30, 1917.

THE HONORABLE
THE SECRETARY OF STATE,
WASHINGTON.

SIR:

I have the honor to transmit herewith a report on "Bead Making in Murano and Venice," dated August 30, 1917, together with a number of sample exhibits illustrating and referred to in said report.

This report has been prepared in accordance with the Department's Instruction without serial number, dated July 14th, 1917, Department File No. 165.184:2, Consular File No. 865.6, received at this Consulate on August 9th, and acknowledged by card on that date. This instruction was

given at the request of C.C. Lord and Co. of Long Beach, Cal. transmitted through the Bureau of Foreign and Domestic Commerce.

The attached report covers fully the processes for the manufacture of small beads as per Department's samples sent under separate cover. In order to fully cover all processes of bead making, including hand made beads, which is one of the historic industries of Venice and is still flourishing and of which I find no adequate or satisfactory report on file here, I am preparing a supplementary report [end p. 1] on Venetian Hand Made Beads which will shortly be transmitted with sample exhibits.[1]

The rare exhibit of glass rod miniatures, the work of Jacopo Franchini, transmitted with this report, is for the Department and not for the firm at whose request the report was made, as it would be very difficult to duplicate this exhibit.

It is respectfully requested that the exhibit be preserved in some national or other museum if this meets with the approval of the Department.

For safety in transit this report is forwarded through the Embassy for transmission by diplomatic pouch.

I have the honor to be, Sir,
Your obedient servant,
[signed] B. Harvey Carroll Jr.
American Consul.

File No. 865.6

ENCLOSURES: Report in Triplicate on Bead Making in Murano and Venice and enclosures as therin [sic] noted. [end p. 2]

THE CARROLL REPORT

AMERICAN CONSULAR SERVICE .
CONSULATE AT VENICE, ITALY.

BEAD MAKING AT MURANO AND VENICE.

Report Made in Compliance with the Department's Instruction without Serial Number, dated July 14, 1917 Department's File No. 165.184:2. Consular File No. 865.6. (This Instruction was given at the request of the firm of C.C. Lord and Company of Long Beach California transmitted through the Bureau of Foreign and Domestic Commerce.)

From B. Harvey Carroll Jr., American Consul.
Venice, Italy, August 30, 1917.

Glass making in Venice is of very remote antiquity. By a law of Nov. 8, 1291 the authorities of Venice, to avoid the risk of fire, ordered the glass making industry to be transferred to the adjacent island of Murano, referring in the decree to the "ancient traditions of the populace there dedicated exclusively to glass making". Ever since Murano has been the most important center for hand made glass and glass bead manufacture in the world.

In recent years certain kinds of hand made beads that must be worked and ornamented individually over the blow pipe and certain processes in the manufacture of machine made beads such as stringing and the polishing and glazing of some types have been again transferred to Venice labor.

Most of the loose stringing of beads is carried on by cottage labor in Venice and the processes for the manufacture of bead articles, such as purses, curtains, flowers and [end p. 1] design work are domiciled again in Venice, leaving in Murano the glass and bead foundries.

The island of Murano lies less than a mile distant over the lagoon north of the city of Venice. Its population is largely devoted to the various kinds of industries in glass, including bead making.

Until about 20 years ago there were a number of competing companies in bead making at Murano but at that time 1896, eleven companies consolidated forming the Società Veneziana Per l'Industria delle Conterie whose paid up Capital Stock is now Lire 4,500,000. (=$ 868,500 at mint rate)

This Company enjoys a complete monopoly of the bead making industry, has been very prosperous and does a world exporting business on a very large scale, shipping to Africa, India, Oceania, Asiatic countries, Europe and the Americas. It makes beads that are used as money by certain tribes in the Congo (Compare attached card with Congo money bead)[2] and in German West Africa and ships many thousands of tons of bead ornaments to the savage as well as the civilized nations of the world.

The offices of the company are in a magnificent old palace at Murano, the Palazzo Trevisan which boasts certain frescos of Tiepolo. Nearby are the foundries and factories, covering many acres of ground. Before the outbreak of the European war this Company kept in storage more than two million kilos (Metric tons 2,000, pounds 4,409,245) of manufactured beads. At the present time less than one fourth of this quantity is in stock and the production has greatly decreased owing to the difficulty in securing fuel and raw material.[3] The Company uses normally 8,000 tons of coal per year. Before the war coal cost them from 21 Lire to 28 Lire [end p. 2] per metric ton. Now, buying in large quantities the

lowest price is Lire 450.- per ton and the Government only allows them 200 tons per month. Soda potash (soda potassa) (Solvay type) the prime raw material of glass making cost before the war Lire 10.- to 12.- per quintal. It now costs Lire 120.- to 160.- per quintal. Nitre, or saltpeter, (Nitro) has increased from Lire 500.- to Lire 5,000.- per metric ton, potassium has increased from Lire 400.- to Lire 6,000 per metric ton, Minio, formerly cost 50.- Lire per quintal now costs 280 to 300.-, Zinc, Copper, Arsenic, Cobalt, all the different minerals used in coloring glass, Soda, Alum, Quartz and even sand have greatly increased in price. Even the sand for Venetian glass making is imported coming from Fontainebleau in France. This very fine type of white sand is also to be found at Sorate near Rome, in Piemonte and in Norway. In former times sand was imported from Pola, Trapani and other places on the Adriatic coast.

The first process of making beads is making glass compounded of soda, sand, and various minerals according to the color desired. The yellows and oranges have a large admixture of lead for example which comes in the form of an orange colored powder, packed in kegs and known as Minio. This Minio is, I believe, oxide of lead, and comes in several grades according to the vividness of the color, ranging from deep orange to red. (The word is sometimes translated vermillion but vermillion is properly a mercuric sulphide usually obtained from cinnabar.) The Minio was formerly purchased from England and Germany but is now normally made in Italy, that used at Murano being supplied by Venice firms. [end p. 3]

The fondant for ordinary types of beads had formerly a base of Egyptian Natron (native sodium carbonate). Nitrate of soda from Chili and crude Nitro (Saltpeter) refined Carbonates of Soda, Sulphate of Soda, refined Nitre, Potash, Cryolite (a fluoride of sodium and aluminium produced in Greenland, used for obtaining soda and alumina) and especially the highly refined Soda Solvay used as a solvent for sand, (formerly imported from France, now made in Italy) figure in the fondants required for the higher types of beads. Since the last years of the last century feldspar has been used as a solvent agent in a large scale. The first used came from Turin and England. The coloring materials are all mineral, including in recent years various oxides unknown to the glass makers of antiquity, especially oxides of Cobalt, Chromium and Uranium. The more important coloring materials are Minio; Manganese, Copper, (from which a great variety of colors are obtained) Iron, Zinc, Zaffara, (a sort of mixture of which cobalt is the base, used for tinting glass blue) Arsenic, Antimony, Silver and Gold.

Cobalt in its various forms gives wonderful and deep shades of blue and was a coloring agent known to the Egyptians as was also Copper. Silver was used by the ancients to give a wonderful yellow gold color but the master glass makers now know how to obtain the same shades without the use of silver. The first one to obtain a formula was a certain Giovanni Giacomuzzi. This maker also tried to produce deep ruby or pigeon blood color for which gold is the only successful coloring agent and marketable shades have been produced but none that compare with the ruby glass of the old makers which [end p. 4] was colored with gold. This glass is known as Rubino (Cf. a sample cane of Rubino Glass that accompanies this report).

Most of the secrets of the trade lie in the color formulas which will naturally not be divulged and new colors and shades and combinations are constantly being formed so that Venetian beads run the entire chromatic scale.[4]

The processes of bead making are often said to be three, towit, making the glass, making the canes, making the beads out of the canes. But so simple a classification is not instructive.

A better division is obtained by following the processes of the industry itself as seen at Murano and I would divide them as follows: compounding the materials; fusing the materials into the fondant or molten glass; cupping the fondant to prepare the orifice that will run through every cane and every bead; pulling the fondant into long hollow tubes; cutting the tubes into canes of about one yard in length; sorting the canes according to diameter; clipping the assorted canes into bead lengths; fanning out the powdered glass; filling the orifices of the sharp edged beads with a composition of charcoal and lime; mixing the beads thus filled with a large quantity of sea sand; refusing in revolving crucibles to eliminate the sharp edges and round the beads; cooling; fanning out the sea sand; mechanical sorting of the beads for size; mechanical sorting for perfect perforation; (in some cases polishing or lucidation) stringing; (or in some cases mechanical threading on fine metal wires) sorting strung beads for color; packing for shipment.

This list of processes will cover the manufacture of all the smaller beads artificially produced in bulk and in [end p. 5] fact of all one color beads not hand made. (Through these processes the beads are made which correspond to the samples sent through the Department). Taking up these processes in their order it may be noted that all except the first are subject to inspection and have been in fact seen by Consul.

1). Compounding the materials. This is done according to formulas more or less secret out of materials already enumerated and others such as Carbonate of Lime, Cream of Tartar and various minerals. At present the basement of the immense plant of the Società Veneziana etc. is used as a storage room where soda, potash, sand from Fontainebleau,

Minio and other materials for compounding the fondant are kept.

2). The glass is fused into the molten mass or fondant in immense crucibles, lined with fireproof tiling and clay, some of which hold 5 and 6 tons of molten glass. The fuel is Newpelton coal of which the normal annual consumption is 8,000. tons per year. (Cardiff and Pocahontas coal do not serve so well). The degree of heat obtained varies from 1000 to 1600 degrees Centigrade as the materials must be exposed to a heat of 1000 degrees before they fuse properly. The immense pots or crucibles are covered over, lined with fire clay, and have orifices or port holes through which can be seen the while[5] glow of the melted glass which might be taken for boiling candy. (These furnaces are built by Engineer Spregiani of Milan.)

3). About the crucibles are workmen with great tubes of iron like a section of gas pipe 12 or 15 feet in length called "Ferri da Canne"[6] which they dip through the port holes [end p. 6] into the molten fondant and take out a dough like mass which is then pounded on metal tables or anvils until it begins to change in color from white to red. Roughly rounded by this process, the dough like mass on the end of the rod is then opened by another workman with an instrument called a Borsetta[7] that appears to be a giant pair of spring pincers and the fondant is scooped and pressed out as if it were a dumpling being prepared for an apple.[8]

This scooping out creates the orifice or hole which ordinarily persists through all other processes until the beads are finished and complete. This cupped mass is again thrust into the oven and heated to white heat and almost the consistency of glue without being allowed to collapse or lose its cupped form. It is again taken out of the crucible and another workman having a similar iron rod but with a broad blunt end[9] presses that end against the top of the fondant cup to which the heat causes it to adhere.

4). As soon as the second rod adheres the two men walk away from each other pulling out the melted glass between them just as candy is pulled or as a child pulls his chewing gum into a thread. Cross ties are laid at intervals over the floor and on these the rope of glass is supported. So ductile is the fondant that a mass the size of a loaf of bread can be stretched for a distance of about 300 yards.[10] The floor of the factory is about the size of the Piazza of San Marco[11] and an unbroken rope or thread of glass will form a loop or belt line like a mimic railway around the entire floor leaving the workmen and the crucibles in the center. Even [end p. 7] when the fondant is pulled out to the thinness of a cambric needle it remains a pipe or tube the bowl of the cup growing ever smaller but always remaining hollow. This fact makes beadmaking in bulk possible.

5). As it cools this tube or pipe, (that often resembles an unbroken filament of vermicelli) changes from white to red and from red to the permanent color given it by its mineral coloring matter. The size of this tube will depend on three things:

a) The fineness and character of the materials of which it is composed which will affect the ductility, especially the quality and quantity of soda used.

b) The size of the cupped mass drawn out. A smaller mass makes a finer and thinner tube.

c) The speed at which the two men walk away from each other in stringing out the molten mass. If they walk rapidly the tube will be smaller and thinner.[12]

As large beads are made in precisely the same way as small ones the diameter of the beads will depend entirely on these three things, and especially on the last two, for out of the same fondant tubes of all sizes can be made.[13] These tubes are, when cold, cut or broken into lengths of about one yard. These lengths are called "canne" (canes) and resemble straws or bamboo rods without joints and these "canne" are the material out of which beads are made. In similar fashion rods that are not hollow canes can be made by merely omitting to make the cup in the fondant.

6). The canes are sorted into sheaves of the same size. This work is done by women and often by quite young girls, who work by the sense of touch, rapidly dividing canes that are apparently all of the same diameter into different [end p. 8] groups between the fingers.

7). The sheaves are then taken to the clipping machines which resemble little guillotines. On a flat trough the canes, placed side by side, are automatically pulled (but guided by hand) under the little guillotine blade that, by the revolution of an electrically driven wheel, clips the canes into bits by biting off the ends.[14] These bits are about the length of the diameter of the canes.[15] These clipped cross sections have sharp edges. The powdered glass which is freely produced by the clipping is sifted and fanned out and the raw edged beads are ready for rounding and finishing.

8). The holes in the raw beads are filled with a composition of charcoal and ordinary lime after which the beads are intermixed in 4 or 5 times their weight and quantity of ordinary sand from the Adriatic Lido (beach) and the sand and stuffed beads are put into an egg shaped, covered crucible that revolves on an axis, tilted at about the same angle of inclination as the globe. This crucible revolves in the heart of a gas fed furnace at about 400 degrees of heat. The charcoal is consumed, the lime vanishes, after having served to "fix" the aperture, the edges of the beads become smooth and rounded, the sand grinds and polishes them and at the same time keeps them from coalescing with each

other, and finally sand and beads together are dumped out into large shallow pans to cool.[16]

9). When cold the sand is sifted and fanned away in a series of large, covered, wooden ventilators and the beads, clean and polished, pass through a funnel or hopper into a series of rocking cradles placed one above the other in a series of eight. The floors of these cradles are sieves [end p. 9] with graduated orifices or mesh bottoms and from these cradles the beads, neatly assorted as to size, pass through little hoppers into baskets set to receive them. Beads of the same color or fondant but of many different sizes are thus automatically assorted as to size. (Assortment as to color is first made by hand while the beads are still in the cane.)

10). For the smaller varieties of beads still another sorting is necessary to determine if the holes have been perfectly preserved. For this purpose a cylinder of about 15 inches in diameter covered with thin wire filaments (like a wire brush) revolves over a tray of beads and the filaments catch the beads that have holes in them lifting them over on the principle of a water wheel scooping up water, and dropping them on the other side through a hopper into a box. The bead is now complete, tested as to color, tested as to size, tested as to perforation, associated with its fellows and equals and ready for stringing or for shipping unstrung. This completes the necessary processes for the making of one color beads (as per Department's samples).

The necessity of a machine to sort the beads for perforation to detect and discard the imperfectly perforated beads was very great. In 1894 it was possible to make the ordinary small beads for about seventy centesimi per kilo. The threading was done by women, as at present, using a handful of needles (24 to 30) at a time and threading very rapidly. For the very small beads the string was about ten inches long and for the larger beads the string was about 18 inches long. A bundle consisted then of 480 strings and a good worker could string ten bundles per day at 12 centesimi per [end p. 10] bundle.

There was a constant controversy between the women and the companies because out of every hundred kilos the women used to bring back 20 kilos, or one fifth, claiming that they could not be strung and meaning that they could not be strung rapidly as the orifices were small or faulty and as the woman worked by the piece they interfered with her speed and diminished her pay.

Only about five per cent, or five kilos out of one hundred, were totally lacking in perforation and so the makers had a grievance as well as the women as such beads had to be remelted and remade and for such purpose had a value of only 5 centesimi per kilo and the makers were losing about 9 francs[17] per hundred kilos on 15 kilos of beads that could have been strung but not rapidly.

Cavaliere Salvatore Arbib one of the manufacturers, conceived the idea of the sorting drum with the wire teeth and the machine, called a "tamburo," was made by Meyer and Sons of Birmingham, England. The teeth or threads of the sorting machines may be of various diameters so that the beads rejected by a coarse toothed machine may be picked up by a finer toothed tamburo. This machine was perfected in 1894. The first threading machine to thread the beads on fine wire was made by the same firm in the same year for the same man. The total cost of the experiments and the making of two machines was about 5,000 pounds Sterling, ($24,332.5).

To return to the processes:

11). Certain one color beads for America have the surfaces slightly ground by contact with emery paste or other grinding material or even sawdust. This process takes place [end p. 11] outside of The Murano factory and usually in Venice. It is called lucidation ("lucidazione").

12). Certain beads, (sizes ranging from Class VIII. on attached sample card "F" to size "b" on attached sample card "D" are then strung by special machinery on thin wire filaments. The wires are suspended in brass tubes and the projecting curved end of the wire picks up beads from a revolving basin which forces them against the end of the wire. These wire strung beads are mostly exported to France for the use in making the coarser grades of artificial flowers for funeral wreaths.

13). All small beads are ordinarily strung by hand. This is done in Venice by cottage labor of women and girls. It is not an unusual sight in the Castello section of Venice to see a group of women and girls sitting in the streets each with a pan of beads in her lap, threading and gossiping at the same time. The needles are about the length of knitting needles but much smaller in diameter with an eye for the thread at the lower end like an ordinary hand sewing needle. The worker takes a number of these needles and spreads them out like a fan or the tail of a peacock, holding them thus grouped in one hand and thrusting the ends into the pan of loose beads until they are covered for almost their full length when the beads are slipped down on the threads and the needles are again arranged to peck [sic] up more beads. A good worker can operate 24 needles at a time and some of the women boast that they can operate 48 needles at once.[18]

14). The strands of beads are sometimes bunched by the women who thread them and sometimes by girls at the Murano factory. Some classes of beads are bunched for weight [end p. 12] and others for number. Many of the small beads

Figure 1. Sample Card F of the Società Veneziana per l'Industria delle Conterie, dated 1899, which duplicates Carroll's "Card F". Several versions have been documented that are practically the same, with only minor differences in glass colors. In every instance where Carroll presents details of Card F, the present card is congruent. The segmented card is 50 mm (20 in.) wide. Courtesy of Paolo and Francesca Scarpa, Venice, Italy (photo: J.D. Allen).

are sold by number. The beads on card "F" numbered with Arabic numerals will run about 20 to the inch. Such beads are sometimes referred to as "count beads" while those sold by weight are known to the English trade as "pound beads." The beads on card "D" Nos. 43 to 105 inclusive are usually sold as pound beads. No prices on beads are quoted in this report because prices have quadrupled and quintupled and are not now on a steady base. The bunched beads are sorted for size and color and in some cases according to country of destination and are stacked in shelf bins in the warehouse according to a chromatic scale. To look at the side of the warehouse is like looking at a rainbow where the shades insensibly melt into each other.

15). The bunches of loosely strung beads are usually packed for shipment in small packages (one pound or one kilo) wrapped in manilla paper. The label shows catalog or list card classification of the merchandise and also bears the name of the purchaser printed when the purchaser is a regular client and buys in large quantities.

Sample card "F," attached to this report, shows a classification, both for size and for color, of the smallest sized beads on the market. The smallest sizes manufactured for commerce are shown on this card in the Roman numerals from I to VIII. The samples sent by the Department would be about Number V. and these samples correspond to the smallest beads ordinarily in mercantile demand. (I have seen beads however hardly more than half the size of No. I) The same card "F" shows also a chromatic scale of colors, in normal times obtainable in any of the sizes from I to VIII., in one color beads in the numbers ranging from 341 to 602 inclusive, showing [end p. 13] 262 distinct shades. The number of possible shades is far greater if indeed it can be limited.

Even the smallest beads however may be made in more than one color and can in fact be made in a great variety of colors and patterns. The sample card "F", Nos. 603 to 615, shows a dozen variegated patterns in small beads [Fig. 1]. Card "D" shows 63 variegated patterns any one of which might be made in the smallest sized beads [Fig. 2].

The process is identically the same as for making the one color beads except that a distinct fondant must be made for each shade of color. Out of the base fondant is made the cup as described in No. (3) above. The fondants of the other colors are superimposed on this to make the pattern,

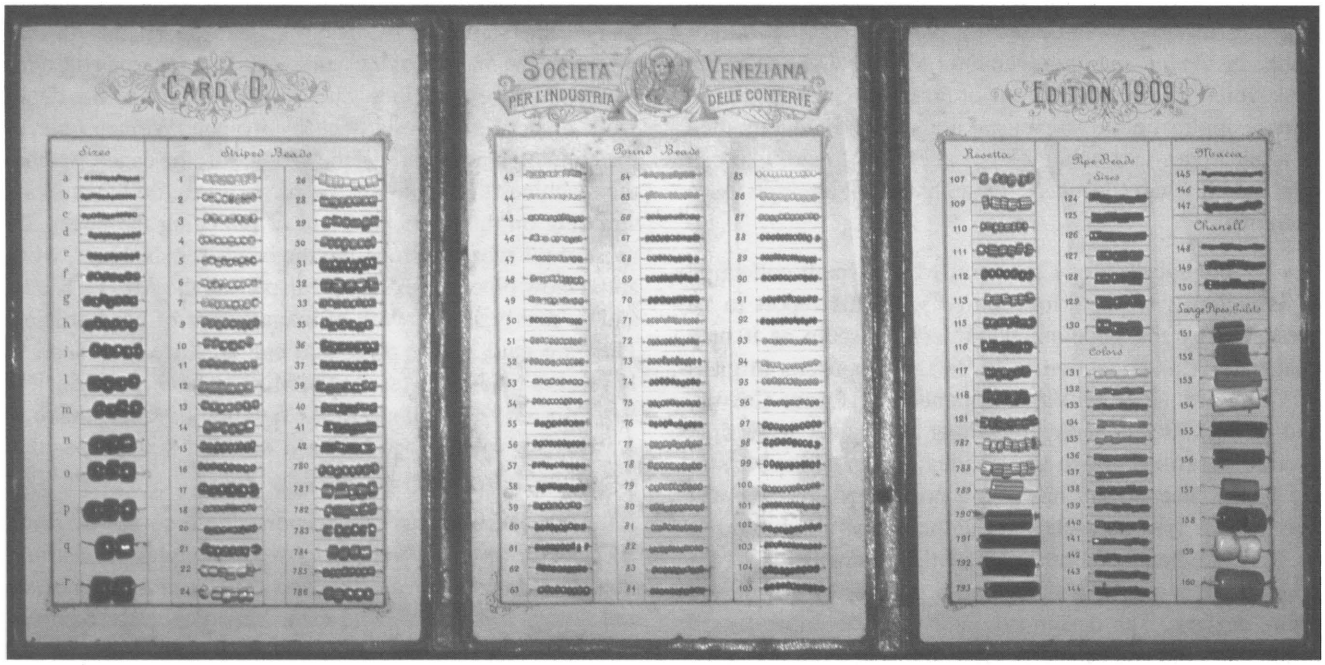

Figure 2. Sample Card D of the Società Veneziana per l'Industria delle Conterie which duplicates Carroll's "Card D". This card is dated 1909, but versions have been documented from as late as 1925 that are virtually the same, with only minor differences in glass color (of the drawn and wound beads) and individual sizes/shapes (of the wound beads). In every instance where Carroll presents details of his Card D, the present card is congruent. It is the same width as Card F. Courtesy of Franco and Maria Salsilli, Venice, Italy (photo: J.D. Allen).

reheating the cup as often as necessary but never allowing it to lose its cup form. When all the colors are superimposed it is reheated almost to the point of liquefaction and then pulled into the tube as already described. The ductility of the medium causes the pattern (as is the case with the orifice) to be preserved even although the tube be pulled out to the diameter of a hypodermic needle or to invisibility.

The different shades of fondant may be applied in complete coatings, like insulations on a wire, (compare 791, 792, and 793 Sample Card "D") or in horizontal stripes applied to the base fondant much as a candy maker adds his stripes of peppermint and wintergreen in making stick candy.

Color Number 615 on card "F", the last sample on the card, has a base fondant of jet and a superimposed coat of crystal, although the beads are made in almost the smallest size. These variations are confined however to either complete superimposed coatings or to lines as no surface [end p. 14] figures are possible because the pattern cup must be drawn into tubes.

Rosetta Work of Franchini. It is of cognate interest, for use in hand-made beads, that, if the fondant is not cupped but is pulled out in a solid rod[19] instead of into a tube or cane, a vertical cross section of that rod (not its surface) will reproduce any pattern desired. Indeed the pattern may be made with rods of cold[20] glass so stacked that their ends form a mosaic. They are then fused to the point of ductility, but not of liquefaction, and even if drawn out to the thickness of a needle a cross section will show the complete pattern. Glass for mosaics (used also for African and mosaic beads) showing patterns of stars, flowers and geometric designs, is made in that way and each clipped segment of the rod shows on its face the pattern.[21]

In the first half of the last century Jacopo Franchini, perhaps the most remarkable glass worker Murano has produced, by binding tiny straws of colored glass together into a rod 5 centimeters thick, formed at the end of the rod a miniature portrait design, or other design. This combination rod was then fused at a glass blow pipe and drawn out until a rod no larger than a knitting needle might be cut into cross sections each one of which would show a perfect portrait or perfect design. (The Consul has in his private collection of Venetian glass articles specimens of this work including portraits of Cavour, of Victor Emanuel, of Franz Josef in 1848, of the inventor's sweetheart in a miniature smaller than a pin head, and a number of other designs including one of a gondola and one of Rialto bridge. These specimens were preserved by Cavaliere Salvatore Arbib and are the same as those in [end p. 15] the Murano Museum.) In the museum

there is a section of glass rod, less than one centimeter in diameter that shows three perfect portraits side by side or rather in clover leaf arrangement. All three of these can be covered by the head of an ordinary pin. Owing to his intense application to so painstaking a work Franchini died in a madhouse and nobody has since been found who can duplicate his work in glass although several attempts have been made.

By the courtesy of Cavaliere Arbib a small collection of Franchini's work is transmitted with this report to be preserved by the government in such museum as it may designate. This collection includes small portraits in glass of Garibaldi, of King Victor Emanuel, of Count Cavour, and of the three together including the clover leaf triple portrait described above the smallest group of portraits in the world. The exhibit has also a portrait of Kaiser Franz Josef in the year he ascended the throne, of a lady said to be the sweetheart of Franchini, of the Rialto Bridge, of a gondola, of a cat, of a skull, and a number of flower and figure designs. The design originally ran the entire length of the glass rod and each disc clipped preserved it perfectly. Such discs can be used as mosaics in the making of hand made beads or combined with goldstone to make flat surface brooch designs, a sample of which is included in the collection above referred to.[22]

Mosaic beads intended for African and other wild tribes are properly classed with hand made beads but as a small section of the "canna" is always or nearly always used as the base[23] the description of their manufacture is included here. These beads are not round but sections of the canna from one half inch to two inches in length are clipped off the canna. These are then fused by glass [end p. 16] blow pipes at Bunsen burners and mosaic beads are pressed into the surface to give the desired pattern and fused to the point where they coalesce but without losing shape. These long beads with snake like mottlings and markings are then ground to a smooth surface, strung, bunched, and packed for shipments. Such beads are really individually hand made although they can be made to set patterns very quickly. Few of these beads go to America although they might easily become a fad there. Nothing but the canes for these beads are made at Murano and all the other work is done at the Venice plant of the society. (A card exhibit of these beads for Africa is attached to this report.)

The foregoing covers all generic varieties of beads made at Murano. There are certain types of beads each individually hand made, ornamented and enamelled[24] at the blow pipe showing surface patterns of roses and other flowers and designs that are made exclusively at Venice by expert workmen. These properly form the subject of a special report.

In the making of beads in bulk, the fondant is mixed, melted and molded[25] by men and men do all the furnace work and the making of the canes. Men also sharpen the axes of the clipping machines, but the greater part of the detail work of bead making is done by women. Women operate the clipping machines, sort the beads, sort the canes, operate the machines that string the beads on wires, do the work of stringing on thread of [sic] and of bunching the beads, do most of the work of preparing the beads for shipment, work at the blow pipe in making and also grind the African beads, and do nearly all the work of manufacture of bead articles. They are paid by the piece and can increase their [end p. 17] wages by expertness. At the Murano factory the Società normally employs about 1,000 families on bead making. A woman's wages vary between one and six lire per day according to her skill and speed.

There accompanies this report single copies of cards "D" and "F" above referred to, several samples of unstrung small beads in envelopes, itemized samples of African beads and several samples of hand made Venetian beads. Samples of the last two varieties were purchased.

The best work on Venetian Glass Making including the Bead Making is by Angelo Santi Director of the Museum at Murano and of the journal La Voce di Murano, (now no longer published, that contains some excellent historical articles on glass making.) Copies of Mr. Santi's book are no longer available except in libraries. It is entitled "Origine dell'Arte Vetraria in Venezia e Murano, Suo Rissorgimento e Progresso, Cenni Storici." (Origin of the Glass-Making Art in Venice and Murano, Its Renaissance and Progress). A very limited use of this book has been made in this report. All the processes of bead making are described from visits to the factory under the hospitable guidance of the management.

From the above named book much of the following information as to the historical origins of bead making is condensed.

"Margarete" or "conterie" were known to the Egyptians and there are in Murano and Venice several specimens of Egyptian mummy beads, some of them so small as to weigh only 93/100 of one grain, known to date from 1100 B.C. It is possible that the first Venetian makers came from Byzantium and mosaic makers are known to have been called to Venice when Byzantium fell.[26]

The first Venetian beads seem to have been made by [end p. 18] artisans in rock crystal after which the glass makers of Murano imitated the beads from natural quartz by perfect counterparts in glass. These were for religious uses in prayers, were called "paternostri" and the glass makers who manufactured them had the special name of "Paternostrieri" and were afterwards known as "suppialume" or glass blowers and "Margareteri" or bead makers.[27]

Domenico Miotti and Chrystoforo Briani of Murano are credited with making the first blown beads of glass in the XIII. Century. These blown beads are said to have been taken by Marco Polo to placate the savages of America but perhaps the beads used by this famous Venetian traveller were only the "paternostri".[28]

The beginning of the present Venetian bead industry seems to have been in the early part of the XV Century when German traders ordered the glass makers of Murano to make pipes or "canne" which were sent to Germany to be cut and afterward retransported to Venice for shipment to the Levant.[29]

As the cutting of the canne into sections is the simplest of all operations connected with bead making the Consul is inclined to the opinion that all the work was done at Murano except for a brief period when a law prohibited the making of "paternostri" out of glass because it was wrong to imitate the natural crystal. This law was substituted by another in 1510 permitting the cutting of "paternostri" short and long out of the canne.[30]

It is not known just when beads began to be rounded but the first were probably rounded one by one by being placed on a spit and exposed to the flame,[31] just as we know that the early crucibles were very small and were gradually [end p. 19] enlarged until they reached the present day dimensions of holding several tons.

A new variety of beads was made in 1860 by Lorenzo Graziati and afterward by Giuseppe Zecchin and others. This type is called "Macca" and is made by subjecting the tubes to enough pressure to give them facets so that they become quadrated or take a pentagon, hexagon or octagon form.[32] This process is mostly used for jet beads. (Compare Sample Card "D" Nos. 145, 146, and 147, last column). A slight variation rules lines in the facets and this type is called "Chanell" (Nos. 148, 149 and 150 same card). Beads with the superimposed stripes of different colored fondants are often called "rosetta" beads especially when the stripe is a fine one. (Compare Card "D" Nos. 107, 109, 110, 111, 112, 113, 115, 117, 118, 121, 787, 788, 789, and 790). But the true Rosetta work in beads is shown in the Congo money bead.[33]

There are many beautiful effects produced by clever compositions or superimposing of fondants, each of which is a special process that can not be entered into in detail in the limits of this report. Some of the famous combinations thus obtained are the "Chiaro di Luna" (Moonlight) "Iride" (Iris or opalescent) "Ceraspagna trasparente" (Transparent Spanish Wax an amber effect) and "Cristallo Argento" (Crystal - Silver). Tiffany in America is famous for producing these effects in glass.

The hand made beads, which are nearly all made from the canne, produce remarkable imitations of Amber, yellow and red, Lapis Lazuli, Coral in all shades, Verde Antique Agate, Onyx, and most of the semi precious stones.

The generic word for beads in Italian is "Conterie", [end p. 20] said by Bussolin to be derived from the use of beads by savage tribes as counting money "moneta contante." Others hold the word to be derived from the Latin expression "Contigie muliebri" or women's adornments. The writer ventures the critical opinion that the word is derived from the fact that the "paternostri" the first beads were made to be counted in numbering prayers. Counting ones beads is a religious act and phrase that still persi[s]ts and has doubtless given the Italian generic name "Conterie" things to be counted from the verb "contare" to count.

Perle or "Perle Veneziane" also covers most varieties of beads, an ancient name is "Margarete" and finally many varieties and classifications have distinct names some of which have been indicated.[34]

This report has sought to indicate in detail all the processes necessary to the making of beads in bulk, and has included the processes for making beads for African tribes as well as an account of the work of Jacopo Franchini and a brief summary of the history of bead making at Murano.

A voluntary report is now in course of preparation, supplementary to this report describing the processes of bead making when the beads are made by hand, one at a time. This report will be referred to in that for an understanding of the preliminary processes and the two together will cover all the field of bead making in Venice and Murano.

Respectfully submitted,

[signed] B. Harvey Carroll Jr.
American Consul.

File No. 865.6 [end p. 21]

LIST OF ENCLOSURES

AMERICAN CONSULAR SERVICE.
CONSULATE AT VENICE, ITALY.

LIST OF ENCLOSURES FORWARDED IN REPORT ON BEAD MAKING IN MURANO AND VENICE. DATED AUGUST 30, 1917.

From B. Harvey Carroll Jr. American Consul
Venice, Italy, August 30, 1917.

Report in triplicate on Bead Making in Murano and Venice.

Sample Card "D" of the "Società Veneziana per l'Industria delle Conterie" of which only a single copy could be obtained.

Sample Card "G" of the same Society, not referred to in the report but corresponding in many respects to Card "D" and showing some new varieties of machine made beads.

Sample Card "F" of the same Society, often referred to in the report, showing sizes and colors of small beads such as those referred to in the Department's inquiry. Two copies of this card are transmitted.

Small Envelope containing samples of beads corresponding to those sent by Department and described in report.

Sample Card 1. Congo Money Bead, to be retained by the Department.

Sample Cards 2,3,4 and 5, Ornamental Beads for African Tribes.

Sample Card 6, Composite Solid Glass Rod used in ornamenting African Beads.

Sample Card 7, with attached small envelope showing sections of "Murino" work used in ornamenting African beads.

Box containing a number of sample cards showing work of Jacopo Franchini, to be retained by Department.

[Handwritten] All samples sent to Inqi....., except the two marked for National Museum.

LETTER OF TRANSMITTAL

October 15, 1917.

The Secretary of State presents his compliments to the Secretary of the Smithsonian Institution and transmits, in an accompanying pasteboard box, for the use of the National Museum, a small collection of Venetian glass articles, consisting of miniature portraits, pictures of flowers and other artistic designs by Jacopo Franchini, a former glass worker of Murano, near Venice, Italy. These articles have been presented by B. Harvey Carroll, Junior, American Consul at Venice. The Secretary of State also encloses an excerpt of so much of the Consul's report of August 30, 1917, on "Bead Making in Murano and Venice", as relates to the above named articles.

2 enclosures:

Excerpt of a report of August 30, 1917, from Venice Italy; pasteboard box containing articles mentioned, under separate cover.

165.184/3
O AW/EMM

ACKNOWLEDGEMENTS

The annotator is grateful for grants awarded by The Bead Society (Los Angeles, California) and the Northwest Bead Society (Seattle, Washington), that facilitated the production of this paper, and supported trips to Venice, Italy, that materially contributed to his knowledge and the present work. He is also grateful to Paolo Scarpa, Franco and Maria Salsili, and Gianni DeCarlo for allowing him to photograph and use the sample cards and specimens illustrated herein. The persons cited in the endnotes are thanked for helpful contributions. Finally he is grateful to those colleagues who read early versions of this article and offered suggestions, and to those who have engaged him in helpful conversation: Elizabeth Harris, Margret Carey, Kirk Stanfield, and Karlis Karklins.

ENDNOTES

The purpose of this section is to clarify, amplify, and otherwise comment on the Carroll report. This is based on personal knowledge of glass beadmaking, and the works of previous authors who were contemporaneous with or preceded Carroll (these are all listed in the References Cited section). This information will round out the Carroll report by presenting discussion of glassworking skills, techniques, or processes that were similar to or variations on those Carroll witnessed. It would be simplistic to assume that the processes Carroll describes in his report were monolithic, or were followed by every factory in operation in Venice during the early 20th century. In addition, reference to earlier authors are helpful in tracing not only variant processes, but the evolution of processes as they may have changed through time.

At the time when Carroll was Consul to Venice, most of Europe was experiencing the development of the Industrial Revolution, wherein many practices that had been accomplished almost entirely by hand began to be done by machine. Carroll, himself, mentions the development of some of these machines—showing that he was witness to a critical time in glassworking practices. Such renovations and improvements in the apparatus of glassworking have given way to procedures that are, today, almost fully

automated. Because of this, it is historically important to better document the methods of the past, before details are lost or misinterpreted. It is my belief that certain varieties of glass beads, or aspects of beads, may be datable—or that dating may be inferred—by fairly subtle differences. Understanding changes in tools, technology, and practices will help us to look for these differences, and make such determinations on a sound basis.

The Carroll report contains an historical section as well as the technical information. As many readers will be interested in the history of beadmaking at Venice, it is important that these passages be checked against other sources. Several of the most valuable works are recent publications—and surely provide the most up-to-date information.

Of the historical reports that relate to glass beadmaking, several are not entirely unique nor original, and some are not eyewitness accounts. Nevertheless, they have had an impact on the way bead researchers have viewed traditional beadmaking. Reading them in chronological order reveals that certain early reports have been utilized by subsequent authors. Benjamin (1880) copies Anonymous (1835); Sauzay (1870) relies on Ure (1845); Nesbitt (1878) and Dillon (1907) rely on Bussolin (Karklins and Adams 1990); and Anonymous (1919) is a shortened version of the Carroll report.

To gain a correct understanding of beadmaking techniques through time, it is important to compare the reports and to note any changes or dissimilarities that are present as they will affect attempts at presenting any sort of statistical analysis of the popularity or commonality of glassworking practices. This is a primary reason for distinguishing between first-hand accounts and those that rely on the work of others. The latter type may be confirming or consolidating, but their inclusion may give a false slant on the commonality of the practices in question.

As the discussion that follows relates to specific items or passages in the Carroll report, the relevant text is designated by sequential superscript numbers which correspond to the following endnotes.

1. It is likely that Carroll's report on handmade beads was never composed. It is certainly not on file at the Records of the Department of State, where the present report is filed. This is unfortunate, since eyewitness accounts of historic lampworking are even scarcer than those pertaining to drawn beadmaking.

2. The location of the sample cards and specimens mentioned here and elsewhere in the text has been a matter of some concern among recent bead researchers. While some of them were forwarded to C.C. Lord and Co., at least some were sent to the National Museum as revealed by a handwritten note at the bottom of the List of Enclosures: "All samples sent to Inqi....., except the two marked for National Museum." Several attempts have been made to locate the Carroll specimens within the Smithsonian Institution museums (the former National Museum) but to no avail. In any event, the "Congo money bead" is surely a typical chevron bead (*see* endnote 33) known to have been valued by the people of that region of Africa (Fourneau 1955).

3. This passage reveals that the pressures of war have the effect of depleting stocks of canes and other components. This is mainly because the availability of raw materials to make glass is restricted—resulting in stocks being used up much faster than they can be replaced. Carroll reports that in 1917 merely one quarter the usual quantity of glassworking stocks was in storage. This situation was to be repeated in only twenty years, during the Second World War. That stocks should be severely depleted twice in twenty years would surely have severely affected bead production.

4. It is noteworthy that in the late 1800s, remarkable progress was made in manipulating the colors of glass. With the advent of modern chemistry, and much trial and error, glassmakers learned to purify mineral colorants and developed new ones. The new formulae yielded glasses of an entirely new color palette—generally brighter than in the past. (Some would even say garish.) This information may be useful in determining the age of beads (or other glass products), but caution is advised. Older colors may have continued to be used after the development of new colors. For instance, we know that even after a bright red had been developed, which did not demand expensive colorants such as gold, the traditional opaque brick red continued to be used for certain beads. The colors of lampworked beads also became affected by the introduction of carborated glass in the 1840s, since the hotter and cleaner flame yielded brighter colors (Francis 1988:20; Gasparetto 1958:195; Karklins and Adams 1990:82; Sprague 1985:94). This is a separate consideration from glass formulae.

5. "White" is meant here.

6. The reported length of the "Ferri da Canne," usually called a pontil or punty in English, seems remarkably exaggerated, since most authors suggest a length of four to five feet—and five feet is a standard length

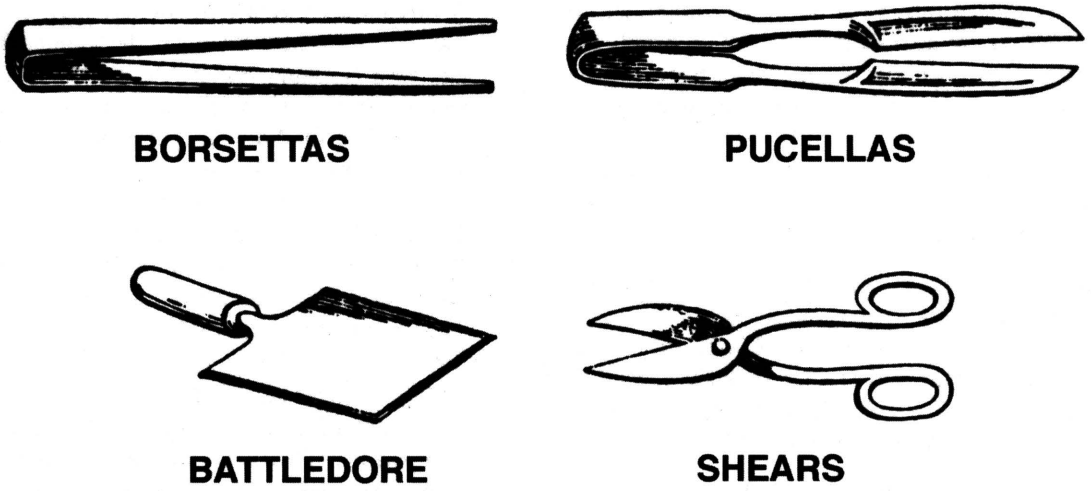

Figure 3. Glassworkers' tools (Pellatt 1849:81).

now (Anonymous 1867:758; Art Seymour 1991:pers. comm.). Carroll's suggested lengths are three times longer than the actual likely length.

7. The "Borsettas" or spring pincers (Fig. 3), mentioned as being used for hollowing out a gather, is actually a rather versatile tool. It may also be used to reduce the diameter of a gather, or otherwise manipulate it.

8. This analogy may have been evocative in Carroll's time, but is no longer instructive to today's audience. In the literature on glass beadmaking, several methods have been described for creating a hollow gather for making a drawn tube. The majority suggest or imply that gathers were blown to make them hollow (Anonymous 1825; Benjamin 1880; Dillon 1907; Lardner 1832; Lock 1882; Nesbitt 1878; Pellatt 1849; Sauzay 1870; Ure 1845). It is, however, important to realize that many authors were dealing with glass manufacture in general, and not necessarily beadmaking in particular. Thus, there may have been a presumption that gathers were blown hollow for bead canes because other products were typically blown. It is also possible that the author may have just been trying to streamline explanations, and did not consider these differences important enough to be mentioned. In any event, this expediency may be misleading. For instance, Benjamin (1880) clearly relies on Anonymous (1835) for his descriptions of beadmaking. Anonymous (1835), however, specified the double-cone method while Benjamin changes this to glass blowing. In terms of glass technology, or glassworking practices, it is not necessary to blow a gather hollow in order to make canes for beads or other purposes. I believe it is incorrect and misleading to stress blowing as a dominant technique, as has happened in the past and more recently (Francis 1986:55-56; 1991: pers. comm.). If all reports related to glass beadmaking were derived from eyewitness accounts, such as the Carroll report, there might not be such an artificial stress placed on the blown method. Carroll wrote that the gather was "cupped," and that the greater open end was closed with a post. In all likelihood, this is related to the "cone" method (Fig. 4) described by Bussolin some 70 years earlier (and to which Carroll referred for his research). The "double-cone" method was described by Anonymous (1835) and is an understandable elaboration of the "cone" method. Likewise, the "double bottle" method, from J.P.B. (1856), and the "bottle" method described by Anonymous (1900), appear to be variations or refinements of both "cone" methods. In fact, I almost hesitate to separate them into different methods, due to their similarity. The cones, however, are described as being "rude" in character, while the others are clearly called "cylinders" or likened to "bottles with the bottom broken out." These latter reports may only reflect the care or skill of the glassworker, or may represent actual refinements. In any event, the relatedness of these techniques should be apparent.

What are the ramifications of these arguments? They may, in fact, be quite important. The artificial stress on glass blowing as a step in the creation of a hollow cane, predisposes one to assume that canes for drawn beads did not exist prior to the development or invention of glassblowing. Nothing, however, could be further from the truth. Glassworkers have been able to make hollow canes or tubes of glass for over three thousand years (Goldstein 1979:48-49). Thus, cane beads exist from considerably earlier than

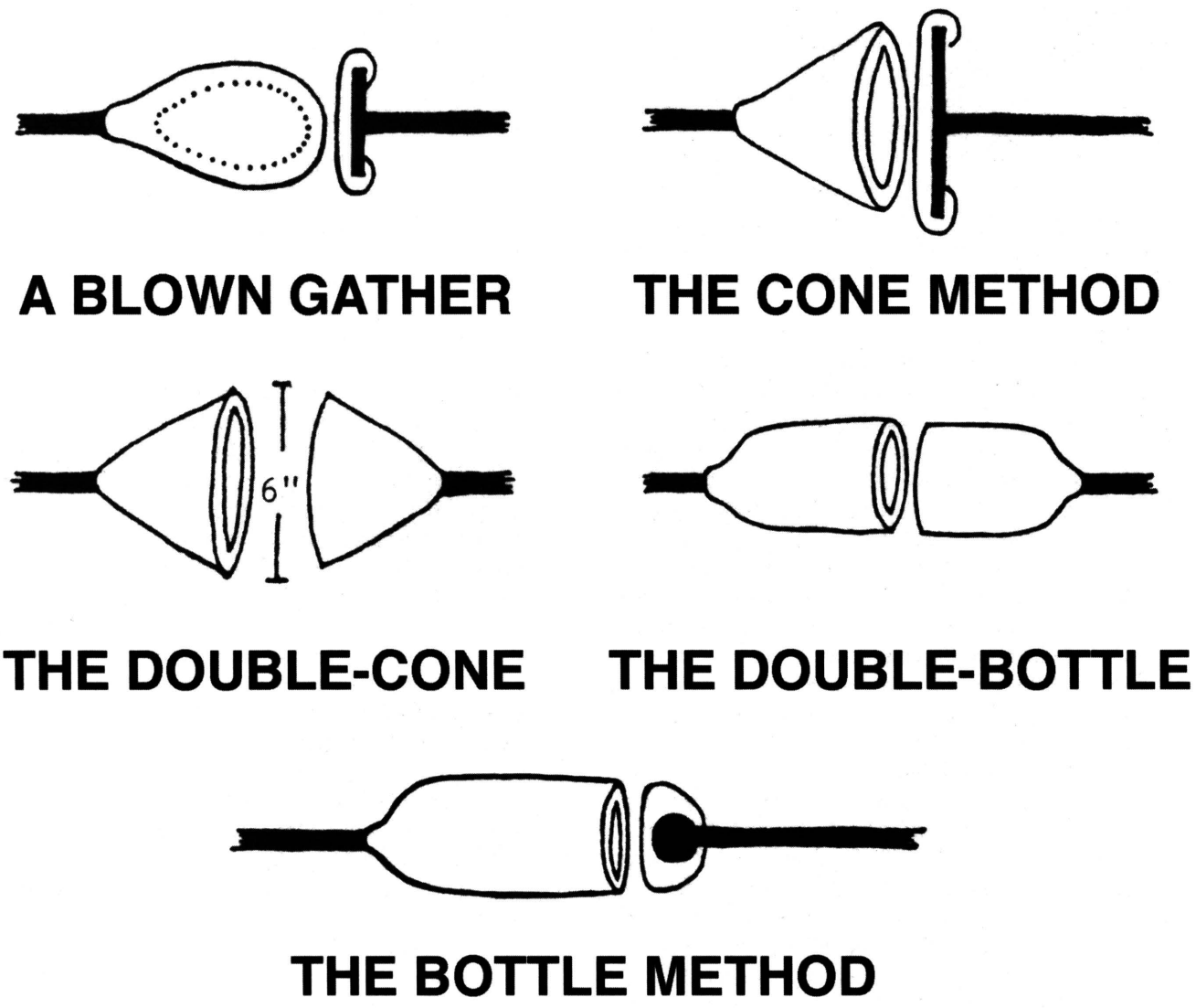

Figure 4. Methods of producing hollow glass gathers for drawn canes at Venice (drawing by J.D. Allen).

the period of glassblowing. On the other hand, it is also apparent that cane beadmaking did not become a common practice until Roman times, at the time of the development of glassblowing—so perhaps there is an historical connection. In either event, it is incorrect to imply that cane beadmaking depends on the art of glass blowing—whether ancient or modern times are concerned. I suggest that cane beads made prior to the advent of glassblowing derive from non-blown gathers; while those that post-date the Roman Era may or may not be from blown gathers. Clearly, Francis' (1983:196-200, 2002) work on Indo-Pacific beads shows a particular method of making cane beads without normal glassblowing. In the Venetian industry, the choice of whether or not to blow a gather hollow may have depended on the skills and preference of the glassworker involved. It may have depended on the type of beads to be made from the canes. Perhaps monochromatic beads were made from tool-hollowed gathers, while more-complicated canes were better made from blown gathers. In any event, the Carroll report and other eyewitness accounts of beadmaking make it clear that glassblowing need not be the requisite technique for hollowing gathers.

9. The tool used in this instance is called a "post" in English and is used when it is necessary to connect to a large surface area, such as the open end of the cone, or when it is necessary to establish a large and strong connection to insure a more uniform elongation

of a gather. Posts may have a variety of diameters, but contrast to the ends of other types of pontils or punties which may be blunt or have a "ball" ending. When a post or pontil is to be connected to a gather of hot glass, it is normally prepared by the application of a small quantity of hot glass, called a "cookie" (Art Seymour 1991:pers. comm.). Thus, the gather sticks to the glass, not to the iron rod or its head. The appropriate use of these tools is depicted in Figure 4, in conjunction with five different types of approaches to making a hollow gather.

10. It is quite problematic that Carroll specifies a length of 300 yards in cane drawing. This would be equal to nearly three football fields placed end-to-end! We can be certain that there were no glass factories in Venice with such long galleries. The reports of other authors generally specify a considerably shorter length, ranging between 60 and 150 feet (e.g., Anonymous 1825; Anonymous 1835; Benjamin 1880; Dillon 1907; Lardner 1832; Pellatt 1849). In fact, it is suggested that 150 feet is actually the length of the gallery where the cane is pulled—so the cane itself would be somewhat shorter. It is obvious that the length provided by Carroll is in error, but it is uncertain whether this was caused by faulty conversion from the metric system or some other reason. In any event, it is an absurd idea that canes were ever stretched to as long as 300 yards. Remarkably, this is a mistake that has been repeated without criticism in a number of later reports, most notably Kenneth Kidd's (1979:26) important paper on glass beadmaking. Allen (1983) and Francis (1988: 5) also repeat this mistake. I hope this will put to rest the idea that canes were ever routinely elongated much past 100 feet, and then only for the canes needed to produce very small beads. Large-diameter canes would have been stretched much less.

11. During a visit to Venice, I paced the Piazza San Marco and found that it is about 140 paces long by 90 paces wide which would equate, more-or-less, to the same dimensions in yards. Clearly, the Piazza is considerably shorter than 300 yards.

12. As Carroll points out, concurrent with the issue of cane length is the speed at which the workers withdraw from each other to elongate the cane. Popular conception has the men running away from each other as soon as the gather has rods connected to each end. This is, however, only necessary when a cane of a quite small diameter is desired. About half of the historical accounts surveyed mention running, while the other half indicate a slower pace. Carroll, himself, proposed the latter, based on his observation—and is probably the most generally accurate—particularly since he was witnessing the manufacture of small-diameter canes for seed beads.

    Having watched Art Seymour and his son perform this task, and with additional discussion of the issues involved, it is clear that written accounts considerably oversimplify the drawing process. The gather must be carefully and correctly heated so that it is quite soft, but not so hot as to lose its character. The second iron must be attached efficiently, quickly, so that not too much heat is lost, and with a strong connection so that the gather will elongate in a uniform manner. Further, the correct moment must be determined since the glass cannot be either too hot nor too cool. When the glass reaches the correct temperature for elongation, there is more to the process than the workers receding from each other. Sometimes the master actually "whips" the cane to control flow. Initially, the cane sags as it's being pulled, but eventually forms a straight line between the two workers. Occasionally, the cane is fanned in places where it is becoming too thin which cools the glass preventing further thinning. The various steps are graphically depicted in Fig. 5.

13. What Carroll means to say is that any particular gather may be drawn out to any desired diameter. He is not implying that the elongation of a particular gather will yield all the possible variations in diameter, from large to small, even though the resultant tube is typically somewhat non-uniform. A cane will be thinnest in the middle (or, in some instances, where there are bubbles or imperfections), and thickest near the ends. Beads made from these end-sections (e.g., large chevron beads) actually have a fairly noticeable taper.

14. Most sources agree with Carroll regarding the division of canes into bead-sized pieces. Bussolin (Karklins and Adams 1990:18-19) reports that Captain Longo invented a cutting machine in 1822, operated by two workers. It was not precise enough, however, and many years later, canes were still being cut by hand. To be precise, the canes are not actually "cut" into segments but chopped in a controlled manner. It is just a convenience to say "cut" in the literature.

15. Other observers generally agree with Carroll that canes are chopped into pieces that are more-or-less equal in diameter and length. An exception is Anonymous (1835:79) who specifies that the length is twice the

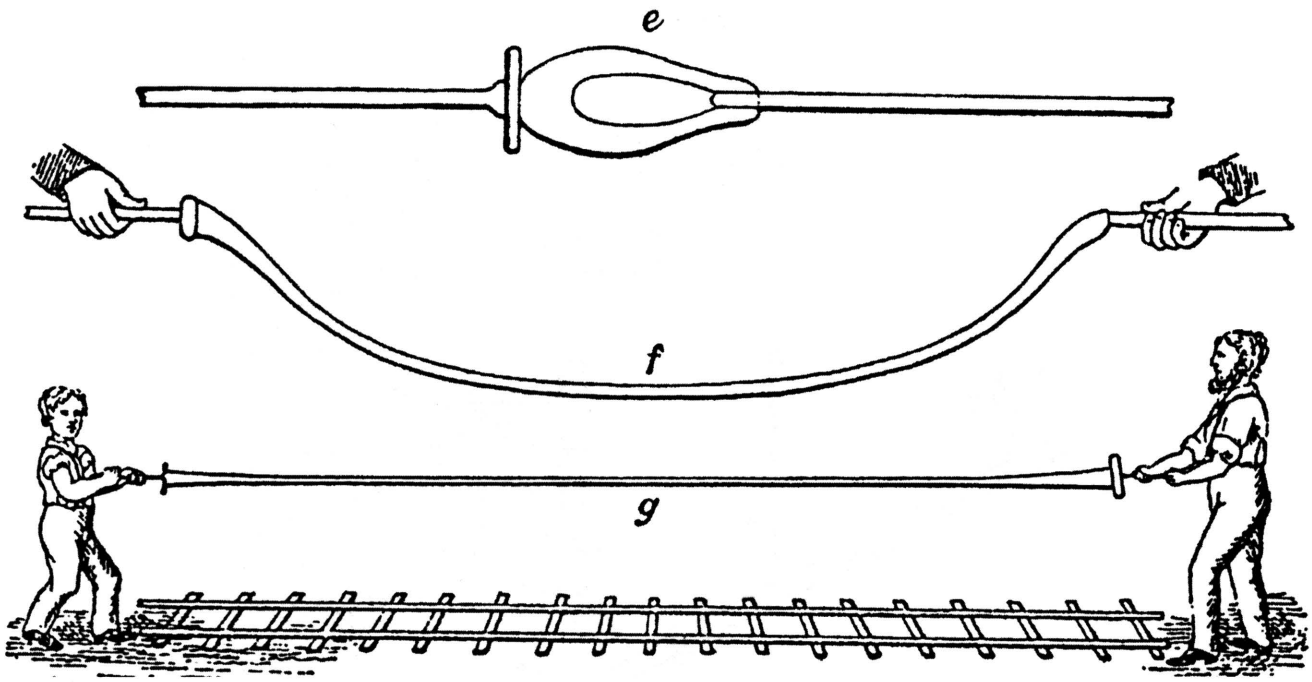

Figure 5. Elongating a gather of glass into a cane (Pellatt 1849:107).

diameter. In actual fact, the length may be regulated to produce any desirable length. The proportions Carroll mentions would be ideal for making the common embroidery or seed beads.

16. This passage is concerned with one of the most often confused aspects of cane beadmaking—the heating of bead segments, en masse, to rounded them. Carroll's presentation is fairly straight-forward and accurate, with the exception of his statement that the sand or packing material with which the beads are circulated "grinds and polishes" the beads. This is totally incorrect, but is a mistake that has been made many times by authors who have confused the process with typical lapidary tumbling. The lapidary polishes rocks and stones by placing them in a rotating tumbler with wet grit. The grit, which is changed periodically and becomes progressively finer, slowly grinds away the rough surface, ultimately resulting in a polished surface. The finishing of glass beads by "hot-tumbling" (Allen 1983b) involves the use of heat and not grinding.

As Carroll only provides an abbreviated account of the "hot-tumbling" process (Fig. 6), a more detailed account is provided here. In the first step, the cane segments are filled with a material of choice so that the perforations will be preserved during the heating operation. Various materials have been noted: sand and wood ashes (Anonymous 1825); a paste of moistened ashes (Anonymous 1835); gypsum and plumbago (graphite) or ground clay and charcoal (Ure 1845); and siribiti—moistened charcoal powder and lime (Karklins and Adams 1990; Nesbitt 1878:). The majority of these recipes are in agreement, and probably represent minor variations of choice. Ure's suggestion of "gypsum and plumbago" stands out as the most radically different, as does the "ground clay," but possibly any of these formulae would work.

The filled segments are then placed into a barrel-shaped container, along with a quantity of packing material. This has been reported as just sand (Anonymous 1835; Benjamin 1880; J.P.B. 1856), or either a mixture of sand and ashes (Anonymous 1825), or sand and charcoal (Karklins and Adams 1990; Nesbitt 1878). Anonymous (1900) mentions "coal powder," but this probably refers to charcoal. Whatever the composition, the main function of the packing material is to prevent the beads from sticking to one another as the glass become viscid.

When full, the container is placed over a fire in a small furnace where it is situated so that it can be rotated by a hand-crank. The fire is only hot enough to allow the cane segments to become soft enough to have a small degree of flow. A greater temperature would cause the beads to become distorted or melted

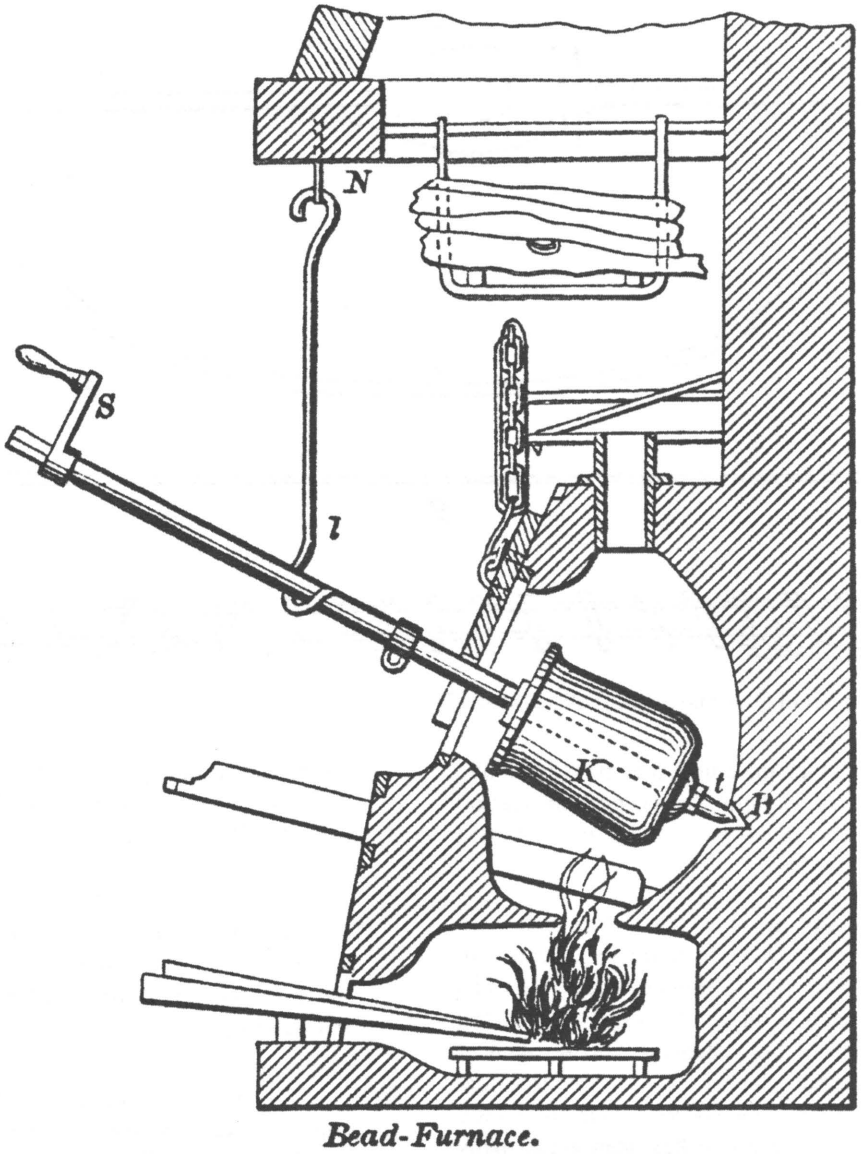

Figure 6. The furnace and apparatus used for hot-tumbling beads (Ure 1845:209).

out-of-shape. The container is continuously rotated, the idea being to create a situation where a softened body is freely floating in space. The result is that it will become the most compact form possible—a spheroid. When the operation has been completed, the container is removed from the furnace, but is still rotated to maintain the free-floating environment.

When they have cooled, the finished beads are removed from the container, and separated from the packing materials. Carroll says that the filling medium is "consumed" or "vanishes." Other reports, however, state that it must also be separated from the beads. This may depend on what materials were used for filling.

When beads are hot-tumbled, they generally do not become perfectly round spheres. Far from it. There is a continuum of roundness, ranging from cylindrical segments with barely rounded edges, through rounded cylinders and oblates, to spheroids. These variations depend on several conditions: a) the degree of heat to which the segments are exposed; b) the length of time the segments are heated; and probably c) the speed at which the container is rotated.

17. It is curious that Carroll reports the value in French francs, rather than lire. This may indicate that he referred to Bussolin or another French-language work

for the information, or that the statistics are derived from commerce reports between Italy and France.

18. For a detailed account of this aspect of the Venetian industry published in 1893, *see* Ninni (1991).

19. There is considerable disagreement in the literature about whether the name "cane" should be applied to only solid, or only hollow constructions, or to both of these forms. Carroll implies that a solid construction is a "rod," while its hollow counterpart is a "tube or cane." Kenneth Kidd (1979:57, 59), another respected authority, states a "cane" is "a solid rod of glass, often coloured," and that a "tube" is "a hollow rod of glass." Unfortunately, there is no lexicon to help bead researchers resolve this issue. In the past, it has been the practice of both glassworkers and historians to refer to any cylindrical or drawn component as a "cane." I would propose that a "cane" may be either solid or hollow, and that it be referred to as being either a "solid cane" or a "hollow cane." The terms "rod" and "tube" are clearly not interchangeable, and I suggest that a "rod" is a solid cane. "Tube" and "tubular" are slightly more problematic. I feel these terms better define shapes than types of constructions as one may have a "tubular bead" that is not derived from a section of drawn cane.

20. "Cold glass" refers to preformed glass components, or a group of rods that are made for such work. He does not mean to imply that the rods are actually cold.

21. This, again, is an oversimplification. Within the Venetian industry (and in Europe, in general), there are several distinct techniques used to create canes with internal patterns. The composite technique–that of bundling small preformed rods—to compose a mosaic pattern is of great antiquity. The overwhelming technique of choice, however, particularly for typical conventional images such as stars and flowers, derives from cane molding. This is entirely different from compositing; but this fact was not generally recognized and reported until quite recently (Allen 1982, 1983a).

22. Although Franchini is the undisputed leader in cane portraiture (Fig. 7; DeCarlo 1987), the works of Vincenzo and Luigi Moretti, and Guiseppe Barovier are impressive (Sarpellon 1995:126-138, 152).

23. Carroll is mistaken in suggesting that the "base" or core material of typical millefiori beads consists of a small section of the "canna." Typical 19th- and 20th-century Venetian millefiori beads, well-known to collectors and researchers as "African trade beads" (the ones Carroll is discussing here), are lampworked products with a wound base. The cores of these beads are proportionately small and are frequently only visible on one end.

24. It is misleading to suggest that lampworked beads were "enamelled" in the general sense of this term. In 19th- and early-20th-century literature, it was common to refer to colored glass as "enamel." This was to distinguish it from typical clear and colorless glass. "Enamelling" properly refers to the process of decorating an object (whether metal, glass, or ceramic) with powdered glass of a low melting point, often applied as a paint, and fired to fuse and permanentize it. Very few glass beads were made this way, since glass is seldom enamelled.

25. In this context, Carroll should have said "shaped," "formed," or "modeled," not "molded." In beadmaking terms, the word "molded" should be reserved for instances where components or beads have been shaped or made by inserting viscid glass into a mold (e.g., molded canes for rosetta beads, or the famous molded beads of the Czechs). Further, a molded bead does not exist as such before its production in a mold. In other words, a wound bead that is inserted into a device to reshape its conformations is a "pressed bead." It existed as a bead before insertion, while a "molded bead" did not. The correct use of these terms will avoid confusion, and allow everyone to discuss the same topic at the same time (Elizabeth Harris 1979: pers. comm.).

26. Byzantium fell in 1204 C.E. Carroll misleads the reader in suggesting that ancient Egyptians made "conterie," or tiny drawn glass beads. While it is likely that small drawn beads were made in Egypt during the Roman Era, Carroll is referring to "mummy beads" which were made of glazed faience, not glass.

27. There is considerable confusion regarding the different branches or specialities of beadmakers in Venice. Carroll suggests the Paternostrieri eventually split and became the Suppialume or glass blowers and the Margareteri or bead makers. This is not correct. The Suppialume were not "glass blowers" (at least not exclusively). They were a guild of workers who made lamp beads. The phrasing implies that these workers did not make glass beads, but blew other glass products. They certainly did make beads at the lamp, possibly

Figure 7. Examples of Jacopo Franchini's miniature portraits in glass (excepting the lower left specimen depicting a peacock). The descriptions of the subjects are based on Sarpellon (1995). The subjects are listed below by row, from left to right, and the approximate year of production is provided.

Row 1: 1) Emperor Franz Josef (1863); 2) Victor Emanuel II, Cavour, and Garibaldi (1862); 3) Emperor Franz Josef (1863); 4) Garibaldi (1862); 5) Victor Emanuel II (1860); 6) Garibaldi (1862); 7) Cavour (1862).

Row 2: 1) Napoleon III (1862); 2) Angelina (1845-47); 3) Napoleon III (1862); 4) Victor Emanuel II (1860); 5) Angelina (1845-1847); 6) Angelina (1845-1847); 7) Garibaldi (1862).

Row 3: 1) Rialto Bridge (1845-1848); 2) gondola (1843-1846); 3) initials "F G" (1845-60); 4) gondola (1843-1846); 5) Rialto Bridge (1845-1848).

Row 4: 1) Flower (1840-1843); 2) initials "P B" (1845-1846); 3) skull (1941-1845); 4) smoking man (1841-1845); 5-6) rose (1843-1845); 7) rose (1840-1843).

Row 5: 1) Roses (1843-1845); 2) Cavour (1862); 3) Garibaldi (1862); 4) Angelina (1845-1847); 5) date "1843"(?).

Row 6: 1) Peacock (by Guiseppi Barovier, 1913); 2) Angelina (1845-1847); 3) Garibaldi (1862); 4) Cavour (1862); 5) Victor Emanuel II (1860). Courtesy of Giacomo DeCarlo, Venice, Italy (photo: J.D. Allen).

even including blown glass beads. Carroll implies that the beadmaking branch of the Paternostrieri became the "Margareteri." In fact, the Margariteri preceded the Paternostrieri.

28. There is a popular story, often repeated by historians, that Marco Polo was responsible for inciting bead manufacture at Venice. It is, however, a falsehood, perpetrated in 1811, by a man named Rizzi—and refuted in 1955 (Francis 1988:12; Kidd 1979:17). Carroll's reference to the "savages of America" is puzzling as Marco Polo had nothing to do with that continent. Perhaps he meant to write "Asia"?

29. This statement is also confused. Carroll specifies events of the early 15th century, whereas previous authors place these events in the 16th century. It is difficult to interpret what Carroll means by "the present Venetian bead industry," when he remarks about its beginnings in the 1400s. He is, however, probably referring to the introduction of cane beadmaking since Venetians had been making glass beads for at least 100 years prior to the 15th century (Dillon 1907:184).

30. This supposition had been previously made by Nesbitt (1878:92) who believed that the ruling of 1510 indicated that Venetians only sent canes to Germany for a short period of time because they could not be made into beads locally due to current restrictions. Nesbitt cites documents that imply beadmaking was an ongoing industry at Venice. Authors in the German camp have suggested that the German demand for canes from Venice instigated the Venetian involvement in beadmaking, but this would seem to be prejudicial.

31. Carroll again oversimplifies the development of this aspect of beadmaking. It is unknown when and how the practice of canemaking was introduced into Venice, but it is clear that cane beads were made in other parts of the world prior to this and they had been finished by heating operations. The practice even predates the Roman Period, and was not devised by Europeans.

    Prior to the introduction of hot-tumbling in 1817 (*see* endnote 16), small cane beads were finished en masse by placing them in an open pan mixed with the requisite filling and packing materials. The pan was about 10-13 in. in diameter with a long handle. As the pan was heated over a fire, a hatchet-like tool was used to stir the contents (Karklins and Adams 1990:73). The process would have been similar to hot-tumbling, but was less effective at rounding the beads in a consistent manner, and involved considerably fewer beads per batch. This process and/or the beads were referred to as "a ferrazza" (Gasparetto 1958:182).

    Another concurrent method was used primarily for rounding larger beads. This involved placing one or more cane segments onto a metal spit (*spiei*, in Italian) which was then heated so that the glass became viscid. The spit was turned, and probably rolled over shaping surfaces and manipulated with tools to form the segments into nicely shaped beads. This is probably the essence of the work done by the Paternostrieri. It was preferable to treat cane segments in this manner when their physical size made en masse treatments ineffective. The *a spiei* method could be performed at either a lamp, or at a furnace provided with a gloryhole. Beads produced in this manner often exhibit distinctive characteristics (Karklins 1993).

32. I would hesitate to describe faceted cane beads as "new" Venetian products developed in 1860. The name Macca sounds like it might be related to the earlier "Maccaton"—a variety of trade bead listed among the cargo of an English ship sailing out of Bristol in 1725 (Erikson 1969:60). In any event, the Venetians made polyhedral canes for beads long before 1860. Certainly, the use of small faceted black glass beads as substitutes for jet predates this period in Europe. Kidd (1979:53) states that Macca beads had diameters greater than their length. On page 58, however, he apparently counters this information by suggesting typical measurements are 3 mm by 4-5 mm long. They are featured on Sample Card D (Fig. 1) and Kidd's assertion seems not to be warranted. It is likely that Graziati and Zecchin developed some new process for making certain faceted canes, but the specifics are not clear.

33. Since typical chevron beads are called "perle a rosette" by Venetians, there can be no doubt that the "Congo money bead" is a chevron bead. Carroll's remark that striped beads could be "called "rosetta" beads, especially when the stripe is a fine one," is problematic. The likeliest explanation is that he viewed striped rosetta beads and only took the exterior appearance into account. Among the sample cards Carroll received, he discusses aspects of Card D in some detail. Extant Venetian "Card D" sample cards, that are consistent with Carroll's description, display "rosetta beads," that are clearly small striped star beads (*see* Fig. 2).

34. Naming beads in a consistent and constructive manner is the greatest obstacle bead researchers face. We also have the problem of interpreting historical names, which may describe different beads at different times, or types of beads which may have had a number of different names over time. These are two distinct problems. For all his discussion of bead names and terms, Carroll barely skims the surface of this complicated issue. In fact, no single work yet exists to suggest reasonable names or compromises.

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