BEADS

Journal of the Society of Bead Researchers

2004 Vol. 16

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Printed in Canada

Design and Production: David Weisel

Cover. *Coral:* Beads of Pacific *Corallium elatius* utilized by the Kalabari Ijo of Nigeria. Worn by members of a woman's dance group in 1984, the large strings of beads in mottled shades of pink around their necks are called *barilotti* (short, rounded, barrel shapes) and *cannette* (cylindrical shapes). This is a detail of Pl. IIIA bottom (photo by permission of Joanne B. Eicher).

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KARLIS KARKLINS, editor

CONTENTS

BOOK AND DVD-VIDEO REVIEWS

INFORMATION FOR AUTHORS

1. Papers submitted for publication must by typed double-spaced, justified left, with 1 in. margins. Submissions should not exceed 50 pages including references cited. The hard copy should be accompanied by the text as an email attachment or on a 3-1/2 disk or CD in Word Perfect 8/9 (.wpd) or Rich Text File (.rtf).

2. All manuscripts must be prepared with the following internal organization and specifications:
   a. First Page: place title and author's name(s) at top of the page.
   b. Abstract: an informative abstract of 150 words or less is to comprise the first paragraph.
   c. Acknowledgements: these are to be placed at the end of the article, before the references cited.
   d. Author's Affiliation: place author's name, affiliation, and address adjacent to the right margin immediately following the references cited.
   e. Tables: each table must have a short title and be typed double-spaced on a separate page. Do not embed tables or illustrations in the body of the report.
   f. Figure Captions: list the captions for black and white illustrations (Figures) sequentially on a separate page using Arabic numerals; color illustrations (Plates) should be listed separately using Roman numerals.

3. Number all pages consecutively from the title page through the references cited.

4. All headings should be situated three (3) spaces below the preceding text and flush with the left margin.
   a. Primary headings are to be capitalized and bold.
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8. If review remarks are such that substantial changes are required before a manuscript is acceptable for publication, the revised paper will be re-reviewed by the original reviewer prior to its final acceptance.

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10. Each author or set of co-authors will receive five complimentary copies of the journal. Book reviewers will receive one copy.

PRECIOUS RED CORAL: MARKETS AND MEANINGS

Susan J. Torntore

Beads and other ornamental items made of precious red coral have been utilized by various cultures worldwide for thousands of years. Depending on its properties and market context, this highly valued material has meant different things to different peoples through time. The current industry—based in Torre del Greco in southern Italy—reflects past traditions but also incorporates new ideas into the production of beads and jewelry for the three principal world markets: fashion, ethnic, and tourist. These reflect the historic trade and use of red coral beads in several West African, European, and American cultural settings. This article describes the Torrese coral industry, revealing how the different beads are manufactured and marketed, and also delves into the cultural significance of precious coral over time.

INTRODUCTION

Precious red coral (*Corallium rubrum*) has been made into beads and used by diverse cultures around the world for millennia. In this article,[1] coral beads are discussed as items of dress and as a commodity in a long-term, extensive, cross-cultural trade originating in the Mediterranean country of Italy. Historically, red coral as an organic material has carried different meanings based on its physical properties, such as its ancient use as an amulet against the evil eye or in early Christian religious symbolism. Coral also had a high economic value as a luxury product on the silk and spice routes. The value and trade of coral beads and jewelry in our contemporary era have been influenced by these historical meanings and traditions, and there are three primary yet very different commercial markets for coral beads that reflect their historic trade and use in several cultural settings.[2] These markets are categorized as Fashion, Ethnic, and Tourist. Coral beads have high value because they are worn in specific and special ways. These three market categories are based on the production of different beads that result from different physical properties of red coral, and each has diverse needs based on different interpretations of coral's historical meanings. This analysis is based on the production of red coral beads within a contemporary perspective of coral as a precious and highly valued organic material.

TORRE DEL GRECO

Since the 17th century, most of the Mediterranean coral has been fashioned into beads by an Italian industry centered in Torre del Greco which today is one of the three most important locations in the world for the production of coral beads (Liverino 1989a, 1989b).[3] Torre del Greco is known as "the world's capital of coral." Geographically, it is in the province of Campania in southern Italy, on the southwestern coast of the Gulf of Naples, approximately 20 minutes south of the city of Naples. It is also Italy's leading exporter of coral beads and coral products such as jewelry. In the late 1990s, Italy accounted for 90% of red coral commerce and the production of coral objects worldwide (Cattaneo-Vietti and Cicogna 1993:8). Eighty percent of coral objects and beads made in Torre del Greco are exported throughout the world from over 320 active businesses and workshops (Torntore 2002). The coral sector in Torre del Greco is characterized by a strong commercial orientation to the outside world. It is an industrial wholesale sector that exports its coral products primarily to other parts of Italy, Europe, and the United States (Stampacchia and de Chiara 2000). The coral exporting business is conducted in Italian or English, except business with Germany which has to be conducted in German. For this reason, the large workshops employ at least one person who can speak, write, and read English and German, or they set up partnerships with branches of the family that have migrated to Germany (Torntore 2002). The Japanese who do business with Torre del Greco speak Italian. Torre del Greco's title as "world's capital of coral" is very real but not very visible to an outsider. Being a production and wholesale center, it is very difficult to purchase coral beads or jewelry as a retail customer. Retail jewelers do not feature coral in street-side window displays and sell coral primarily on a wholesale basis, if at all.

PRECIOUS RED CORAL

The precious corals harvested to make beads and jewelry are of the genus *Corallium*, and the geographical

distribution of *Corallium* corals is limited predominantly to the Mediterranean and to Japanese waters in the Pacific (Campbell 1976; Silverberg 1965). At least 27 species of *Corallium* have been identified, and eight of these are worked into beads and other products (Liverino 1989a, 1989b, 1998). Of these eight, the two most prevalent *Corallium* species are pertinent for this discussion. Mediterranean and Pacific varieties of coral have very different physical characteristics that play a role in limiting or pre-determining the final products. The oldest and best known species is *Corallium rubrum*, and the Mediterranean Sea has been a major source of this prized red coral for millennia. Called *sardegna* in Torre del Greco, this coral is uniformly red through the diameter and length of branches, and various shades of red are found in different geographic locations in the Mediterranean, such as off Morocco, Tunisia, and Sardinia.

More-recently utilized *Corallium* species from the Pacific Ocean come in a wide spectrum of colors ranging from pure white through shades of pink, salmon, and orange to a very dark ox-blood red.[4] In comparison to *Corallium rubrum*, Japanese or Pacific corals are larger in size and dimension, more compact in structure, and thus easier to handle. They can be more highly polished and more perfectly shaped, but they do not have uniform coloration throughout either surface or interior. One of the most utilized Pacific corals in the Italian industry is *Corallium elatius*, called *cerasuolo* in Torre del Greco. Pacific corals are important in the Italian coral sector because Mediterranean coral is scarce and expensive (B. Liverino 2000: pers. comm.). By the end of the 19th century, enormous quantities of raw Pacific coral from Japan began to be exported into Italy (Balletta and Ascione 1992). This crisis led to changes in the structure of the coral industry. As Mediterranean coral fishing declined, Torrese coral businessmen went to India to sell their manufactured coral goods, and to Japan to buy raw coral for working in Torre del Greco (Balletta and Ascione 1992; Liverino 1989a, 1989b, 1998). This direct, international, commercial trade in coral kept the industry alive, and is a way of doing business that still characterizes the Torrese coral industry today. Scuba diving has tremendously increased the expenses and price of the raw coral pulled from the Mediterranean. International regulations related to the harvesting and trade of endangered species also restrict the supplies of raw coral from the Mediterranean (Liverino 1989a, 1989b, 1998). So the bulk of the raw coral in Torre del Greco is now imported from Pacific waters via Japan and Taiwan, and many beads, bead blanks, and other pieces of worked coral for jewelry are imported from Taiwan (Torntore 2002). Taiwan also now supplies large quantities of coral beads, much quicker and cheaper, for international markets formerly supplied by Torre del Greco manufacturers. Torre del Greco, however, is known for the high quality of its coral products.

CORAL BEAD PRODUCTION

Coral beads may go through as many as 12 stages of highly labor-intensive production before they are finished. Making coral beads in Torre del Greco is, in general, still a process of working by hand, with hand tools replaced by mechanization in some steps (Torntore 2002). Essentially, however, coral bead production methods today are the same as those used in the past. The nature of a piece of raw coral strongly determines the choice of the finished product and, consequently, the finished product determines how the coral is processed and the beads produced (Torntore 2002). After harvesting, raw coral branches (Pl. IA) are separated from the trunk at their intersections and cut into manageable sizes. This first cutting is called *spalliatura* and the pieces are then sorted for size, color, quality, and form before being cut again. As they arrive at this stage, the pieces are cylindrical (Pl. IB). In the step called *tagliatura*, the branches are cut crosswise into smaller uniform pieces on an electric saw (Pl. IC), and these bead blanks are again sorted into more refined groups by color and diameter based on final end use. Once sorted by diameter, the coral pieces go through the first step of rough shaping called *aggarbatura*. Beads are shaped by hand using a grinding wheel, with the bead blank securely held in large wooden pliers (Pl. ID). This step simply rounds off the rough edges and removes the remainders of the soft crust called *coensarc* to expose the hard core we recognize as coral. Subsequent grinding stages shape the bead into the final form. In some cases, like branch coral beads (called *frange*) or the rougher cylindrical beads called *fabbrica* (translated as "factory stuff"), this might be the only stage of shaping, although the beads may be further refined and polished. Smaller spherical beads called *pallini* are shaped by a machine called a *rociatrice* (Pl. IIA). This process utilizes a rotating round bronze disk that has a pattern of numerous small holes cut into it. Coral pieces are pushed into the holes and ground down between two large, horizontal, carborundum grindstones. The pieces revolve in the holes and gradually become rounded.

After these preparatory stages, rough blanks and pieces of coral are directed towards three separate categories based on use and each category is then finished appropriately. Today, the Italian coral industry uses the terms *liscio* and *inciso* for the two major categories of production and finished products made from coral (Torntore 2002). *Liscio* ("smooth") refers to coral made into smooth and polished products: *tondo* or cabochons, and *rotondo* or beads.[5] *Inciso* ("incised") refers to coral that is carved or engraved, such

as cameos, small amulets and good luck charms, sculptures and other art objects, or even a category of carved beads.

Once the beads are shaped, holes are drilled in them, a process called *foratura (a mezzo buco)* or *bucatura* (Pl. IIB). In many workshops, especially those dedicated to high cost and quality, beads are drilled one at a time, halfway through from each side (*a mezzo buco* translates as "a small hole halfway through"), to make a straighter hole and prevent breakage. When they arrive at this stage, the coral pieces have a milky or cloudy film covering the surface, which a polishing process removes. Beads are submersed and soaked, and sometimes tumbled, in a solution of water and hydrogen peroxide in plastic basins or buckets. After polishing, the stringing (*infilatura)* process is the final step of production and one of the most time-consuming (Pl. IIC). It is completely accomplished by hand by women working in a factory workshop or at home. The beads go through a final sorting process for color, size, and quality as they are threaded onto strings. Finished strands are braided or knotted together into a large bundle called a *mazzetta*, and these bundles are packaged for general wholesale distribution as beads, or made into various styles of necklaces or other items for different markets.

Coral beadmaking is a time-consuming process. For example, it takes between 10.5 and 14.5 days to produce one kilogram of the small round beads called *pallini* (Stampacchia and de Chiara 2000:91). The flow charts in Tables 1 and 2 outline the entire process of coral bead production at Torre del Greco. One of the most important points to note in this discussion is the wide range of value-added production activities that each type of coral and bead undergoes in preparation for one or more of the three specific markets.

Coral beads are named and sold according to their shape and size. In some cases, they are also referred to by a specific finish or characteristic, such as the term *fabbrica* for the roughly finished, imperfect beads of different shapes. Table 3 identifies the major characteristics and shapes of the most common coral beads produced in Torrese workshops, sold in Italian retail shops, or as observed in use. Every piece and scrap of coral is utilized in some form, and the smallest scraps are drilled and made into the beads called *spezzati,* for instance, to satisfy a specific market demand or custom. *Pallini* comprise the bulk of the production and export, and are primarily produced by mechanized means. *Frange* and *spezzati* are second in production amounts (Liverino 1998:197; Stampacchia and de Chiara 2000; Torntore 2002).

Coral bead production and export in Torre del Greco comprise a multi-billion-dollar industry (Stampacchia and de Chiara 2000). The prevalent business structure in the industry follows the Italian model of small family businesses in which the work has been mandated and inherited from one generation to the next (Torntore 2002). In this setting, family members are drawn into the business when very young, and learn the ropes from their parents and grandparents. Although non-related persons may be employed to complete production processes, the family does the decision-making. Many of today's larger coral businesses have been in Torrese families since the mid-19th century, and are operated by fourth-, fifth-, and sixth-generation descendants of the founders (Torntore 2002). Additionally, these businesses are primarily conducted in a domestic setting, from the ancestral home or, in the case of larger businesses, in laboratories and workrooms constructed adjacent to the family home or within a family compound. For example, Apa, one of the oldest (since 1848) and largest coral manufacturers in Torre del Greco operates out of one of its historic family villas, which includes space for offices, manufacturing workshops, and a large showroom on the first floor. Located adjacent to an exit of the major north-south freeway, this was the most visible retail outlet for coral jewelry in Torre del Greco in 2000 (pers. obs.). The showroom is open 365 days a year and, in 2000, had 500,000 people come through it (G. Bartoli 2000: pers. comm.). This central and easily accessible location allows the firm to work with the operators of large tour companies and tour bus operators, offering sales or kickback incentives to have buses stop at its premises (G. Bartoli 2000: pers. comm.). Tourists from Germany, Japan, Great Britain, and America all buy coral here. In addition, they have a large internet presence for wholesale trade.

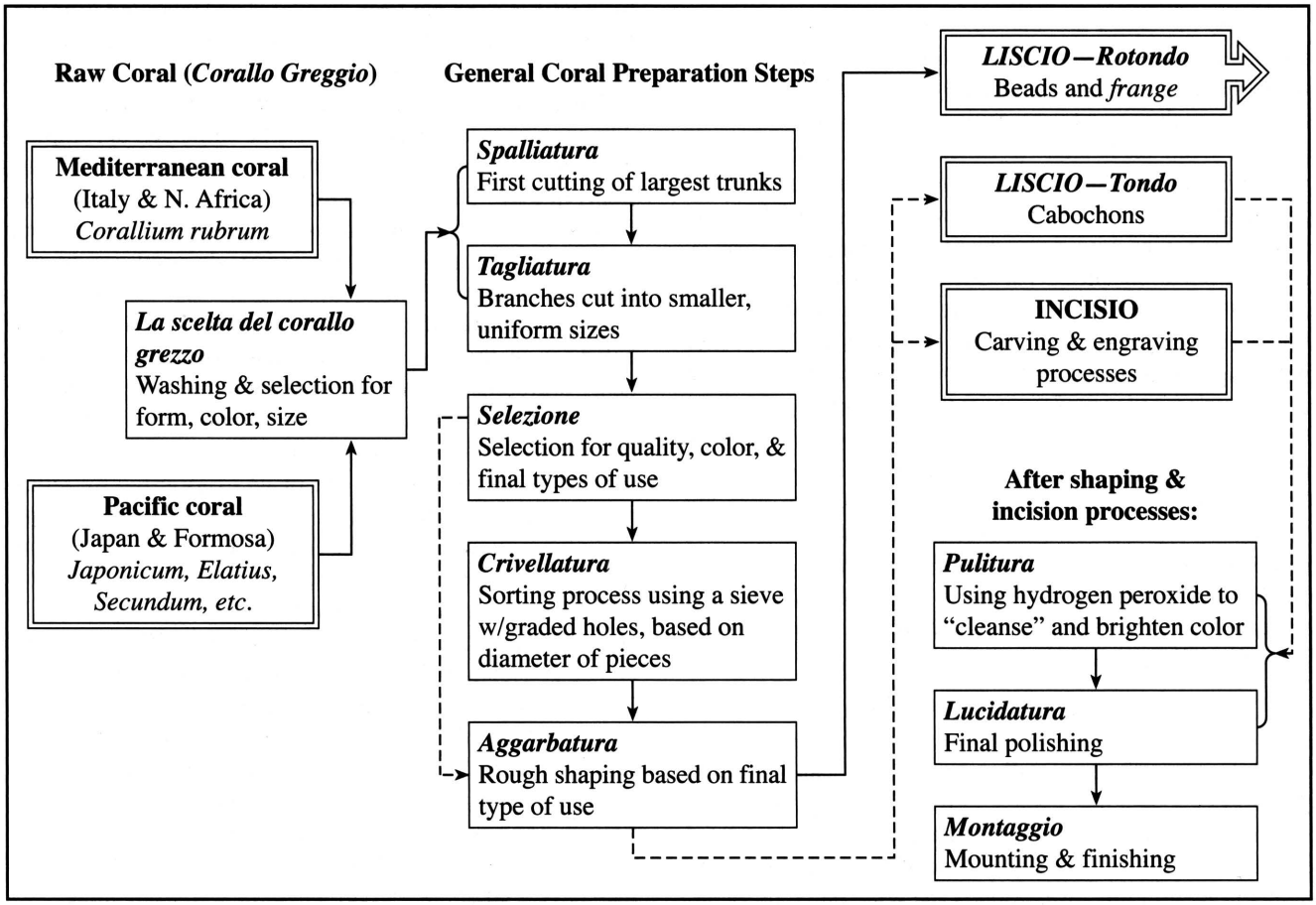
CORAL BEAD MARKETS

Different beads are made for different markets. Three very particular destinations and target markets were identified by coral producers in Torre del Greco for specific types of coral beads and bead products (Torntore 2002). These are categorized here under the larger headings of fashion, ethnic, and tourist markets, based not only on the terms used by manufacturers, jewelers, exporters, and retailers to refer to specific beads, but also to the differing characteristics of the beads and jewelry (Torntore 2002). More importantly, these categories outline three diverse values and meanings of coral and coral beads.

The Fashion Market

The fashion market category is based on current, constantly changing fashions and styles. In this market

Table 1. General Categories of Coral Production.

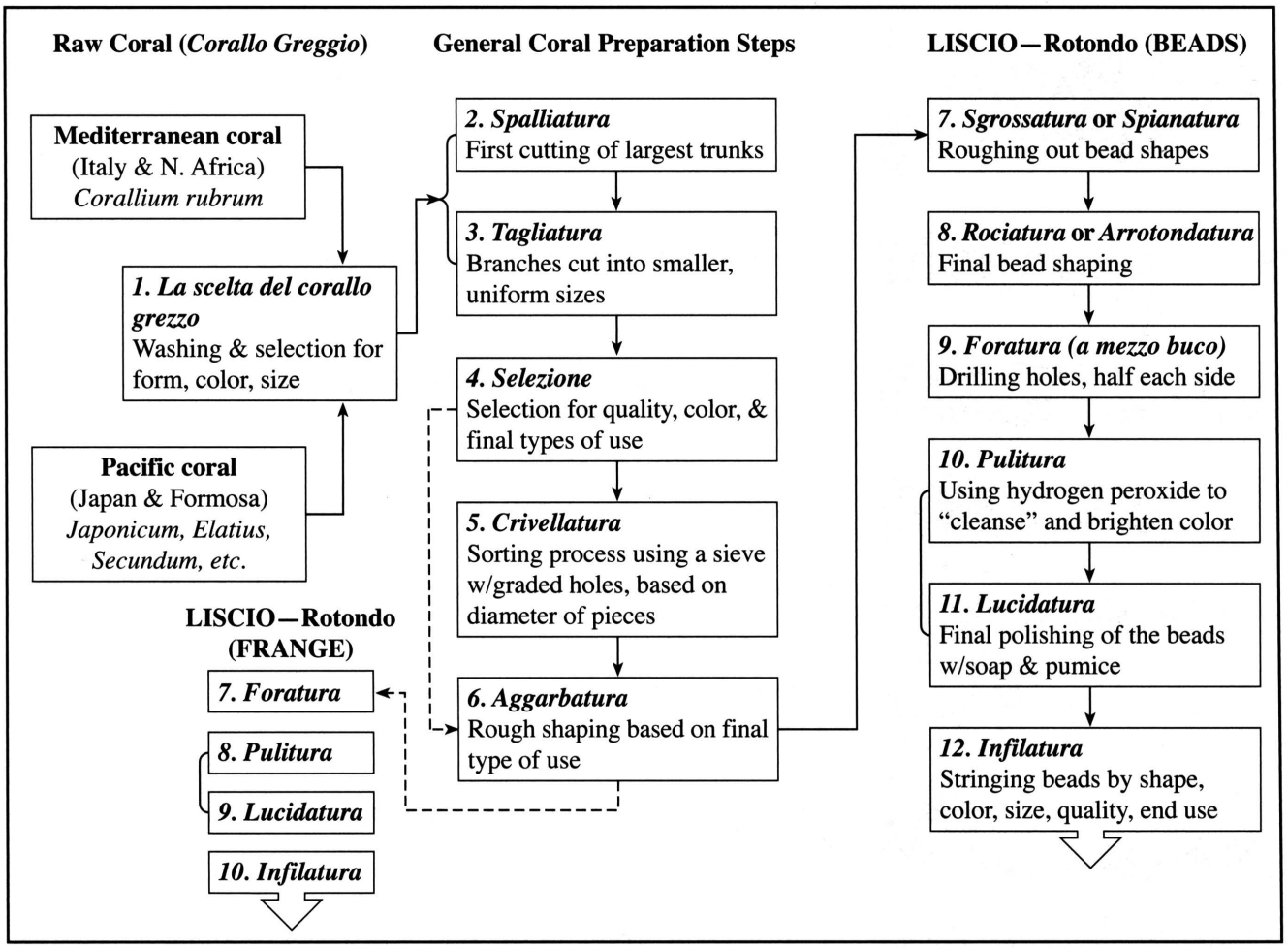


This flow chart (Torntore 2002) is based on Stampacchia and de Chiara (2000).

category, coral beads are strung in carefully graduated sets, based on the historic idea of a matching set, or combined with carved or incised coral pieces or gold and platinum beads. This market prefers highly refined beads that require a great deal of handwork to shape, polish, and match them. Imperfections are not tolerated, unless the "ethnic look" is fashionable, and then slight variations may add character to a piece. Mediterranean coral is the preferred color and type within this market, although pink and red Pacific corals are also acceptable if they don't show imperfections in coloration. This category is reflected in the ready availability of two classic types of necklaces in Italian jewelry shops. One is the single-strand necklace of graduated coral beads, similar to a strand of pearls (Fig. 1). The other is the multiple-strand necklace called a *torsade* or *torchon*, the most popular style of necklace for the fashion market (Pl. IID). This style consists of several strands of small spherical *pallini* twisted together into a choker or collarbone-length necklace, with a decorative clasp. The more expensive corals for this market are made into high-quality beads that are then mounted and combined with other expensive, high-quality materials like 18-24 karat gold, platinum, pearls, diamonds, and other precious stones. Beads in this category are only purchased by consumers as finished jewelry, from jewelry retailers in Europe and the United States.

In Italian and European fashion markets, these two seemingly unchanging styles of coral necklaces are considered classics and designed and purchased in the same way that pearl necklaces are designed and purchased—small details like the size of the beads, the length or number of strands, or the style and material of the clasp may change each season or every couple of years. They are easily read as a cliché in the Italian fashion market, as something that is expensive and classy, and worn by a certain level of society, like gold and diamonds and expensive pearls are worn and understood in the United States. In Torre del Greco, coral beads in this market category hold the highest value overall for bead producers. *Pallini* are used to make numerous other styles of jewelry for the fashion market, such as collar-type

Table 2. The Full Production Process for Coral Beads Based on Final Category and Use as Beads (*Liscio-Rotondo*).



This flow chart (Torntore 2002) is based on Stampacchia and de Chiara (2000).

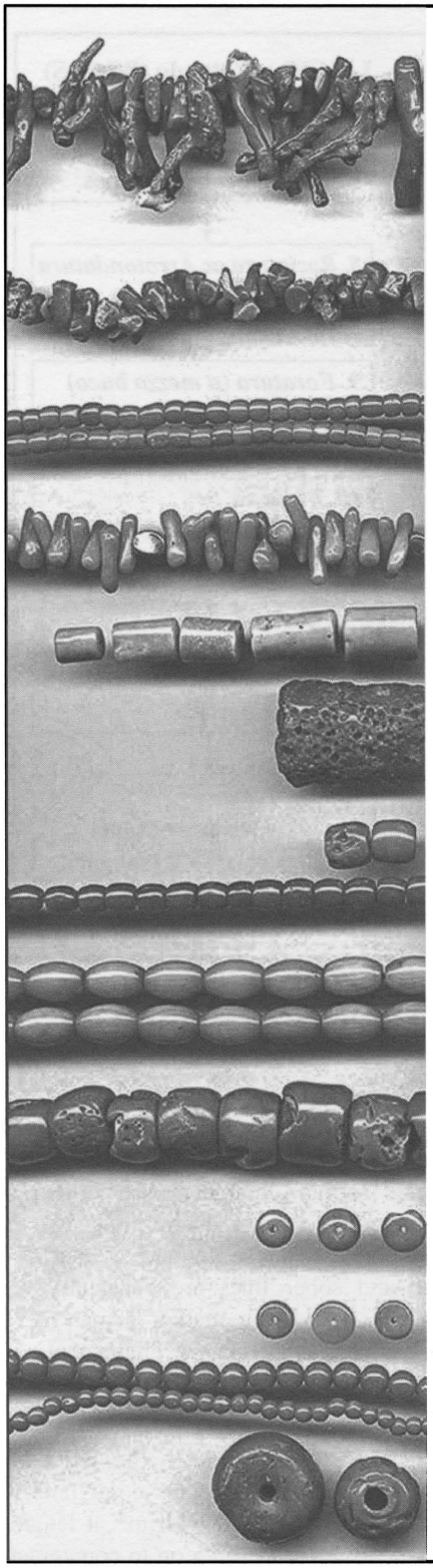
necklaces or beaded cuff bracelets with gold, platinum, and diamond clasps, contemporary cross pendants, or cuff bracelets in a vintage sewn-style with gold and coral cabochon clasps. Basilio Liverino, the most prestigious firm in Torre del Greco, has for generations made coral beads and cabochons for high-end jewelers such as Bulgari and Tiffany (A. Civale 2000: pers. comm.). They have a reputation for producing the highest-quality coral work, and they also produce their own high end lines of jewelry based on current trends, such as the ethnic look in jewelry which is currently so popular, or the classic *torsades* and graduated sets of coral bead necklaces.

Today, in the Italian and European fashion market, coral beads are synonymous with classic style. As one Italian art historian explains it:

> A century ago the Torre del Greco artists determined the style of coral jewelry. Their pieces [were] inspired by mythological and neo-classical models and created by skillful workers. Tradition though, may have its barriers. Today's coral jewelry production appears to still be deeply bound to these antique stylistic elements. Classic and sober lines are constantly repeating themselves, to meet a market demand, which seems to passively appreciate a cliché that consider coral as an expression of popular ornament (del Mare 2001).

Mauro Ascione (2000: pers. comm.), the head of another large, historic, and very prestigious coral family business in Torre del Greco, discussed with me at length a new promotional strategy he is working on to counteract this attitude. He wants to add value to the product itself,

Table 3. The Names and Shapes of Coral Beads in the Italian Coral Sector.



1. *frange:* twig or branch tips, hole at one end (5-50 mm long)

2. *spezzati:* small chips or fragments of coral with holes

3. *barocchetti:* small, short, irregular, barrel-shaped pieces of coral, holes lengthwise (two strands shown)

4. cupolini: small, thick, rounded twigs, holes in the middle

5. cannettine: straight, cylindrical, canister-shaped, holes lengthwise, smaller diameter and length

6. cannette: larger, straight, cylindrical, canister-shaped

7. *barilotti:* slightly rounded barrel-shaped, holes lengthwise, variable diameter and length (two sizes shown)

8. *olivetti:* olive-shaped, various sizes, holes lengthwise, always described as "old-fashioned" (two strands shown)

9. fabbrica: "factory coral," any shape, rough-polished with imperfections and worm holes

10. lenticchie: small, flat, rounded disk-shaped like lentils, holes in center

11. *rondele:* small, short, flat shape, central hole

12. *pallini:* smallest round beads (2-10 mm; two sizes shown)

13. *tondo:* larger spherical/round beads (two sizes shown)

Based on Torntore (2002).

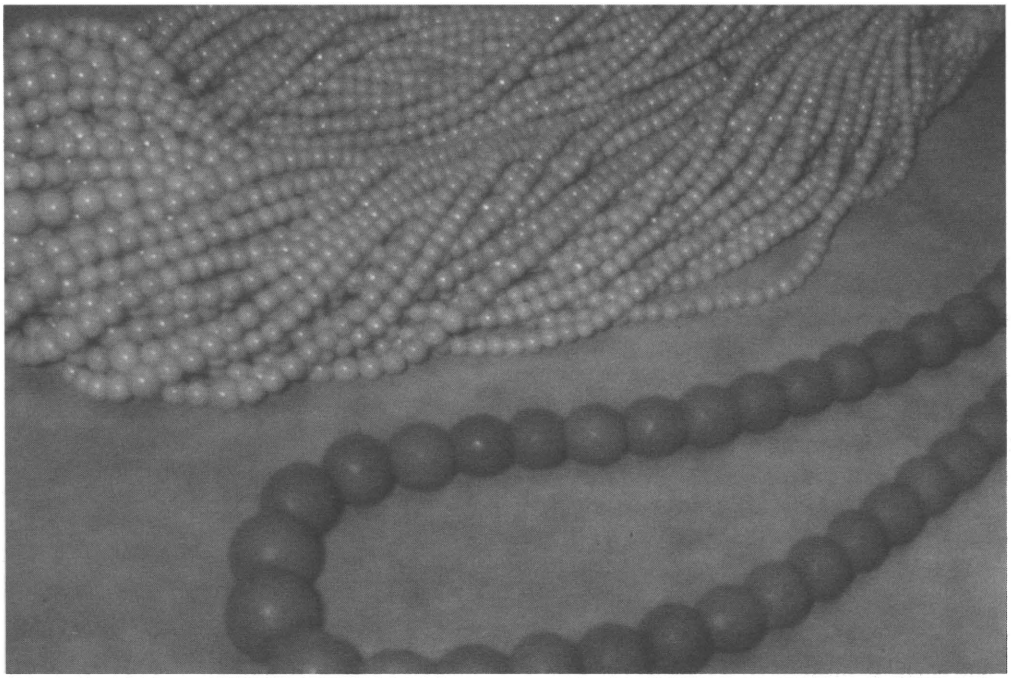


Figure 1. Fashion-market bead styles. The older single strand is composed of graduated, spherical, orange, Mediterranean *Corallium rubrum* beads called *tondo*. The *mazzetta* or twisted bundle is comprised of graduated, pink, *Corallium secundum* beads called *pallini* (photo by author).

to the handwork, and to the idea that created it as an innovative style or piece of beautifully designed jewelry with personality. Young Torrese designers and goldsmiths, or manufacturers and exporters who are also involved in the design, marketing, and sale of their own lines and collections of jewelry, all see this direction as one of the major ways to save the Italian coral industry right now. Most recently, the supply of quality raw coral in Pacific waters has diminished so drastically that harvesting has come to a virtual standstill, further raising its price, but reducing the price of lower qualities and flooding the market with this inferior material (Torntore 2002).

The coral businessmen in Torre del Greco are struggling today to keep pace with these developments, but manage to maintain their position as world capital of coral despite the stiff competition and fluctuating costs. The raw coral is expensive and scarce, and it is becoming very expensive to continue production by hand in the face of mounting Asian competition. On one hand, it means commercializing the product even more, raising the retail sales price to reflect the real costs of production and design, and, as in the fashion industry, positioning a quality product by creating a name for it. The high-end coral bead producers want the pieces from their workshops to be immediately recognized and purchased just like a Versace or Armani is recognized (M. Ascione 2000: pers. comm.). On the other hand, Assocoral (the Association of Coral Producers in Torre del Greco) launched the "Made in Torre del Greco" label at the 2003 *Vicenza Oro* trade fair (del Mare 2003). Mauro Ascione, then-president of Assocoral, sees this as an important move to recognize Torrese coral products as such: "This collective brand was created to protect the area's craft firms and to provide greater visibility on national and international markets. It will also highlight the quality of the 'Made in Torre del Greco' label and defend the product from Asian competition" (del Mare 2001).

In the coral industry, the middleman or *intermediazionecommerciale* plays an important and fundamental role in the sale of coral beads as the direct link between the market and the producer (Torntore 2002). The middleman attends the trade fairs, such as *Vicenza Oro*, where the majority of the coral products are ordered and sold on an annual basis. These large, international jewelry trade fairs are critical in the wholesale trade of coral. They are used for planning production and are a laboratory for ideas, styles, and trends that influence international fashion markets and production needs. The trade fairs are also an important venue for many young designers and older firms who are involved in designing new lines and forms of coral jewelry. Some of these fashion styles have been very popular and copied in many different forms. Producing more creative, trendy designs in coral will attract new, wider audiences, and increasing the production range in one location like Torre del Greco will allow the coral sector to grow in different

directions. Other, newer methods of marketing coral and coral beads are also being tried, like e-commerce. These coral internet sites, however, are more informational than commercial in the sense that price lists are not included; one must contact the company directly because the price of coral beads is not fixed and fluctuates widely based on market and supply (A. Mennella 2000: pers. comm.).

Coral and coral beads have high investment value in different circles, an important aspect of their overall value, especially in Italy and Europe where there is an understanding and appreciation of coral as a luxury commodity. In certain circles, coral beads and jewelry are purchased solely for their market value—for the number of grams of coral and gold, not for their fashionableness or style or for the creative expression or handwork that they represent. The value of the coral and gold will only increase over time, so in this sense they are an investment, not strictly a piece of jewelry to be cherished and shown off every time it is worn. When worn as status symbols, coral jewelry has the power to communicate a person's economic status and display prestige in many diverse cultural and social contexts.

The Ethnic Market

The ethnic market relates to all the uses of coral beads and jewelry outside the fashion market, excluding the tourist market. It includes all the world markets where coral beads are used for non-fashion functions. Beads directed at ethnic markets are very different from those of the fashion market in shape, size, and texture—they are larger in many cases and less refined in shape and texture. The *fabbrica* or rough-surfaced type of bead in different sizes and shapes, such as the *barilotti* and *cannettine* beads, are the most popular (Pl. IIIA top). The strand of *fabbrica barilotti* on the left side of the image was described as popular in the Mexican market in 2000 (G. Mazza 2000: pers. comm.). The branch-coral beads called *frange,* more properly placed within the tourist market, are also sometimes sold in the ethnic market due to their roughness and variability of shape.

The ethnic market category encompasses diverse cultural settings around the world. Beads made for Italian and European ethnic markets include those used for specific traditional or folk purposes, such as the wedding necklaces worn by Polish women with their folk costume. The ethnic market also includes the American Southwest, where coral has been combined with turquoise and silver for many decades. In many cases, because the beads are so diverse for this market, customers travel to the producers in Torre del Greco or other locations in Italy, such as Milan, Florence, or Rome, to purchase their beads, or maintain a standing order at a Torrese factory (B. Liverino 2000: pers. comm.).

The West African, and particularly the Nigerian, market prefers larger *cannette* and *barilotti* shapes in some of the lighter shades of pink and orange Pacific corals, in a wide range of sizes (Torntore 2002). Darker *sardegna* red coral is also prevalent in the Nigerian market. Beads directed to specific ethnic markets in Nigeria, for instance, include both Pacific and Mediterranean corals worn by the Kalabari Ijo ethnic group of the Niger Delta area (Pl. IIIA bottom). In the ethnic market, as in many cultures, coral beads are worn as personal adornment, but they are not simply a matter of individual taste. According to Joanne Eicher (1998), coral beads have become an important vehicle by which the Kalabari Ijo store, exchange, display, and transmit wealth, status, and prestige. They are a symbol of Kalabari identity and cultural survival. Purchases in the ethnic market are often handled in a very different way than in the fashion market. For example, when coral beads are needed, Kalabari family members have traveled from Nigeria to Torre del Greco to hand pick and purchase large quantities of beads, which they then take back with them (B. Liverino 2000: pers. comm.). They have long lists of sizes, colors, and amounts in order to make the regalia needed for ceremonies. Kalabari family members in London will also often purchase beads in person from Torre del Greco and then distribute them as needed among family members in Great Britain, Nigeria, and the United States (B. Liverino 2000: pers. comm.). The large Nigerian canister- and barrel-shaped coral beads (Pl. IIIB top) also represent a major secondary resale market in the United States (Torntore 2002). Coral beads are purchased from Nigerian family collections by itinerant West African dealers and then sold to American dealers who may reshape them for other sectors of the ethnic market such as refugee Tibetan Buddhist monks or folk jewelry collectors in the United States (T. Leung 2000: pers. comm.; P. Nilson 2000: pers. comm.; E. Salter 2000: pers. comm.).

The Tourist Market

The tourist market caters to producing and selling less-expensive souvenir items. The coral items most described in Torre del Greco as being part of the American tourist market are inexpensive costume jewelry necklaces of branch-coral beads (*frange),* and simple, relatively inexpensive necklaces made from waste coral pieces (*spezzati)* (Torntore 2002). Although these types of beads are all produced from coral pieces that would otherwise be thrown out as unworkable, they represent a significant amount of time to cut, polish, drill, and string them. The pale pink colors of Pacific coral made into costume jewelry resemble the more exclusive *pelle d'angelo* or angel-skin coral. These simple, relatively inexpensive three- or four-strand *torsade* necklaces (Pl. IIIB

bottom) were also commonly described as popular with American tourists (A. Bartoli 2000: pers. comm.). Italian or European tourists may buy something in this market category that looks more fashionable, like a multi-strand *torsade* necklace, instead of a more inexpensive single-strand souvenir-type necklace like many Americans purchase. Their purpose, however, is to purchase it as a sentimental souvenir of their vacation or trip rather than purchase the coral as an investment or classic fashion accessory.

Market Cross-Overs

It should be noted that there is cross-over between the three market categories, especially when the "ethnic look" is fashionable. A current ethnic-look trend in jewelry includes many of the forms from both the ethnic and tourist market categories—rough *fabbrica* beads in larger *cannette* and *barilotti* shapes, and the use of bright red-dyed bamboo corals instead of the more subtle Mediterranean or Pacific *Corallium* colors (Fig. 2). This current ethnic look also includes high fashion necklaces with multiple rows of *frange* mixed with amber, turquoise, silver, and coins that imitate specific ethnic adornments such as Moroccan or Berber jewelry. Many of these pieces are very expensive and slated for a high-fashion market, while other examples are targeted at the middle price range in the United States. A wide variety of coral beads is seen today on the fashion runway, in fashion-related magazines, and in jewelry ads. One feature in the *InStyle* magazine even spells out coral's historic appeal for their young readers and gives advice on how to wear it:

> People in warmer climates have understood the fiery appeal of coral for aeons. The ancient Egyptians, for example, used it in their intricate jewelry. Flash forward a few thousand years and designers are pursuing a more natural look, shining up the colorful stalks and stringing them together into spindly, jagged necklaces and earrings. Like creatures of the sea, these pieces have a disconcerting beauty. To wear them well, hold the ruffles and go easy on the prints. Coral looks best with simplicity (Fasel and Proddow 2003).

HISTORICAL SYMBOLISM AND MEANING OF CORAL

The Roman writer Ovid described coral as being "like soft grass growing not in land, but in the sea, whose saltiness causes the little plant to rot, and so the leaves detach themselves and the foam of the sea brings the plant ashore. The air hardens it and whoever touches it would say that what long ago was grass was now stone" (*Metamorphoses* Book IV as translated in Liverino 1989a:11). Coral does come from the sea, but today we know it is an animal life form, a colony of polyps, not a plant. As coral is a material from the sea, it therefore carries many associations and meanings related to water as well as blood, and has a long history in this respect. One of the earliest associations of coral and blood comes from the myth of Medusa in Greek and Roman mythology. According to the myth, anyone who gazed into the eyes of the snake-haired Gorgon Medusa turned to stone. According to Ovid, the hero Perseus killed the Medusa and laid her severed head on some twigs or seaweed, which instantly hardened when her blood touched them. These twigs were scattered into the ocean by sea nymphs, and there transformed into coral (*Metamorphoses* Book IV as translated in Liverino 1989a:11).

The metaphor of blood in the ocean also fits into the Greek and Roman imagery of coral as "the finest fruit of the sea" (*Metamorphoses* Book IV as translated in Liverino 1989a:11), as the "tree of life," a metaphor which was eventually translated into the Christian symbolism that became so important in medieval Italy and is still used today in the tradition and liturgy of the Roman Catholic church. Many paintings from the Renaissance and Baroque periods show coral in association with the sea, mythological personages, and in classical mythological scenes, such as the fresco in Venice by Tiepolo[6] in which Neptune presents the treasures of the sea to Venice, characterized in the painting as a classic goddess.

The significance of the color red as an amulet is of interest to many scholars. Speculations include whether or not it represents the color of blood as life force and vitality, the blood of sacrifice (in biblical reference to the blood placed on the doorpost to ward off the destroying angel in the tenth plague), or even the color of fire as purifying agent. The significance of the color red in association with the Roman and Greek myth of Medusa directly links the color red and coral itself to the evil eye belief complex around the Mediterranean (Torntore 1999). Red stones, such as the ruby, carnelian, and bloodstone, have also been widely and historically associated with blood and amuletic power in Europe, Central and Western Asia, and Africa (Jay 1996). One particularly magnificent and large coral amulet with a heavy gold cap hangs above the Christ child's head in Mantegna's famous late-15th-century painting of the "Madonna of Victory" which hangs in the Louvre in Paris.

Coral was an important product in the wide-ranging and centuries-long Mediterranean luxury trade between Europe, India, and the Middle East. In the form of beads, it was a

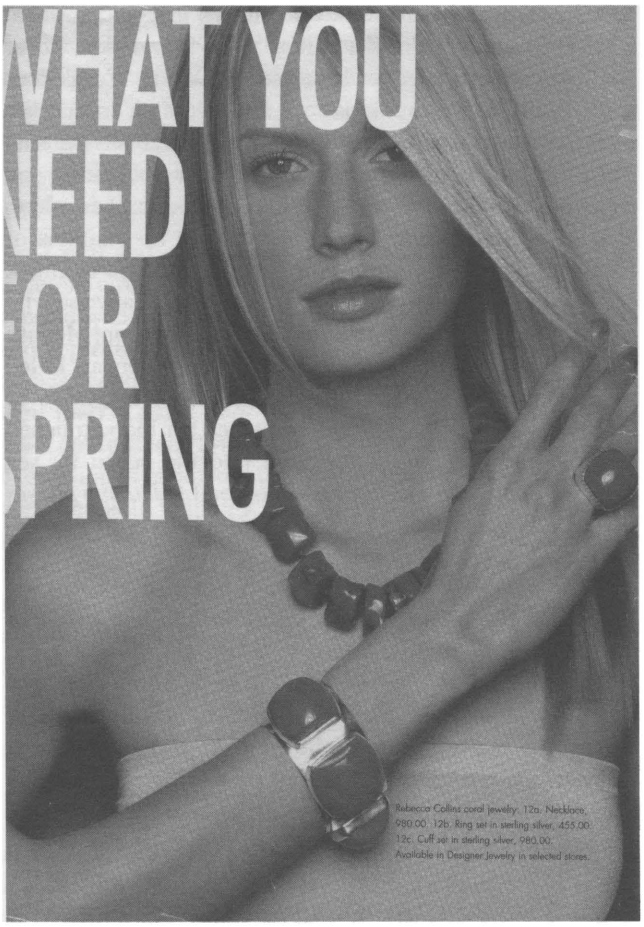


Figure 2. "What you need for spring." Neiman Marcus catalog ad for fashion coral jewelry in an ethnic style (March 2000:12). Designed by Rebecca Collins, the necklace is made of dyed bamboo coral on a knotted cord, and advertised for $980.00 (photo by permission of Anthony Cotsifas).

major Roman export to India through the 6th century, where it was traded for pearls, gems, spices, and pepper (Torntore 2002; Warmington 1974). The medieval Mediterranean spice trade was of great importance as a luxury trade, and coral, categorized as a spice, held a prominent place in the commercial life of the time (Francis 1989; Lopez and Raymond 1990; Pegolotti 1936; Torntore 2002; Warmington 1974). In the Middle Ages, coral beads were in great demand for rosaries, favored because of coral's magical and protective properties and red color, which connected coral to the rose and rose garden as the spiritual identity of the Virgin Mary (Torntore 1999). In medieval Christian iconography it also symbolized the blood of Christ. After the early 16th century, coral placed first in exports to the East, and was an essential commodity in all trade with India, where it was traded for diamonds (Warmington 1974; Yogev 1978). Coral beads were a primary export commodity from Italy that was transformed into a powerful currency for trade with West Africa in the period of European expansion and was used in the European-West African slave trade (Ryder 1969).

From the time of classical Rome, Italy has been the center of Mediterranean trade, as well as the center of coral harvesting, adornment manufacture, and the trade in coral. In medieval and renaissance Europe, coral beads had high decorative and cultural value as items of dress and adornment (Torntore 1999). Coral was greatly favored in Italy for jewelry because it was so plentiful, and is seen in numerous paintings from the 14th through 16th centuries, worn as necklaces, brooches, bracelets, as hair ornaments, and mixed with gems and jewels such as pearls (Torntore 1999). At this time, coral was also favored and widely worn in India, Persia, and China. Marco Polo mentions his surprise at the great amount of coral used in Tibet (Latham 1958). In North Africa, especially in Morocco, and in Arabia, coral was worn in large quantities by women in their jewelry (Liverino 1989a).

CONTEMPORARY SYMBOLISM AND MEANING

In the three contemporary markets for Italian coral beads, the history of coral's significance comes into play, and geography and place are even more related to the meanings associated with coral in several respects. Although the economy of Torre del Greco depends almost exclusively on the transformation and trade of coral, the local market for coral, in terms of its purchase for use in Italy, is strictly based on season and gender (Torntore 2002). Coral was described to me time and again as "the summer jewel," something only worn in the warm months of summer. And coral is primarily worn by women. I use this as an example to introduce some of the long-term meanings of coral as an organic material, meanings that figure prominently in all three of the markets. As one Italian coral jeweler explained: "Coral is *caldo*, hot, a red color like blood, warm like life, it is the color of life. When you wear coral, it warms to your body; sometimes it changes color when you wear it, reacting differently to each person wearing it" (S. Russo 2000: pers. comm.).

The Italian word *caldo* translates literally as "hot" or "warm" and is a term used for referring to cooking and weather. *Caldo* is also used figuratively to mean "passionate" or "impassioned," and this also says much about how many producers and users in Torre del Greco relate to coral. I heard many times about coral's link to blood and life because of its color and how it warms when touching the skin—it takes on one's life and so works well symbolically. Summer is a very

Figure 3. A window display of the jewelry shop U. Gherardi on the Ponte Vecchio in Florence, Italy (photo by author).

warm and humid time of the year, and many Italians who can afford it go to the beach. Coral comes from the sea and is a natural product related to familiar marine environments like that of Mediterranean, so therefore easily related to memories of a seaside vacation. In addition to creating high fashion pieces, many jewelry designers capitalize on the idyllic Italian vacation element to sell their work, reflecting on Italy's past and travel in advertising. Italian tourists purchase the coral beads not because they are Italian per se, but because they have specific meanings related to an Italian concept of seasonal jewelry in addition to the sentimental value they have when purchased on vacation at the seashore.

Further, coral beads in Italy are advertised as being made of Italian or Mediterranean coral whether they are or not. The color of Mediterranean coral has been beloved and most prevalent for several centuries and Mediterranean *Corallium rubrum* is the most familiar coral in terms of color and recognition. Thus, it is the coral that is used as the "gold standard" for all other corals in terms of color, name, and quality, both historically and today, and in all three markets (Torntore 2002). As an international center for fashion and jewelry, Florence is one of the largest coral wholesale markets in Italy outside of Torre del Greco (B. Liverino 2000: pers. comm.), and provides a glimpse into how coral is valued and how meanings are created within these market settings. Florence is also an important retail market for both the Italian fashion and tourist markets, for wider European fashion and tourist markets, and especially for the international tourist market. Unmounted and mounted beads are sold in many high-end shops along the Ponte Vecchio, such as U. Gherardi (Fig. 3). Many of these shops are run by Torrese family relatives (B. Liverino 2000: pers. comm.). Lower-end coral bead jewelry is also sold in numerous smaller tourist shops and by street vendors in Florence. I found that in many of these tourist-oriented shops, all coral is touted as Italian even though in most cases I could readily identify it as Japanese or Pacific corals (based on such details as variations in coloration). It was also my experience that strands of branch coral I purchased from a wholesale factory in Torre del Greco were assuredly guaranteed to be Italian Mediterranean coral; sales personnel knew what I was looking for as an American. But one who knows how to identify different varieties of coral could immediately observe the white flaws and other variations in coloration that denote Japanese or Pacific coral.

Coral is perceived as coming from Italy and all things Italian are popular today, especially in the United States. So coral is imbued with a certain sense of quality and style. In these associated meanings, Japanese raw coral forming Italian coral beads can be seen to be simultaneously global and local, playing on the connotation of "Italian" with high style and exquisite craftsmanship in the production of luxury items, and the connotation of coral as Italian because

the beads are produced in and exported from Italy (Torntore 2002). We have seen the increasing "commodification of Italy" and coral joins ranks with other products like olive oil, pasta, parmesan and pecorino cheese, and Venetian hand-blown glass as symbols of Italian aesthetic taste and style (Reich 2000:210). They are part of an international consumer market hungry for all things Italian. In this way, the notion "Made in Italy" or "Italian" also increases the market value of low-quality or "waste-coral" beads, such as *frange*, in the popular tourist items purchased by Americans. With the idea of coral as Italian, coral becomes an Italian icon—a cultural commodity in a global marketplace.

CONCLUSION

If we look at all the factors, we can understand why coral beads come with a high value in terms of their preciousness as an organic material. As they move through time and space and through various cultural settings, coral beads exemplify complex networks and relationships, and illustrate varied players or actors. Coral, as a natural material, holds value through intrinsic physical or aesthetic qualities such as color, hardness, size, shape, and the amount of skill required to work it, as well as its relative or comparative rarity as a natural material. This rarity is a source of value in and of itself, and this value is compounded by the degree of difficulty to obtain the material or the objects made from it, and the distance they must travel as well as the sense of how exotic they are. In different settings, wearing coral beads and jewelry of a certain value and design can indicate power and status in terms of wealth, but coral used to display power and status is also based on the type of coral, on how it has been worked, and on perceptions of taste in each setting.

Certainly the availability of coral and coral beads is intertwined with price and value, and scarcity and supply. We can see how the cost of coral beads relates to labor, production processes, and a specific Italian model of business and production. The value of this global product is determined not only by supply and demand, but also by perceptions of rarity and ideas of locale and provenience, and is steered by manufacturers, merchants, and consumers. Economic value is added at each step in the production process, and the greatest increase comes when the beads are mounted and prepared as a piece of jewelry in a retail outlet or export sale for three primary markets. The value of coral is not necessarily dependent on supply and demand, and the meanings related to coral are not necessarily contingent on the superficial sources of its price.

I heard many times that the Torrese coral sector could not work in America, could not be transplanted to the United States, and I agree with this. The coral sector in Torre del Greco is particularly Italian. There are no models to which we could compare it to in Europe, and certainly not in the United States. The coral industry is a diversified field with a wide organizational flexibility that allows many firms to decrease or increase production according to market demand. Much of the value and preciousness of coral comes from its history and the meanings associated with it as an organic material.

ACKNOWLEDGEMENTS

I could not have accomplished this project without the financial assistance of several organizations and I am grateful for their generosity and the support that allowed me to conduct five months of fieldwork in Torre del Greco: the College of Human Ecology at the University of Minnesota for the Dora A. Waller Award for International Research; the National Italian American Foundation for the Doctoral Research in Italy Fellowship; Phi Upsilon Omicron National Educational Foundation for the President's Research Fellowship; Phi Upsilon Omicron Alpha Alumni Chapter for the Margaret Drew Endowment Fund Graduate Scholarship; and the American Italian Historical Association for the Memorial Fellowship. I am also very grateful for the support I received from Dr. Joanne B. Eicher and the Department of Design, Housing, and Apparel at the University of Minnesota. This research could not have been completed without the cooperation and generosity of all those who participated in this study in Torre del Greco, and those who supported my work there in every little way during the course of my fieldwork. The list is long and my appreciation deeply heartfelt. Finally, I want to acknowledge the support of the International Bead Expo Symposium and the Society of Bead Researchers for providing such an important venue for disseminating our work about beads.

ENDNOTES

1. This paper was initially presented as an invited lecture at the International Bead Expo Symposium held March 17-21, 2004, in Santa Fe, New Mexico.

2. This is part of an ongoing research project on coral and coral beads, and is primarily based on fieldwork and archival research conducted in Torre del Greco, Italy, documenting the Italian coral bead industry for a doctoral dissertation. From February through mid-June 2000, the author conducted in-depth and informal interviews with participants in all of the different levels of involvement in the coral industry (manufacturing, exporting, retail sales, schools

and training, artistic production, consumers, collecting historic objects in public and private settings, research and scholarship, business promotion, and marketing).

3. Taiwan and Mumbai, India, are the other two production centers for coral beads. Taiwan is thought to be the largest production center today, superseding Torre del Greco in coral bead exports (B. Liverino 2000: pers. comm.), and a comparative study in Taiwan is planned as a future phase of my research.

4. Other Japanese or Pacific corals include *Corallium elatius*, *Corallium japonicum*, *Corallium konojoi*, and *Corallium secundum*. In addition, three species from the Midway Islands, discovered within the last two or three decades, are not yet classified or named but are beginning to be worked (Liverino 1989a, 1989b, 1998).

5. In this paper, I am not including the details of non-bead coral products. The different types of *liscio tondo*, however, do include the large category of cabochons, which are completely flat on one side and meant to be set into a bezel. Manufacturers in Torre del Greco identified several types of cabochons or *liscio* products: *bottoni* or *spole*, oval or round cabochons called "buttons" or "bobbins" that are slightly rounded on their bottom side; and *mandorle* and *gocce*, almond-shaped pieces used to create pendants and drop earrings, for instance, by being drilled or capped at the pointed end. Many other irregularly or custom-shaped *lisciotondo* pieces are made for the creation of jewelry.

6. "Neptune Offering Venice the Riches of the Sea" by Giovanni Battista Tiepolo (1696-1770); Palazzo Ducale, Venice, Italy.

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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,

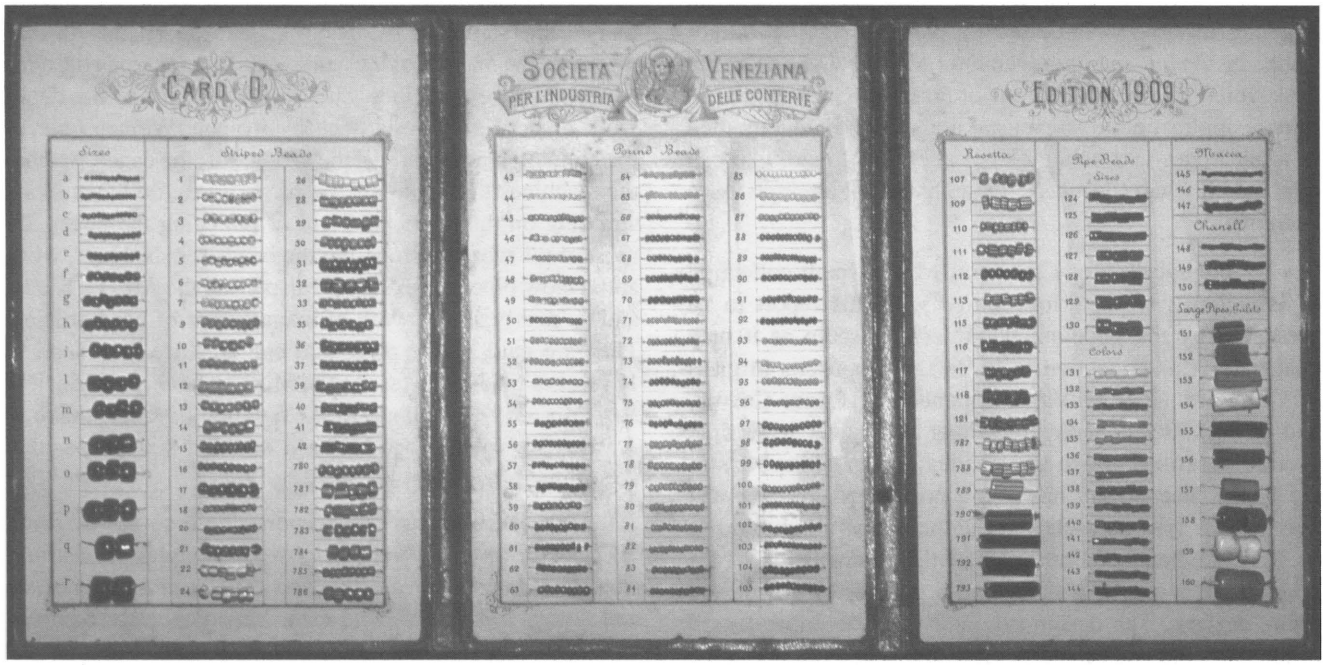

Figure 2. Sample Card D of the Società Veneziana per l'Industria delle Conterie which duplicates Carroll's "Card D". This card is dated 1909, but versions have been documented from as late as 1925 that are virtually the same, with only minor differences in glass color (of the drawn and wound beads) and 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.

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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

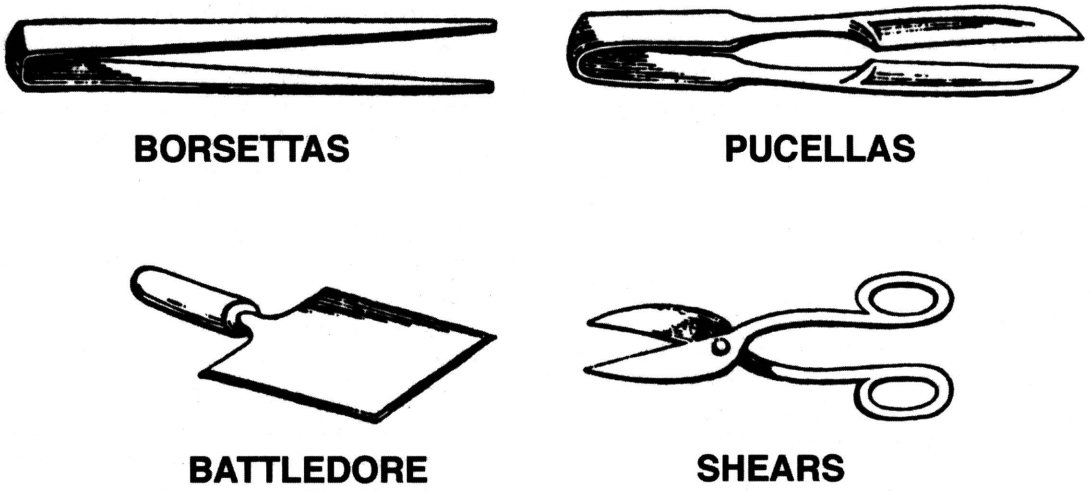

Figure 3. Glassworkers' tools (Pellatt 1849:81).

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

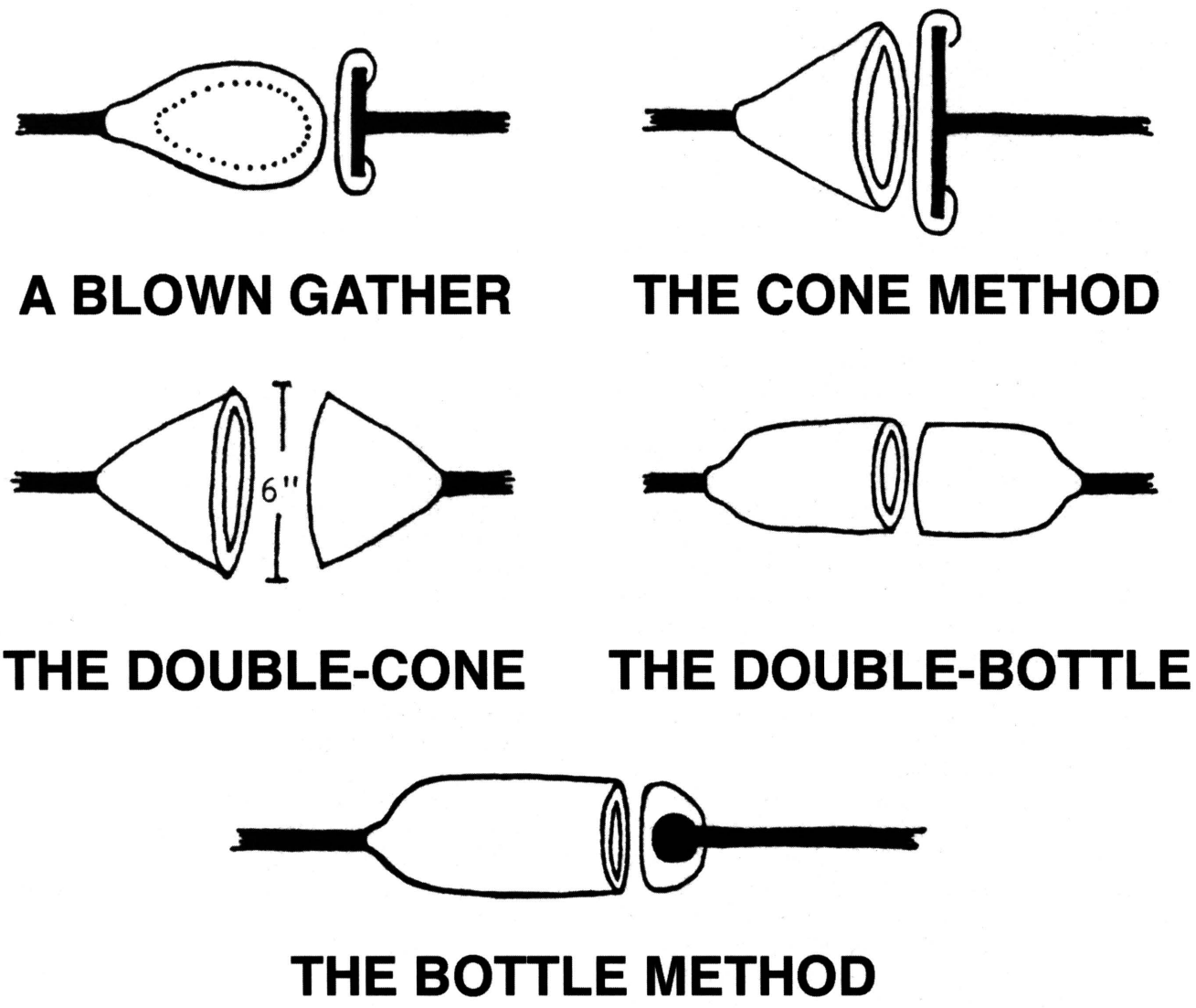

Figure 4. Methods of producing hollow glass gathers for drawn canes at Venice (drawing by J.D. Allen).

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

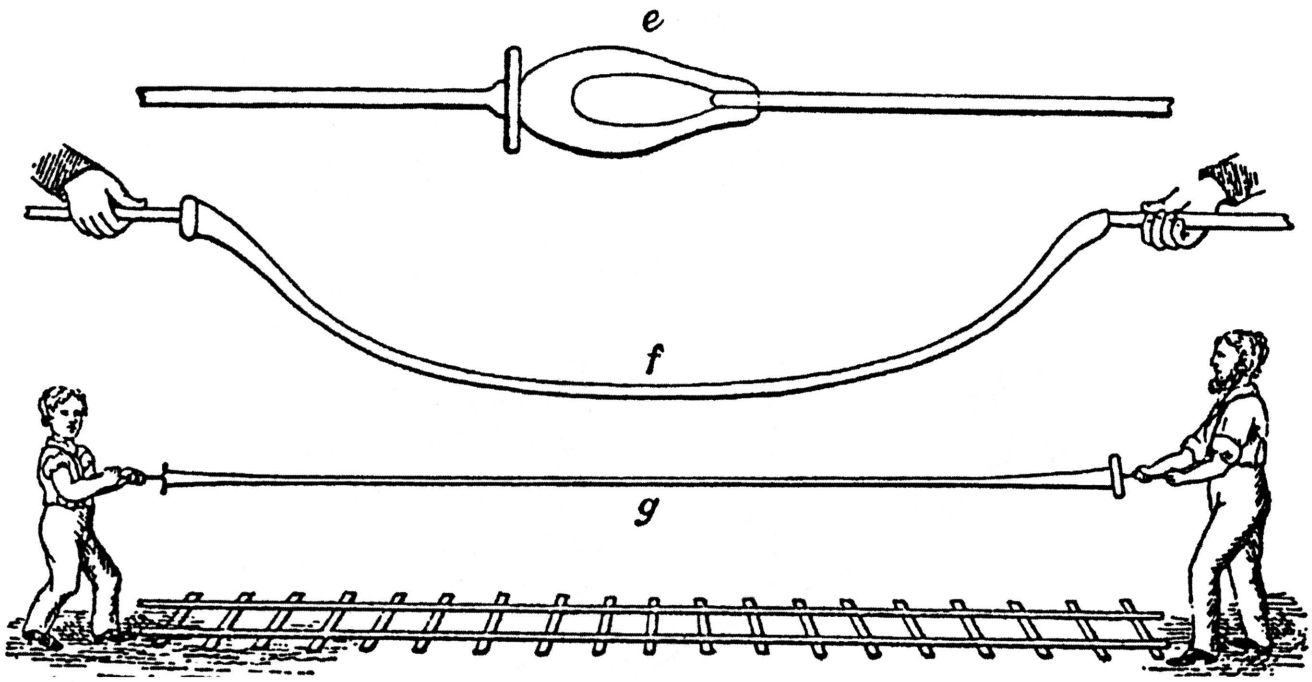

Figure 5. Elongating a gather of glass into a cane (Pellatt 1849:107).

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

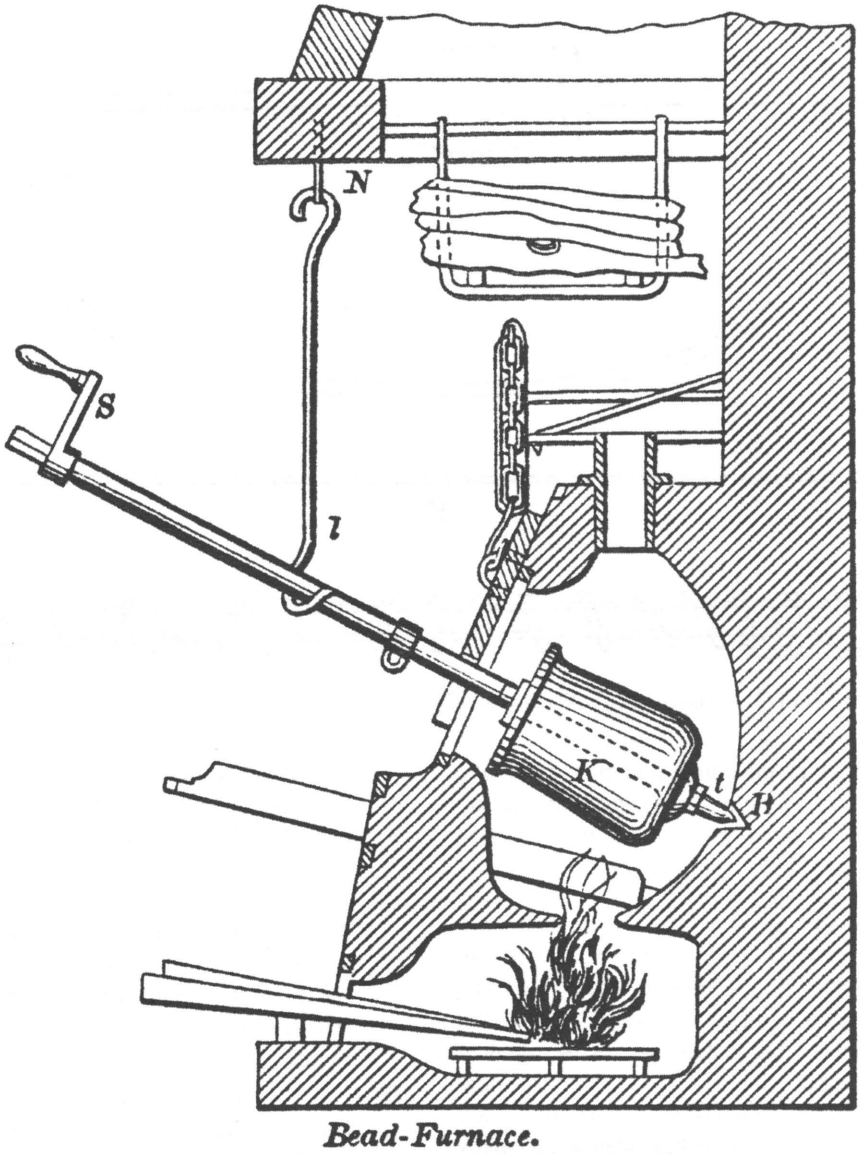

Figure 6. The furnace and apparatus used for hot-tumbling beads (Ure 1845:209).

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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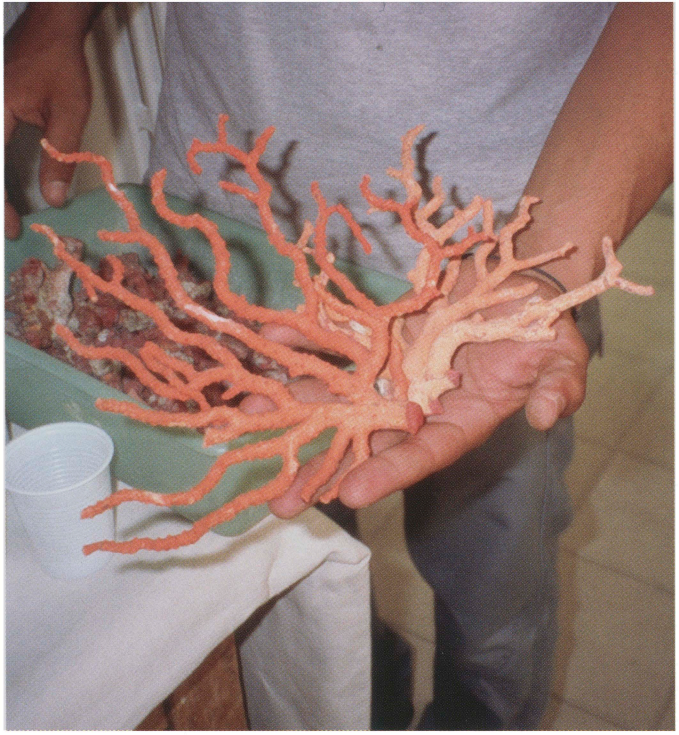


Plate IA. *Coral:* Raw coral branches; the branch in front is *sardegna* and the one behind is *cerasuolo*. The coral branches are first cut into manageable sizes and the crusty skin called *coensarc* is scraped off to view the coral underneath. The branches are then marked with white string or paper to identify where the initial cuts should be made. Selection at this point can be quite laborious and the waste can be enormous, depending on the type of coral (photo by author).

Plate IB. *Coral: Cerasuolo* coral branch fragments (rear) and the blanks cut from them (front). Three stages of production can be seen here. The coral branches have been cut into bead blanks and sorted into more refined groups by color and shape. These first steps of examination, and branch and blank cutting, are considered the most important in the entire production process (photo by author).

Plate IC. *Coral:* Branch sections are formed into bead blanks by cutting progressively smaller pieces on an electric saw. The cutter's skill and expertise determine the final disposition and preparation of the piece of coral (photo by author).

Plate ID. *Coral:* Shaping beads using an electric carborundum grinding wheel with the coral piece held tight in a wooden pliers (*pliersor*) or attached to a stick with resin. This rounds the rough edges and removes the rest of the soft crust. The final form is achieved in subsequent grinding stages (photo by author).

Plate IIA. *Coral:* *Pallini* in the *rociatrice* machine. The holes in the lower disc secure the coral pieces while the grindstone reduces them to the proper size (photo by author).

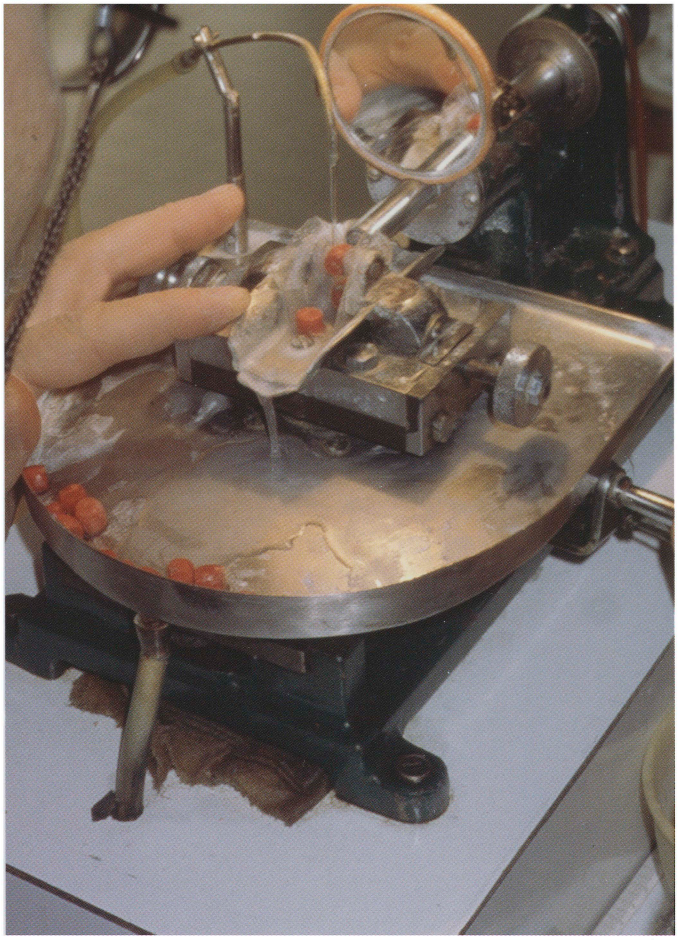


Plate IIB. *Coral:* Drilling holes in the beads, a step that requires a great deal of expertise, precision, and skill (photo by author).

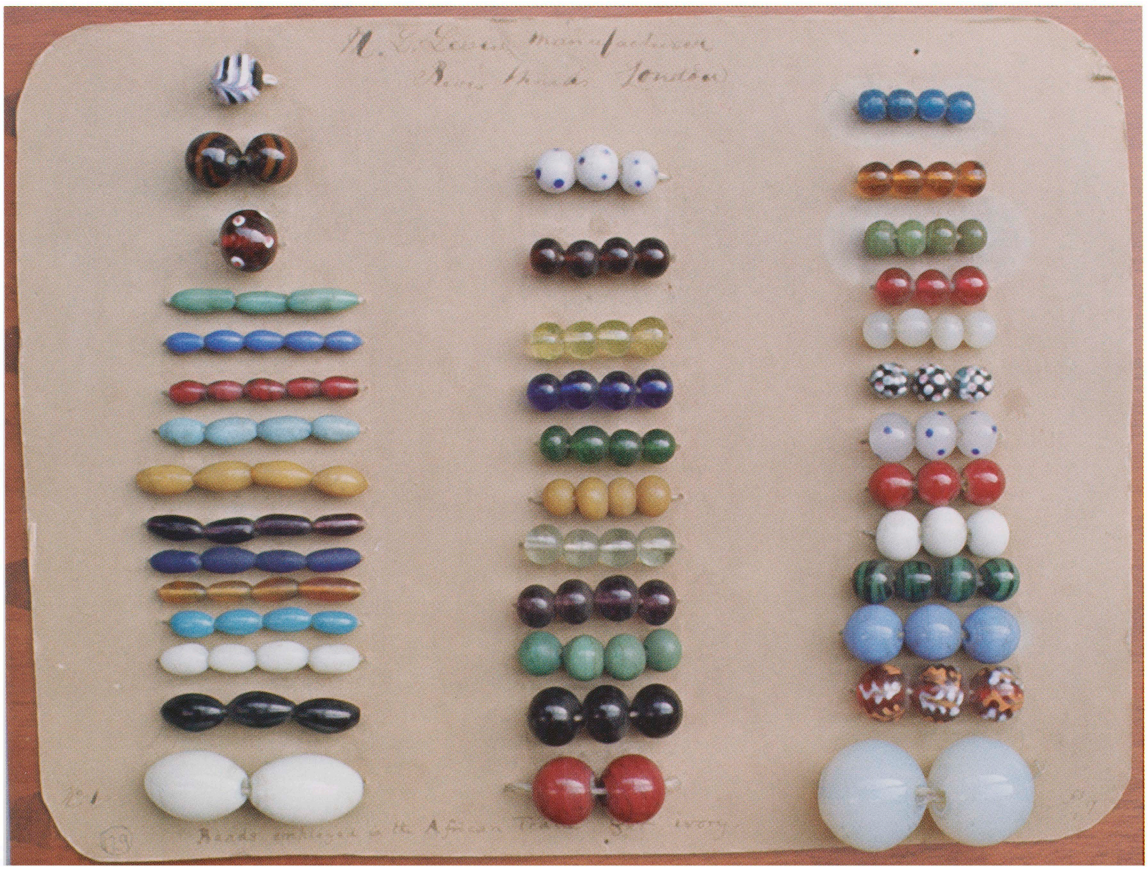
Plate IIC. *Coral:* The *infilatrice* stringing round beads onto a matching colored thread with a long thin needle. The beads in the foreground are *frange* (photo by author).

Plate IID. *Coral:* *Torsade* or *torchon* necklaces of tiny *pallini* beads of Mediterranean and Pacific coral for the fashion market (photo by author).

Plate IIIA. *Coral:* **Top:** Ethnic-market *fabbrica* beads. Left to right: graduated *barilotti* beads for a Mexican market; graduated *frange* beads and coral chips (*spezzati*); *barocchetti* beads; cylindrical beads called *cannette* (large) and *cannettine* (small) for the Nigerian market (photo by author). **Bottom:** *Barilotti* and *cannette* beads of Pacific *Corallium elatius* worn by the Kalabari Ijo of Nigeria (1984) (photo by permission of Joanne B. Eicher).

Plate IIIB. *Coral:* **Top:** Strings of "Nigerian" *barilotti* and *cannette* beads of Pacific coral for sale at Miami Bead Expo in 2002. Called "Nigerian" for their color, shape, and size, these ethnic beads are part of a large secondary resale market in the United States. **Bottom:** Necklaces formed of coral waste pieces and smaller imperfectly shaped beads geared for the American tourist market (photos by author).

Plate IIIC. *Levin:* Sheet no. 1 of the 1863 collection: "Beads employed in the African Trade for ivory" (all photos by author; reproduced by courtesy of the Trustees of the British Museum).



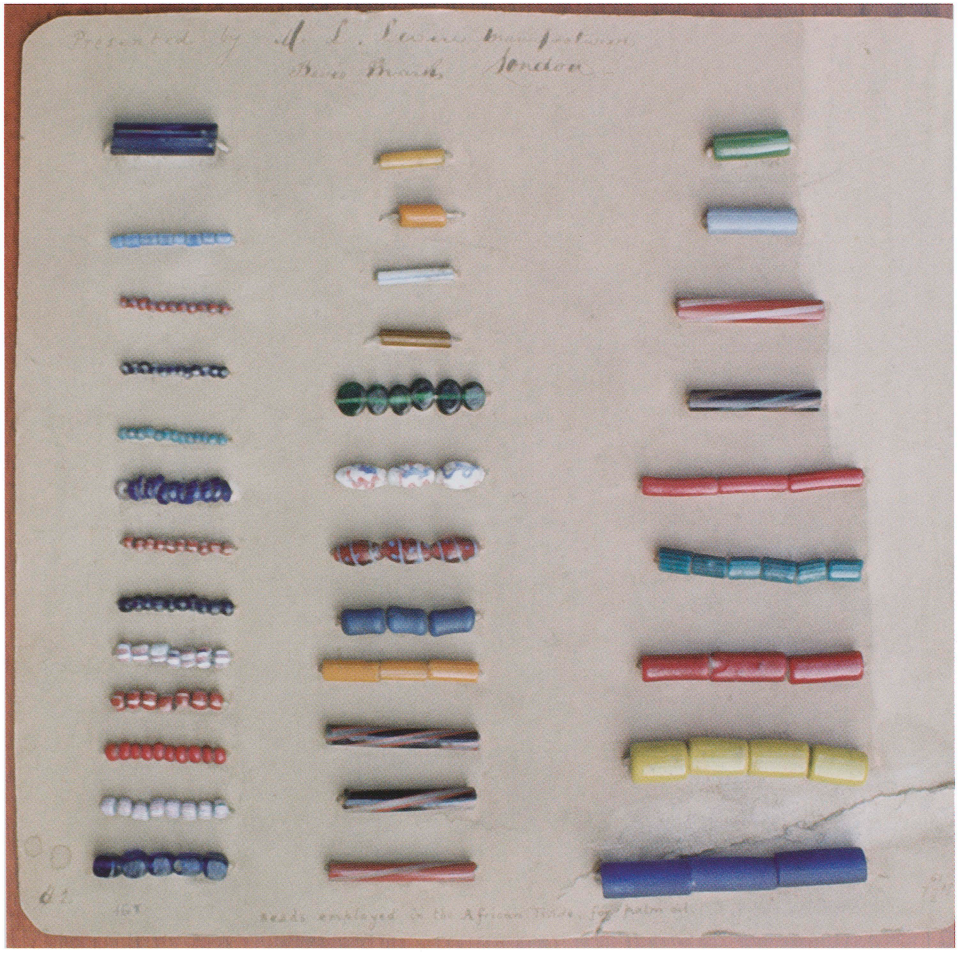


Plate IVA. *Levin Catalogue:* Sheet no. 2 of the 1863 collection: "Beads employed in the African Trade, for palm oil."

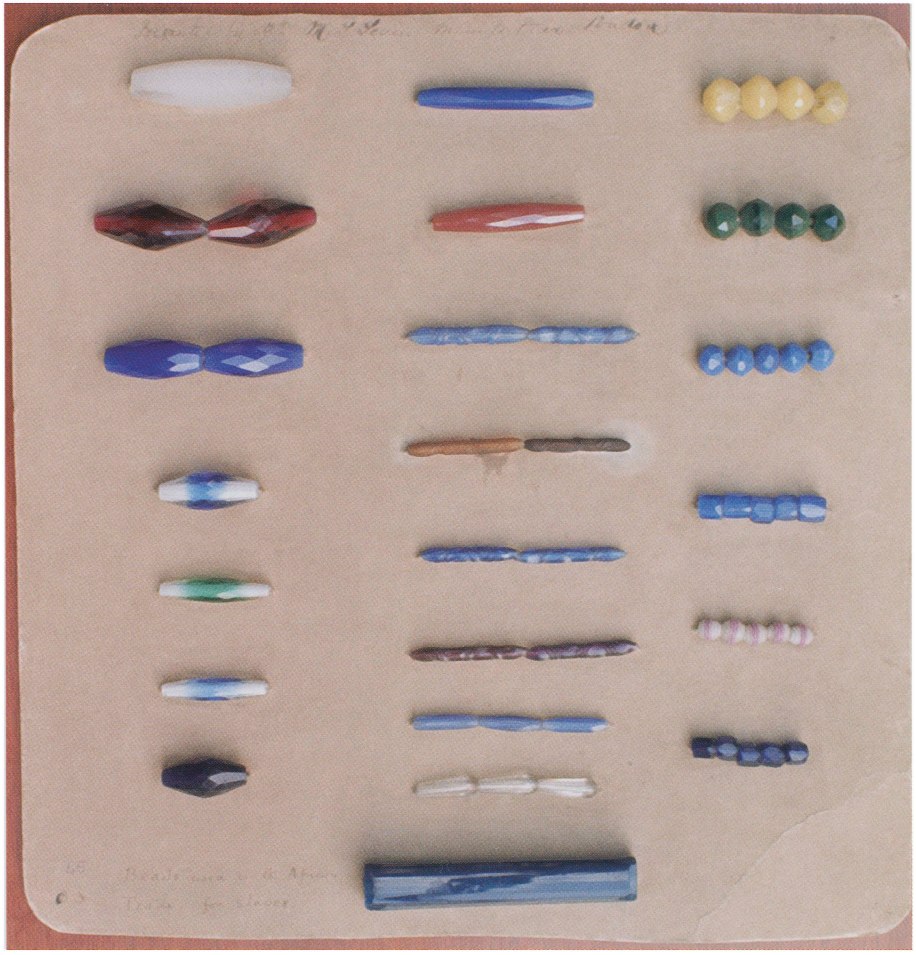


Plate IVB. *Levin Catalogue:* Sheet no. 3 of the 1863 collection: "Beads used in the African Trade, for slaves."

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THE LEVIN CATALOGUE OF MID-19TH-CENTURY BEADS[1]

Karlis Karklins

The Levin Catalogue is composed of two similar collections of glass and stone beads assembled by Moses Lewin Levin, a London bead merchant whose business operated from 1830 to 1913. A total of 1021 beads of 128 different varieties makes up the collections which can be dated to the period 1851-1869. Although the beads are recorded as having been used in the African trade, several have counterparts at North American sites, thereby making the catalogue a potentially valuable research tool for those involved in the study of North American trade beads as well.

INTRODUCTION

The Levin Catalogue consists of two similar bead collections acquired by the Museum of Mankind in 1863 and 1960. The 1863 collection is composed of four small cardboard sheets to which are affixed a total of 124 short strands of beads (Pls. IIIC, IVA-B, and VA). The statement "Presented by M.L. Levin, manufacturer, Bevis Marks, London" is handwritten in ink at the top of each sheet. A caption for each set of beads is similarly written at the bottom of each card (*see* plate captions for specifics).

The 1960 portion of the catalogue consists of three glass-topped display cases ca. 20 x 30 cm containing a total of 57 strands of beads (Pls. VB and VIA-B), most of which are duplicated in the 1863 collection. Two of the cases are marked "Beads such as are used by Traders in West Africa, & given in exchange for Palm Oil & other African produce. Presented by M.L. Levin Esq., Manufacturer, Bevis Marks E.C." The remaining display case is marked "Beads such as have been used by Traders in West Africa as barter for Palm Oil and other African produce. Presented by M.L. Levin Esq., Manufacturer, Bevis Marks E.C." on the cover, while the former caption appears on the back of the case.

Although no information concerning the Levin Catalogue or M.L. Levin himself was on file at the museum, follow-up research at several libraries in London and Birmingham resulted in the compilation of a brief but comprehensive history of Mr. Levin and his bead business. This information was instrumental in dating the two collections that make up the catalogue.

M.L. LEVIN AND COMPANY

Moses Lewin Levin made his commercial debut in 1830 as an "importer of French fancy goods" at 12 Jewry Street, Aldgate, London (Robson's London Commercial Directory 1830). The following year Levin was the proprietor of a "Bead and Foreign toy-warehouse," and had been joined by Ephraim L. Levin, a "Dealer in Clock and Watch-tools, etc." (Critchett 1831:240).

In 1838, the Levins moved to 16 Great Alie Street in Goodman's Fields, London, where they carried on business for the next ten years as "importers of fancy french jewellery, toys, beads, clocks, music boxes, and other foreign manufactures; also Birmingham and Sheffield goods of every description" (Kelly 1838:348; 1840:161; 1845:828; 1847:341). Then, in 1848, Ephraim Levin went on his own as an importer of fancy goods, beads, and toys, leaving Moses Levin to carry on the existing import-export business alone (Kelly 1848:920; 1849:875). The following year, Moses Levin is described as having "a large supply of beads and cutlery in bond for the indian and african trade" (Kelly 1849:875).

In 1851, M.L. Levin removed his prospering business to 1 Bevis Marks in east London (Kelly 1851:850). Within three years, Levin had expanded his market to include America, in addition to India and Africa (Kelly 1854:1009). By 1862, Levin was designated a "manufacturer and importer of beads, coral, german cutlery, arms etc. for the african, american and indian markets" (Kelly 1862:1072). As it was, however, common practice at this time to designate oneself as a "manufacturer" regardless of whether one made anything or not, it is by no means certain that Levin actually produced any beads. In fact, considering the specialized facilities, the degree of skill, and the number of workers required to produce glass beads on a commercial basis, it is probable that he did not.

Moses Levin's company continued as a "manufacturer" of beads until 1869, in addition to importing "coral, amber and glass beads, muskets and musket flints, mother-o'-pearl shell, cowries and african ivory" (Kelly 1866:1192;

1869:1034). Thereafter, Levin is listed only as an "importer." In 1876, the imports included "corals for the african and india trade, beads for trimmings etc." (Kelly 1876:1108).

Moses L. Levin and Company remained at its 1 Bevis Marks address as importers of "beads, coral, agate, amber and glass for african and home trade; guns, arms and military stores of every description" until 1893 (Kelly 1885:1072; 1893:1136). The following year, the business was located at 101 Leadenhall Street, just a few blocks from the previous location (Kelly 1894:1150). In 1898, Levin's company is listed as an importer of Venetian, Bohemian, and German beads (Kelly 1898:1230).

For the next 13 years the company was involved primarily in the importation of beads, amber, corals, and cowrie shells, as well as the sale of old firearms (Kelly 1905:1362; 1911:1029). Then, in 1912, M.L. Levin's establishment moved to 9 Hills Place in central London, and once again became a "manufacturer" of bugles (short tubular beads) and beads (Kelly 1912:1045). This endeavor was short-lived, however. Two years after the move, Moses Lewin Levin and Company were no longer in business.

THE BEAD INVENTORY

The Levin Catalogue contains 186 drawn beads of 43 varieties, 784 wound beads of 76 varieties, 34 mold-pressed beads of 7 varieties, and 17 carnelian beads of 2 varieties. The glass specimens are classified using an expanded version of the system developed by Kidd and Kidd (1970) as presented in Karklins (1985). Beads that do not appear in the Kidds' lists are marked by an asterisk (*) because they lack variety numbers. The type codes of these have sequential letters appended to them for ease of reference. Shapes not listed by the Kidds are described using Beck (1928).

Colors are designated using the names used in the *Color Harmony Manual* (Container Corporation of America 1958). Their respective codes are listed in Table 1. As this is a relatively obscure system, the equivalent code in the better-known Munsell color notation system (Munsell Color 1976) is also included in the table.

The diaphaneity of the beads is described using the terms opaque (op.), translucent (tsl.), and transparent (tsp). Simply defined, beads that are opaque are impenetrable to light except on the thinnest edges. Translucent specimens transmit light, yet diffuse it so that objects viewed through them are indistinct. Objects viewed through transparent beads (such as a pin in the perforation) are clearly visible.

Although the shape nomenclature is basically self-explanatory, a few brief comments may help clarify some of the terms used. All tubular beads have round cross-sections unless otherwise noted. Circular specimens are shaped like a torus (ring); i.e., the shape of most embroidery (seed, pound, and pony) beads. The round category includes beads that are not only spheroidal, but also oblate and barrel-shaped. Flat "disc" beads are oval or round specimens pressed flat parallel to the perforation while the glass was still viscid.

Drawn Glass Beads

These are made from sections of glass tubing that was drawn out from a hollow globe of molten glass. The ends of the beads may be broken, or rounded as a result of subsequent heating and agitation.

Ia — Tubular Monochrome Beads

Ia16. Tubular; op. shadow blue; 1 specimen (Pl. IVA, right column, row 2). Broken ends.

Length: 27.8 mm Diameter: 8.6 mm

Ia19. Tubular; tsp. bright navy; 1 specimen (Pl. IVA, left column, row 1). Broken ends.

Length: 32.4 mm Diameter: 10.2 mm

Ia*(a). Tubular; tsl. sunlight yellow; 1 specimen (Pl. IVA, central column, row 1). Broken ends.

Length: 19.9 mm Diameter: 5.0 mm

Ia*(b). Tubular; tsp. mustard brown; 1 specimen (Pl. IVA, central column, row 4). Broken ends.

Length: 22.0 mm Diameter: 5.3 mm

Ia*(c). Tubular; tsl. cinnamon; 4 specimens (Fig. 2; central column, rows 2 and 9). Broken and rounded ends.

Length: 14.6-17.6 mm Diameter: 6.2-7.2 mm

Ia*(d). Tubular; tsp. copen blue; 8 specimens (Pl. IVA, left column, row 2). The glass has a slight golden cast. The ends are well rounded.

Length: 3.5-5.5 mm Diameter: 3.6-4.2 mm

Ia*(e). Tubular; op. dark palm green; 1 specimen (Pl. IVA, right column, row 1). Flat ends.

Length: 23.5 mm Diameter: 8.8 mm

Table 1. Levin Catalogue Color Index.

Color Harmony Name	Color Harmony Code	Munsell Equivalent	Color Harmony Name	Color Harmony Code	Munsell Equivalent
olive yellow	1 le	10.0Y 5/6	medium blue	13-1/2 ng	5.0PB 3/6
sunlight yellow	1-1/2 ga	5.0Y 8.5/8	shadow blue	14 ie	2.5PB 5/4
light gold	2 ic	2.5Y 7/8	deep blue	14 pc	2.5PB 3/8
mustard gold	2 ne	2.5Y 6/8	pale blue	15 ca	7.5B 8/2
mustard brown	2 pi	2.5Y 4/6	cerulean blue	15 nc	7.5B 4/8
amber	3 lc	10.0YR 7/8	robin's egg blue	16 ic	5.0B 6/6
cinnamon	3 le	10.0YR 5/6	bright blue	16 lc	5.0B 5/7
russet orange	4 nc	5.0YR 6/12	medium turquoise blue	17 le	2.5B 5/5
maple	4 ng	7.5YR 4/4	turquoise	17 pa	10.0BG 4/8
lead gray	5 ih	10.0YR 4/1	aqua blue	18 gc	2.5B 6/4
redwood	6 ne	10.0R 4/8	bright turquoise	18 la	7.5BG 6/8
barn red	6 pg	10.0R 3/8	dark jade green	21 ng	10.0G 4/5
scarlet	7 pa	7.5R 4/14	surf green	22 ie	5.0G 5/4
dark rose brown	7 pn	2.5YR 2/2	bright green	22 nc	2.5G 5/10
rose wine	8 le	10.0RP 4/6	dark green	22 pi	2.5G 3/6
ruby	8 pc	2.5R 3/10	apple green	23 ic	10.0GY 6/6
orchid mist	9 ec	2.5RP 7/4	dark palm green	23 ni	10.0GY 4/4
bright Dutch blue	13 la	7.5PB 4/11	white	a	N 9/0
ultramarine	13pa	6.25PB 3/12	oyster white	b	N 8/0
bright navy	13 pg	7.5PB 2/7	light gray	c	N 7/0
copen blue	13-1/2 ic	5.0PB 5/7	black	p	N 1/0

Ib — Tubular Monochrome Bodied Beads with Straight Simple Stripes

Ib*(a). Tubular; op. white body with 4 straight tsp. copen blue stripes set in a very thin layer of clear glass; 1 specimen (Pl. IVA, central column, row 3). Broken ends.

Length: 23.7 mm Diameter: 4.3 mm

Ib' — Tubular Monochrome Bodied Beads with Spiral Simple Stripes

Ib'*(a). Tubular; op. black body decorated with 2 spiral op. medium turquoise blue and 2 spiral aventurine stripes that alternate around the bead; 1 specimen (Pl. IVA, right column, row 4). Broken ends.

Length: 41.0 mm Diameter: 6.9 mm

Ibb' — Tubular Monochrome Bodied Beads with Spiral Compound Stripes

Ibb'*(a). Tubular; tsp. rose wine body decorated with 3 spiral compound stripes of op. lead gray on op. redwood; 1 specimen (Pl. IVA, central column, row 10). The body appears black unless held up to a strong light. The ends are broken.

Length: 47.1 mm Diameter: 6.6 mm

Ibb'*(b). Tubular; tsp. rose wine body decorated with 3 spiral compound stripes of op. black on op. white on op. redwood; 1 specimen (Pl. IVA, central column, row 11). The body appears black unless held up to a strong light. The ends are broken.

Length: 40.6 mm Diameter: 7.0 mm

If — Tubular Monochrome Beads with Surfaces Modified into Facets by Grinding

If*. (a) Tubular, cornerless hexagonal; tsp. bright navy; 5 specimens (Pl. IVB, right column, row 6). This type consists of a short section of hexagonal tubing with a triangular facet cut on each corner. The body facets are composed of unaltered tube faces in the shape of elongated hexagons. There are 18 facets in all. The broken ends are relatively flat. These are the so-called "Russian beads."

Length: 6.6-7.9 mm Diameter: 6.6-7.5 mm

If*(b). Elongate, multi-faceted; tsl. redwood; 1 specimen (Pl. IVB, central column, row 2). The bead has a total of 50 cut facets; 30 diamond-shaped facets around the middle and 10 elongate pentagonal facets around either end. The latter have been cut flat.

Length: 49.4 mm Diameter: 9.1 mm

If*(c). Elongate, multi-faceted; tsp. ruby; 6 specimens (Pl. IVB, left column, row 2; Pl. VIA, row 7). These beads are covered with 47-50 cut facets; 29-30 irregular diamond-shaped facets about the middle and 9-10 elongate pentagonal facets around either broken end.

Length: 37.2 mm Diameter: 15.7 mm

If * (d). Elongate, multi-faceted; tsp. bright navy; 1 specimen (Pl. IVB, left column, row 7). This variety has the same form as the previous one. The ends are broken but flat.

Length: 27.3 mm Diameter: 13.8 mm

If*(e). Elongate, multi-faceted; op. copen blue; 4 specimens (Pl. VIA, row 5). This variety has the same form as the previous one.

Length: 37.6-39.6 mm Diameter: 15.4-16.5 mm

If*(f). Teardrop, multi-faceted; tsp. light gray; 3 specimens (Pl. IVB, central column, row 8). The tapered end is hexagonal in cross-section and exhibits 6 elongate pentagonal facets set parallel to the perforation. The bulbous portion is covered with numerous, small pentagonal to diamond-shaped facets.

Length: 19.1-20.0 mm Diameter: 6.0-6.2 mm

Io — Tubular Hexagonal Beads with Monochrome Bodies Exhibiting an "Alternating Twist"

This pattern was apparently produced by alternatingly twisting a heated hexagonal tube one way and then the other until a series of undulations had been formed in the body facets.

Io* (a). "Alternating twist" beads; tsp. cinnamon; 1 specimen (Pl. IVB, central column, row 4, left bead). The specimen displays four undulations. Its ends are tapered and jagged.

Length: 37.9 mm Diameter: 4.9 mm

Io*(b). "Alternating twist" beads; tsp. maple; 1 specimen (Pl. IVB, central column, row 4, right bead). This variety has the same form as the previous one.

Length: 35.0 mm Diameter: 4.6 mm

Io* (c) "Alternating twist" beads; tsp. rose wine; 2 specimens (Pl. IVB, central column, row 6). This variety has the same form as the previous one.

Length: 37.3-38.6 mm Diameter: 4.6-4.9 mm

Io* (d). "Alternating twist" beads; tsp. ultramarine; 2 specimens (Pl. IVB, central column, row 3). This variety has the same form as the previous one.

Length: 36.3-40.0 mm Diameter: 5.8-6.1 mm

Io*(e). "Alternating twist" beads; tsp. bright navy; 2 specimens (Pl. IVB, central column, row 5). This variety has the same form as the previous one.

Length: 32.3-36.6 mm Diameter: 4.7-4.9 mm

IIb — Non-Tubular Monochrome Bodied Beads with Straight Simple Stripes

IIb*(a). Circular; tsp. bright navy body decorated with 4 straight op. white stripes; 12 specimens (Pl. IVA, left column, row 4).

Length: 2.0-3.2 mm Diameter: 4.1-4.4 mm

IIb*(b). Circular; medium size; tsp. bright navy body decorated with 5 extremely narrow, straight, op. white stripes; 10 specimens (Pl. IVA, left column, row 8).

Length: 2.4-4.0 mm Diameter: 4.8-5.7 mm

IIIa — Tubular Polychrome (Multi-Layered) Beads

IIIa5. Tubular; tsp. scarlet outer layer; op. white core; 6 specimens (Pl. IVA, right column, rows 5 and 7). All specimens are slightly bent and have "orange peel" surfaces. The ends are well rounded. Two size populations are represented.

Length: 21.6-23.7 mm Diameter: 5.4-6.0 mm
20.7-23.8 mm 8.4-9.4 mm

IIIa*(a). Tubular; tsp. bright navy outer layer; tsl. copen blue middle layer; tsp. bright navy core; 7 specimens (Pl.

IVA, right column, row 9; Pl. VB, row 11). The surfaces are dull and pitted; the ends are cut flat.

Length: 26.6-27.6 mm Diameter: 10.6-11.1 mm

IIIb' — Tubular Polychrome (Multi-Layered) Bodied Beads with Spiral Simple Stripes

IIIb'*(a). Tubular; op. redwood outer layer decorated with 4 broad, spiral, op. white stripes; op. black core; 1 specimen (Pl. IVA, right column, row 3). The ends are jagged.

Length: 45.7 mm Diameter: 7.9 mm

IIIbb' — Tubular Polychrome (Multi-Layered) Bodied Beads with Spiral Compound Stripes

IIIbb'*(a). Tubular; op. redwood outer layer decorated with 3 spiral, compound stripes of tsp. rose wine on op. white; tsp. apple green core; 1 specimen (Pl. IVA, central column, row 12). The ends are broken.

Length: 45.5 mm Diameter: 6.2 mm

IIIc — Tubular Polychrome (Multi-Layered) Beads with Square Cross-Sections

IIIc*(a). Tubular (square cross-section); tsp. medium blue outer layer and core; very thin, op. white middle layer; 1 specimen (Pl. IVB, central column, row 9). The ends have been cut flat, and the edges and corners of the ends have been ground down.

Length: 88.0 mm Diameter: 15.7 mm

IIIf — Tubular Polychrome (Multi-Layered) Beads with Surfaces Modified into Facets by Grinding

IIIf*(a). Tubular, cornerless hexagonal; tsp. ultramarine outer layer; tsl. bright Dutch blue core; 5 specimens (Pl. IVB, right column, row 4). This variety consists of a short section of hexagonal tubing with a diamond-shaped facet cut on each corner. The body facets are formed by unaltered tube faces in the shape of elongated hexagons. Each specimen has a total of 18 facets. The broken ends are practically flat. This is another style of the so-called "Russian bead."

Length: 7.4-9.0 mm Diameter: 7.8-8.2 mm

IIIf*(b). Tubular, semi-cornerless hexagonal; tsp. ultramarine outer layer and core; tsl. bright Dutch blue middle layer; 3 specimens (Pl. IVB, central column, row 7). This variety consists of a hexagonal tube with a triangular facet cut on every other corner. The space between each of the former facets is occupied by a cut, elongate diamond-shaped facet. Six elongate hexagonal facets formed by unaltered tube faces encircle the middle. Each specimen has a total of 18 facets. The ends are broken but flat.

Length: 21.3-21.4 mm Diameter: 4.5-4.7 mm

IIIf*(c). Tubular, semi-cornerless hexagonal; tsp. bright navy outer layer and core; tsl. bright Dutch blue middle layer; 1 specimen (Pl. IVB, central column, row 1). This bead has the same form as the previous variety.

Length: 57.5 mm Diameter: 7.1 mm

IIIf*(d). Elongate, multi-faceted; tsp. bright navy outer layer; tsl. bright Dutch blue core; 2 specimens (Pl. IVB, left column, row 3). This variety has a total of 50 cut facets: 30 irregular diamond-shaped facets encircling the middle and 10 elongate pentagonal facets around the ends. The latter are broken but flat.

Length: 32.3-32.7 mm Diameter: 12.4-12.9 mm

IIIf*(e). Elongate, multi-faceted; tsp. ultramarine outer layer; tsp. light gray middle layer; thin op. white core; 2 specimens (Pl. IVB, left column, rows 4 and 6). There are two sizes of this variety. The smallest is covered with 55 cut facets: about 33 irregular diamond-shaped facets about the middle and 11 elongate pentagonal facets around the ends. The larger size has 65 corresponding facets (39 encircling the middle and 13 at either end). The end facets have been ground into the light gray layer, leaving the ultramarine glass as a medial band. The ends have been cut flat.

Length: 34.2 mm, 32.2 mm Diameter: 7.5 mm, 12.0 mm

IIIf*(f). Elongate, multi-faceted; tsp. bright green outer layer; tsp. light gray middle layer; thin op. white core; 1 specimen (Pl. IVB, left column, row 5). This bead has the same configuration as the smaller size of the previous variety and the same comments apply.

Length: 36.0 mm Diameter: 8.0 mm

IIIk — Tubular Multi-Layered Chevron Beads with Plain Outer Layers

IIIk*(a). Tubular (discoidal); chevron bead with 4 starry layers: 1) tsp. bright navy outer layer; 2) op. white layer; 3) op. redwood layer; and 4) op. white core; 13 specimens (Pl. IVA, left column, row 6). The ridges of the second layer show through as straight stripes. These beads are formed of extremely short tube sections with rounded ends.

Length: 1.8-4.0 mm Diameter: 6.3-7.3 mm

IIIk*(b). Tubular; chevron bead with 4 starry layers: 1) tsp. turquoise outer layer; 2) op. white layer; 3) op. redwood

layer; and 4) op. white core; 6 specimens (Pl. IVA, right column, row 6). The ridges of the second layer show through as straight stripes. All of the specimens have "orange peel" surfaces. Their ends are well rounded.

Length: 10.4-10.9 mm Diameter: 6.7-7.7 mm

IVa — Non-Tubular Polychrome (Multi-Layered) Beads

IVa*(a). Circular; tsp. scarlet outer layer; op. white core; 10 specimens (Pl. IVA, left column, row 11).

Length: 3.0-3.9 mm Diameter: 5.3-6.1 mm

IVb — Non-Tubular Polychrome (Multi-Layered) Bodied Beads with Straight Simple Stripes

IVb*(a). Circular; op. white outer layer decorated with 22 straight, alternating stripes of tsp. scarlet and op. bright navy; op. shadow blue core; 8 specimens (Pl. IVA, left column, row 12).

Length 4.6-5.8 mm Diameter: 5.6-6.2 mm

IVb*(b). Circular; op. redwood outer layer decorated with 6 straight op. white stripes; tsp. apple green core; 17 specimens (Pl. IVA, left column, rows 7 and 10). Two size populations are represented.

Length: 2.9-4.1 mm Diameter: 4.5-4.8 mm
4.6-6.0 mm 6.2-6.7 mm

IVbb — Non-Tubular Polychrome (Multi-Layered) Bodied Beads with Straight Compound Stripes

IVbb*(a). Circular; op. white outer layer decorated with 6 straight, compound stripes composed of a tsp. scarlet stripe adjacent to an op. bright navy stripe; op. shadow blue core; 7 specimens (Pl. IVA, left column, row 9).

Length: 4.4-6.0 mm Diameter: 6.0-7.0 mm

IVbb*(b). Circular; op. redwood outer layer decorated with 4 straight, compound stripes of tsp. bright navy on op. white; tsp. apple green core; 11 specimens (Pl. IVA, left column, row 3).

Length: 2.4-3.3 mm Diameter: 3.6-3.9 mm

IVbb*(c) Circular; tsp. medium turquoise blue outer layer decorated with 4 straight, compound stripes of op. redwood on op. white; tsl. light gray core; 13 specimens (Pl. IVA, left column, row 5).

Length: 2.1-2.8 mm Diameter: 3.6-4.0 mm

Wound Glass Beads

The beads in this group were produced by repeatedly winding a filament of glass around a rotating mandrel until the desired size and shape were achieved.

WIa — Cylindrical Monochrome Beads

WIa*(a). Cylindrical; op. olive yellow; 11 specimens (Pl. IVA, right column, row 8; Pl. VB, row 12). There are streaks in the glass.

Length: 17.6-18.7 mm Diameter: 11.5-12.6 mm

WIa*(b). Cylindrical; tsl. medium blue; 3 specimens (Pl. IVA, central column, row 8). The beads have irregular outlines and dull surfaces.

Length: 12.7-14.5 mm Diameter: 8.2-8.3 mm

WIb — Round Monochrome Beads

WIbl. Round; tsp. light gray; 17 specimens (Pl. IIIC, central column, row 7; Pl. VIB, row 12).

Length: 10.2-10.7 mm Diameter: 10.7-11.2 mm

WIb5. Round; tsl. pale blue; 27 specimens (Pl. IIIC, right column, rows 5 and 13; Pl. VIA, row 1; Pl. VIB, row 28). The glass has a golden cast. Two size populations are represented.

Length: 8.1-10.0 mm Diameter: 10.2-10.5 mm
26.7-28.8 mm 29.3-31.0 mm

WIb7. Round; tsp. amber; 19 specimens (Pl. IIIC, right column, row 2; Pl. VIB, row 6). The surfaces are shiny.

Length: 7.2-9.3 mm Diameter: 10.4-10.6 mm

WIb16. Round; tsp. bright navy; 17 specimens (Pl. IIIC, central column, row 4; Pl. VIB, row 8).

Length: 9.7-10.6 mm Diameter: 11.2-11.5 mm

WIb*(a). Round; tsp. light gray with a slight greenish cast; 17 specimens (Pl. IIIC, central column, row 3; Pl. VIB, row 22).

Length: 9.1-9.8 mm Diameter: 10.3-10.7 mm

WIb*(b). Round; tsl. oyster white; 3 specimens (Pl. IIIC, right column, row 9).

Length: 11.0-12.4 mm Diameter: 13.6-14.1 mm

WIb*(c). Round; tsl. light gray; 14 specimens (Pl. VIB, row 19). The glass is crackled.

Length: 8.0-9.7 mm Diameter: 9.8-10.8 mm

WIb*(d). Round; op. black; 24 specimens (Pl. IIIC, central column, row 10; Pl. VB, row 3; Pl. VIB, row 24). The surfaces are shiny. There are two size groups.

Length: 9.1-10.7 mm Diameter: 11.3-12.0 mm
13.2-14.1 mm 15.6-16.9 mm

WIb*(e). Round; tsl. mustard gold; 4 specimens (Pl. IIIC, central column, row 6).

Length: 7.8-9.3 mm Diameter: 10.7-12.3 mm

WIb*(f). Round; tsp. barn red; 19 specimens (Pl. IIIC, central column, row 2; Pl. VIB, row 16).

Length: 8.8-9.7 mm Diameter: 11.2-11.8 mm

WIb*(g). Round; tsp. scarlet; 3 specimens (Pl. IIIC, right column, row 4).

Length: 10.1-10.7 mm Diameter: 10.4-11.4 mm

WIb*(h). Round; tsp. rose wine; 15 specimens (Pl. IIIC, central column, row 8; Pl. VIB, row 21).

Length: 10.2-12.4 mm Diameter: 12.4-13.5 mm

WIb*(i). Round, op. copen blue; 31 specimens (Pl. IIIC, right column, row 11; Pl. VB, row 13; Pl. VIB, row 29). The glass is swirled and the surfaces are shiny. Two size populations are represented.

Length: 9.3-11.0 mm Diameter: 10.5-11.1 mm
15.7-16.4 mm 15.6-16.2 mm

WIb*(j). Round; tsl. cerulean blue; 21 specimens (Pl. IIIC, right column, row 1; Pl. VIB, row 10).

Length: 7.4-8.8 mm Diameter: 9.2-9.7 mm

WIb*(k). Round; tsp. dark green; 19 specimens (Pl. IIIC, central column, row 5; Pl. VIB, row 26).

Length: 7.6-10.9 mm Diameter: 10.2-11.0 mm

WIb*(l). Round; tsl. apple green; 24 specimens (Pl. IIIC, central column, row 9, and right column, row 3; Pl. VIB, row 14). The glass is swirled and contains numerous bubbles. The surfaces are shiny. Two size populations are represented.

Length: 7.3-8.6 mm Diameter: 9.8-10.4 mm
9.9-12.7 mm 12.4-13.5 mm

WIc — Oval Monochrome Beads

WIc1. Oval; op. white; 4 specimens (Pl. VB, row 16).

Length: 28.4-29.5 mm Diameter: 16.1-17.0 mm

WIc5. Oval; tsp. amber; 13 specimens (Pl. IIIC, left column, row 11; Pl. VIB, row 11).

Length: 13.2-17.6 mm Diameter: 6.1-7.0 mm

WIc*(a). Oval; tsl. oyster white; 15 specimens (Pl. IIIC, left column, rows 13 and 15; Pl. VIB, row 9). Two size populations are represented.

Length: 13.2-14.9 mm Diameter: 7.9-8.8 mm
30.1-31.5 mm 19.8 mm

WIc*(b). Oval; op. black; 12 specimens (Pl. IIIC, left column, row 14; Pl. VIB, row 7). The beads are shiny and represent two size populations.

Length: 13.0-16.1 mm Diameter: 7.6-8.8 mm
18.5-19.2 mm 10.3-11.5 mm

WIc*(c). Oval; tsl. mustard gold; 12 specimens (Pl. IIIC, left column, row 8; Pl. VIB, row 27).

Length: 15.7-17.3 mm Diameter: 8.1-8.9 mm

WIc*(d). Oval; tsp. rose wine; 12 specimens (Pl. IIIC, left column, row 9; Pl. VIB, row 1).

Length: 14.5-17.5 mm Diameter: 6.5-7.7 mm

WIc*(e). Oval; op. ultramarine; 5 specimens (Pl. IIIC, left column, row 5).

Length: 10.6-12.0 mm Diameter: 6.1-6.6 mm

WIc*(f). Oval; tsl. bright navy; 12 specimens (Pl. IIIC, left column, row 10; Pl. VIB, row 3). The surfaces are shiny.

Length: 14.8-16.2 mm Diameter: 6.6-8.0 mm

WIc*(g)/ Oval; tsp. bright navy; 10 specimens (Pl. VIB, row 17). Surfaces are shiny.

Length: 12.8-14.5 mm Diameter: 5.9-6.6 mm

WIc*(h). Oval; tsl./op. bright blue; 4 specimens (Pl. IIIC, left column, row 12). The glass is swirled and practically opaque.

Length: 13.0-14.3 mm Diameter: 6.8-7.8 mm

WIc*(i). Oval; tsl. robin's egg blue; 9 specimens (Pl. VIB, row 5). Surfaces are shiny.

Length: 14.1-16.5 mm Diameter: 7.6-8.6 mm

WIc*(j). Oval; tsl. light aqua blue; 4 specimens (Pl. IIIC, left column, row 7).

Length: 12.9-15.4 mm Diameter: 7.6-8.3 mm

WIc*(k). Oval; tsl. apple green; 12 specimens (Pl. IIIC, left column, row 4; Pl. VIB, row 25). There are swirls in the

glass and the surfaces are shiny. Two size populations are represented.

Length: 15.5-20.0 mm Diameter: 6.3-6.9 mm
14.0-16.9 mm 8.2-9.1 mm

WIIb — Monochrome Flat "Disc" Beads

WIIb*(a). Flat "disc" beads; tsp. dark green; 6 specimens (Pl. IVA, central column, row 5). These consist of round beads pressed flat while the glass was still viscid.

Length: 7.0-8.6 mm Diameter: 4.2-4.9 mm by 9.3-11.3 mm

WIIf — Monochrome "Ridged Tube" Beads

WIIf*(a). Ridged tube (square cross-section); tsp. bright navy; 5 specimens (Pl. IVA, left column, row 13). Their sides exhibit a "waffle iron" design.

Length: 7.3-8.5 mm Diameter: 6.6-7.3 mm

WIIk — Monochrome Circular Convex Bicone Beads

WIIk*(a). Circular convex bicone (Beck's type I.B.I.e.); op. white; 22 specimens (Pl. VA, left column, row 3; Pl. VB, row 14). Shiny surfaces.

Length: 5.7-6.2 mm Diameter: 15.4-16.2 mm

WIIk*(b). Circular convex bicone; op. light gold; 5 specimens (Pl. VA, left column, row 2). Dull surfaces.

Length: 5.0-7.1 mm Diameter: 16.2-17.0 mm

WIIk*(c). Circular convex bicone; op. cinnamon; 29 specimens (Pl. VA, central column, row 1; Pl. VB, row 1). The beads have a dull luster.

Length: 4.5-5.4 mm Diameter: 13.7-14.8 mm

WIII — Monochrome Standard Circular Truncated Convex Bicone Beads*

WIII**(a). Standard circular truncated convex bicone (Beck's type I.C.I.f.); op. light gold; 6 specimens (Pl. VA, central column, row 5). Dull surfaces.

Length: 9.4-10.3 mm Diameter: 9.9-11.0 mm

WIIIa — Class WI Beads with a Surface Coating of a Different Color or Material

WIIIa*(a). Round-ribbed; tsl. oyster white body covered with an interconnected series of identically colored, ca. 0.8-mm-wide glass filament rings that encircle the bead; the equator is further decorated with 2-3 tsl. rose wine rings; 5 specimens (Pl. IVB, right column, row 5).

Length: 7.3-7.9 mm Diameter: 7.4-8.5 mm

WIIIa*(b). Round; tsp. scarlet outer layer; op. white core; 21 specimens (Pl. IIIC, central column, row 11, and right column, row 8; Pl. VB, rows 2 and 15). Two size populations are represented.

Length: 12.6-13.1 mm Diameter: 13.2-13.5 mm
16.7-16.8 mm 19.5-19.8 mm

WIIIa*(c). Oval; tsp. scarlet outer layer; op. white core; 14 specimens (Pl. IIIC, left column, row 6; Pl. VIB, row 2).

Length: 10.2-11.8 mm Diameter: 6.4-7.6 mm

WIIIb — Class WI Beads with Inlaid Decoration

WIIIb*(a). Cylindrical; tsl. light gray body decorated with a compound stripe of tsp. scarlet on op. white around the middle, and 4 compound dots of tsp. bright navy and op. white glass swirled together around either end; 5 specimens (Pl. VA, left column, row 6). Shiny surfaces.

Length: 9.2-11.0 mm Diameter: 5.6-6.0 mm

WIIIb*(b). Cylindrical; op. light gold body decorated with 9 tsp. scarlet dots, and 9 short, compound stripes of tsp. bright navy on op. white on op. barn red on op. dark rose brown; 13 specimens (Pl. VA, right column, row 6; Pl. VIA, row 12). The surfaces are shiny.

Length: 14.2-15.4 mm Diameter 9.0-10.1 mm

WIIIb*(c). Cylindrical; op. light gold body decorated with 2 op. barn red and 2 tsl. dark palm green stripes that alternate around the bead; a tsl. dark palm green stripe encircles the middle; a dot of the same color is situated in the center of each of the square areas produced by the intersecting stripes; 4 specimens (Pl. VA, right column, row 3). The beads have a dull luster.

Length: 12.0-13.3 mm Diameter: 7.8-8.4 mm

WIIIb*(d). Cylindrical; op. mustard gold body decorated with 2 pairs of loops composed of a tsl. dark palm green stripe next to an op. white stripe next to a tsp. scarlet stripe; the two sets of loops are separated from each other by a short, diagonal, compound stripe of tsp. bright navy next to op. white; the loops in each set are separated from each other by two tsl. dark palm green dots; 4 specimens (Pl. VA, right column, row 5). The specimens have dull surfaces.

Length: 14.2-15.0 mm Diameter: 7.7-7.8 mm

WIIIb*(e). Cylindrical; op. mustard gold body decorated with: 1) a spiral, compound stripe of op. mustard gold (formed by the body of the bead) bordered on one side by an op. barn red stripe and by an op. dark palm green stripe on the other; 2) a wavy, spiral, compound stripe of op. white and tsp. scarlet filaments twisted together; and 3) 15-17 scattered, op. dark rose brown dots; 7 specimens (Pl. VA, right column, rows 2 and 4). The beads, all of which are dull-surfaced, represent two size populations.

Length: 14.3-14.7 mm Diameter: 7.5-8.0 mm
15.7-16.8 mm 9.1-9.6 mm

WIIIb*(f). Cylindrical; op. barn red body decorated with approximately 20 op. white loops with an op. light gold dot or dash in the center of each; 11 specimens (Pl. VA, right column, row 1; Pl. VB, row 10). The surfaces are dull.

Length: 18.0-19.9 mm Diameter: 8.1-8.9 mm

WIIIb*(g). Cylindrical; tsl. bright navy body decorated with 3 compound dots of tsp. scarlet on op. white which encircle the middle, and 3 op. light gold dots around either end; 4 specimens (Pl. VA, left column, row 4). The bright navy glass appears black unless held up to a light and its surface is dull.

Length: 6.2-7.3 mm Diameter: 4.6-5.0 mm

WIIIb*(h). Round; op. white body decorated with 6-9 tsp. bright navy dots; 3 specimens (Pl. IIIC, central column, row 1).

Length: 10.5-11.7 mm Diameter: 12.8-13.4 mm

WIIIb*(i). Round; op. white body decorated with 2 tsp. scarlet and 2 tsp. bright navy floral motifs set parallel to the perforation; 11 specimens (Pl. VIB, row 4). Surfaces are shiny.

Length: 10.3-11.7 mm Diameter: 8.9-9.5 mm

WIIIb*(j). Round; tsl. light gray body decorated with 6 tsp. bright navy dots; 3 specimens (Pl. IIIC, right column, row 7).

Length: 9.5-12.0 mm Diameter: 13.7-13.9 mm

WIIIb*(k). Round; op. black body decorated with a combed design of tsp. ruby on op. white; 1 specimen (Pl. IIIC, left column, row 1).

Length: 14.8 mm Diameter: 15.1 mm

WIIIb*(l). Round; op. black body decorated with approximately 25 compound dots or eyes of tsp. scarlet on op. white and op. turquoise on op. white; 14 specimens (Pl. IIIC, right column, row 6; Pl. VIB, row 20).

Length: 11.1-11.3 mm Diameter: 10.6-11.0 mm

WIIIb*(m). Round; tsp. scarlet body decorated with 8 large, op. white dots; 13 specimens (Pl. VIB, row 13).

Length: 6.9-9.6 mm Diameter: 7.7-9.5 mm

WIIIb*(n). Round; tsp. ruby body decorated with 11 compound dots of tsp. scarlet on op. white; 1 specimen (Pl. IIIC, left column, row 3).

Length: 16.3 mm Diameter: 18.0 mm

WIIIb*(o). Round; tsp. ruby body decorated with 6 floral motifs set parallel to the perforation: 3 motifs have op. white leaves and op. russet orange stalks; the others are solid russet orange; 12 specimens (Pl. IIIC, right column, row 12; Pl. VIA, row 4).

Length: 14.0-15.4 mm Diameter: 16.0-16.4 mm

WIIIb*(p). Oval; op. white body decorated with 4 floral motifs set parallel to the perforation; 2 motifs have tsp. scarlet leaves and faint op. bright navy stalks; the other two are solid bright navy; 12 specimens (Pl. IVA, central column, row 6; Pl. VIB, row 15).

Length: 14.3-15.1 mm Diameter: 7.8-8.4 mm

WIIIb*(q). Oval; tsp. ruby body decorated with: 1) a compound, spiral stripe composed of entwined op. white and tsp. bright navy filaments, and 2) a spiral series of 10 compound dots of op. white and tsp. bright navy swirled together; 11 specimens (Pl. IVA, central column, row 7; Pl. VIB, row 18).

Length: 14.7-15.4 mm Diameter: 8.3-8.5 mm

WIIIb*(r). Oval (barrel-shaped); op. light gold body decorated with 3 straight, compound stripes of tsp. bright navy on op. white on op. barn red, and a compound stripe of op. barn red on op. white on op. dark palm green that encircles the middle and extends over the other stripes; 3 specimens (Pl. VA, central column, row 2). Bead surfaces are dull.

Length: 11.7-12.2 mm Diameter: 7.8 mm

WIIIb*(s). Oval (barrel-shaped); op. cinnamon body decorated with 3 straight, compound stripes of tsp. bright navy on op. white on op. barn red; an identical stripe encircles the middle and extends over the other stripes; 14 specimens (Pl. VA, central column, row 3; Pl. VIA, row 11). Dull luster.

Length: 11.7-12.1 mm Diameter: 8.8-9.5 mm

WIIIb*(t). Oval (barrel-shaped); op. cinnamon body decorated with 8 short, straight, compound stripes of tsp. bright navy on op. white on op. barn red, and a compound stripe of tsp. bright navy on op. white on op. barn red on tsl.

dark palm green which girds the equator; 4 specimens (Pl. VA, right column, row 7). Surfaces are dull.

Length: 14.6-15.7 mm Diameter: 10.6-11.4 mm

WIIIc — Class WII Beads with an Inlaid Decoration

WIIIc*(a). Flat "disc" beads; op. mustard gold body decorated with 16 loops composed of a tsp. dark rose brown stripe next to an op. orchid mist stripe; a compound dot of tsp. bright navy and op. white swirled together occupies the center of each loop; 16 tsl. dark palm green dots occupy the interstices between the loops; 11 specimens (Pl. VA, right column, row 9; Pl. VB, row 5). Dull surfaces.

Length: 16.2-17.0 mm Width: 19.4-19.7 mm
Thickness: 6.5- 7.0 mm

WIIIc*(b). Flat "disc" beads; op. mustard gold body decorated with several elements: 1) a wavy compound stripe of bright turquoise and op. white filaments twisted together encircles the middle and is bordered by 10 near op. dark rose brown dots; 2) 5 loops of op. white on tsp. scarlet with a compound dot of tsp. dark palm green and op. white swirled together in the center of each encircle either end; and 3) identical dots occupy the spaces between adjacent loops; 12 specimens (Pl. VA, right column, row 8; Pl. VB, row 7). Surfaces are dull.

Length: 14.6-16.3 mm Width: 16.4-17.6 mm
Thickness: 6.1- 6.9 mm

WIIIc*(c). Flat "disc" beads; op. deep blue body decorated with 16 loops composed of tsp. scarlet and op. white threads twisted together; an op. mustard gold dot is situated in the center of each loop; 16 op. white dots cover the rest of the surface; 11 specimens (Pl. VA, right column, row 10; Pl. VB, row 6). The surfaces are dull.

Length: 17.1-17.5 mm Width: 19.2-20.0 mm
Thickness: 7.0- 7.2 mm

WIIIc*(d). Short circular barrel (Beck's type I.B.l.b.); op. sunlight yellow body; a compound stripe of tsp. dark jade green and tsp. scarlet on op. white encircles the middle; a compound stripe composed of a series of short, alternating tsp. dark jade green and scarlet diagonals on an op. white background encircles either end; 5 specimens (Pl. VA, central column, row 4). They exhibit a dull luster.

Length: 7.4-8.0 mm Diameter: 11.6-13.7 mm

WIIIc*(e). Short circular barrel; op. aqua blue body decorated with 5 compound dots of tsp. scarlet on op. white that gird the middle, and 5 compound dots of tsp. bright navy on op. white around either end; 8 specimens (Pl. VA, left column, row 8). Surfaces are dull.

Length: 5.1-5.8 mm Diameter: 7.5-8.8 mm

WIIIc*(f). Short circular barrel; op. surf green body decorated with a compound stripe of tsp. scarlet on op. white that encircles the middle and is bordered on either side by a wavy, op. mustard gold stripe; 10 tsl. rose wine dots are situated in the area between the central stripe and the lateral ones; 5 op. white dots encircle either end; 5 specimens (Pl. VA, left column, row 7). They have a dull luster.

Length: 5.9-6.4 mm Diameter: 10.8-12.9 mm

WIIIc*(g). Short circular truncated convex bicone (Beck's type I.B.l.f.); op. light gold body decorated with two identical sets of very narrow, straight, simple stripes: an op. barn red stripe situated between 2 tsl. dark palm green stripes; a very narrow, op. barn red stripe extends along the equatorial ridge; 4 specimens (Pl. VA, central column, row 9). Surfaces are dull.

Length: 14.3-14.7 mm Diameter: 17.0-18.0 mm

WIIIc*(h). Standard circular truncated convex bicone (Beck's type I.C.l.f.); op. black body decorated with 6 irregular, op. cinnamon blotches with an op. barn red loop in the center of each; 13 specimens (Pl. VA, central column, row 6; Pl. VB, row 9). Surfaces are dull.

Length: 15.7-16.0 mm Diameter: 15.1-15.5 mm

WIIIc*(i). Standard circular truncated convex bicone; op. black body decorated with 8 eyes composed of an op. bright blue dot enclosed by an op. mustard gold ring with 2 crossed compound stripes of op. black next to op. mustard gold next to op. barn red in the center of each; a compound stripe of op. mustard gold on op. barn red extends around the equator, and an op. white ring encircles either end; 4 specimens (Pl. VA, central column, row 7). Surfaces are shiny.

Length: 15.7-16.3 mm Diameter: 15.2-16.6 mm

WIIIc*(j). Standard circular truncated convex bicone; op. cinnamon body decorated with 4 straight, compound stripes of tsl. dark palm green on op. cinnamon, bordered on one side by an op. barn red stripe and by an op. dark rose brown stripe on the other; a tsl. dark palm green stripe girds the middle and extends over the compound stripes; 11 specimens (Pl. VA, central column, row 10; Pl. VB, row 4). They have a dull luster.

Length: 16.0-16.2 mm Diameter 17.7-19.0 mm

WIIIc*(k). Standard circular truncated convex bicone; op. dark jade green body decorated with 3 to usually 4 straight, compound stripes of op. light gold bordered on one side by an op. black stripe and by an op. barn red stripe on the other; an op. light gold stripe extends along the equatorial ridge

and crosses the other stripes; 4 specimens (Pl. VA, central column, row 8). The beads have dull surfaces, and the ends are irregular and not very wide.

Length: 13.7-15.0 mm Diameter: 14.3-16.5 mm

WIIIc*(l). Standard circular truncated convex bicone; op. dark palm green body decorated with 4 straight, compound stripes of op. light gold bordered on one side by an op. black stripe and by an op. barn red stripe on the other; an op. light gold stripe encircles the equator and extends over the other stripes; 1 specimen (Pl. VA, left column, row 1). Surfaces are dull and the ends are irregular and not very wide.

Length: 16.9 mm Diameter: 18.1 mm

WIIIc*(m). Ridged tube (square cross-section); tsl. oyster white body decorated with 6 very short, compound stripes of tsl. oyster white on tsp. bright navy with an op. amber dot in the approximate center of each stripe; the stripes are perpendicular to the axis of the perforation; 9 specimens (Fig. 4; left column, row 9; Pl. VB, row 8). The beads have shiny surfaces. They are equivalent to Beck's (1928) long square cylinders (type IX.D.2.b.).

Length: 18.6-18.8 mm Diameter: 8.1-9.1 mm

WIIIc*(n). Ridged tube (triangular to square cross-section); op. black body decorated with a wavy op. amber stripe around the middle, and a wavy op. white stripe around either end; 5 specimens (Pl. VA, left column, row 5). These are the equivalent of Beck's (1928) long square cylinder (type IX.D.2.b.) and long triangular cylinder (type VIII.D.2.b). Surfaces are shiny.

Length: 9.1-10.1 mm Diameter: 5.4-5.9 mm

WIIIf — Class WI Beads with Internal Decorative Elements

WIIIf*(a). Round; tsl. maple body decorated internally with slightly spiral, op. white glass bands that encircle the perforation; 2 specimens (Pl. IIIC, left column, row 2).

Length: 14.0-15.4 mm Diameter: 14.7-16.8 mm

WIIIf*(b). Round; tsl. dark green body decorated internally with slightly spiral, op. white glass bands that encircle the perforation; 4 specimens (Pl. IIIC, right column, row 10).

Length: 11.0-11.6 mm Diameter: 12.0-13.2 mm

Mold-Pressed Glass Beads

These beads were manufactured by pressing molten glass in a two-piece mold and then letting it harden. The surfaces of most specimens were subsequently modified by grinding.

MPIa — Monochrome Round Beads

MPIa*(a). Round; tsl. sunlight yellow; 9 specimens (Pl. VIB, row 23). The beads have slight equatorial bulges, shiny surfaces, and their perforations taper noticeably.

Length: 11.0-12.2 mm Diameter: 13.3-13.9 mm

MPIIa — Monochrome Round-Faceted Beads

MPIIa*(a). Round-faceted; tsl. sunlight yellow; 4 specimens (Pl. IVB, right column, row 1). The beads are covered with numerous, poorly cut, irregular facets. The perforation tapers noticeably.

Length: 11.5-12.0 mm Diameter: 13.6-14.3 mm

MPIIa*(b). Round-faceted; tsl. amber; 7 specimens (Pl. VIA, row 3). Numerous cut diamond-shaped facets cover the medial portion, whereas cut pentagonal facets extend around the flat ends.

Length: 19.4-20.0 mm Diameter: 23.8-25.0 mm

MPIIa*(c). Round-faceted; op. bright Dutch blue; 5 specimens (Pl. IVB, right column, row 3). This variety has approximately 26 diamond-shaped cut facets around the middle, and 8-10 irregular pentagonal cut facets at either end. The perforation is tapered and the ends are flat.

Length: 7.9-9.2 mm Diameter: 10.1-10.8 mm

MPIIa*(d). Round-faceted; op. dark green; 4 specimens (Pl. IVB, right column, row 2). This variety exhibits 54-60 neatly cut facets: 36-40 triangular facets around the middle, and 9-10 trapezoidal facets about either end. The perforations taper and the ends are flat.

Length: 10.8-11.3 mm Diameter: 12.6-13.1 mm

MPIIb — Monochrome Long Hexagonal Barrel Beads

MPIIb*(a). Long hexagonal barrel (Beck's type XIII. D.I.b.); tsl. light gray; 4 specimens (Pl. IVB, left column, row 1; Pl. VIA, row 6). This variety has a cut, hexagonal-sectioned body that tapers gradually towards either flat end. The glass contains elongate bubbles parallel to the axis of the perforation.

Length: 52.0 mm Diameter: 13.3 mm

MPIIb*(b). Long hexagonal barrel; tsl. deep blue; 1 specimen (Pl. VIA, row 2). This bead has the same form as the previous one.

Length: 105.0 mm Diameter: 20.8 mm

Stone Beads

Long circular barrel (Beck's type I.D.l.b.); banded carnelian; 7 specimens (Pl. VIA, row 10). The beads have polished surfaces.

Length: 19.2-22.9 mm Diameter: 6.7-7.8 mm

Long octagonal cone (Beck's type XIV.D.2.d); banded carnelian; 10 specimens (Pl. VIA, rows 8 and 9). The ends of every other facet have been ground down. The surfaces are polished. Two size populations are represented.

Length: 24.4-28.7 mm Diameter: 8.3-9.9 mm
40.0-43.2 mm 9.1-11.4 mm

DISCUSSION AND CONCLUSIONS

Although the exact date the display cards and boxes that comprise the Levin Catalogue were prepared is not known, fairly narrow relative dates can be assigned to the two component collections. The four display cards are attributable to the period 1851-1863. The latter year corresponds to the cards' museum accession date, whereas 1851 is the first year that M.L. Levin is recorded as being at the Bevis Marks address that appears on the bead cards. The three display boxes can be ascribed to 1857-1869. The former date is based on the presence of the city zoning designation "E.C." after the address on the display case labels. The use of such zones in London street addresses appears to have been implemented in 1857 (Kelly 1857). The other terminal date is founded on the fact that the designation "manufacturer," which appears after Levin's name on the box labels, is deleted from the London city directory listings after 1869. This implies the bead boxes were assembled before this date. Many of the beads themselves have counterparts at similarly dated archaeological sites in North America, suggesting the specimens exhibited in the Levin Catalogue represent current rather than old stock.

While there are no records to indicate exactly who produced the beads in the Levin Collection, it is known that Venice, Bohemia, and Germany supplied beads to the company during the 1890s and early 1900s (Kelly 1898:1230; 1911:1029). Certainly the bulk—if not all—of the wound specimens were produced in Venice/Murano. The faceted beads are probably the products of Bohemia as are the mold-pressed specimens, though Germany may also have been a supplier. Germany likely provided the carnelian beads; the gem-grinding center at Idar-Oberstein being a major source of such beads.

ENDNOTE

1. This article was previously published in *Glass Beads* (Karklins 1985:7-39). It is being reprinted as it remains one of only a few sets of mid-19th-century sample cards in existence, and also shows the value of city directories in bead research. The text essentially remains the same. The major change is publishing the catalogue in color.

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Ontario Service Centre
Parks Canada
1600 Liverpool Court
Ottawa, ON K1A 0M5
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INCISED DENTALIUM SHELL BEADS IN THE PLATEAU CULTURE AREA

Roderick Sprague

Whole dentalium and segments of dentalium shell have been used as beads in the Northwest Coast and interior Plateau culture areas both prehistorically and ethnographically. Incised whole shells, and no more than five known examples of incised segments, have been recovered from the Plateau, limited to archaeological contexts. A review of the reported incising clearly shows the use of design elements typical of the Plateau Culture Area as often also used on bone, antler, wood, and historic copper in addition to dentalium. The Asotin site (45-AS-9), one of the few well-dated Plateau burial sites with incised beads indicates that this phenomena has a broad and, as yet, poorly defined chronological occurrence, largely from the protohistoric to the early historic.

INTRODUCTION

The shell popularly called tusk shell, haiqua, hiaqua, hiqua, dentalia, and dentalium is, for the most part, recovered from the waters off of the west coast of Vancouver Island. Other terms in English include tooth shell, Indian tusk shell, horn shell, and Indian money shell. There is also a list of 18 native terms (plus one added in ink by the publisher) as recorded by explorers (Galois and Mackie 1990:3). Of the several species found along the Pacific coast, only *Dentalium pretiosum* Sowerby is found in the Pacific Northwest archaeological record (Erickson 1990:94), however, *D. neohexagonum* is found in coastal California waters (Erlandson et al. 2001). Unlike the Atlantic variety, *D. entails*, the dentalium traded in the West is smooth surfaced thus making it an excellent medium for fine etching or incising and, according to one authority, "scratched" (Clark 1963:18). For a detailed study of the distribution of procurement sites and the various species available, consult the thesis by Barton (1994).

A detailed study of the major species of shell used in the Plateau and their trading routes is provided by Erickson (1990). Other sources for the distribution and trading of dentalium include Andrews (1989), Clark (1963), Galois and Mackie (1990), Mackie and Galois (1990), and Weld (1963). For the Klamath-Modoc region, often included in the Plateau, consult the article by Largaespada (2006). Her study of the archaeological occurrence of marine-shell beads in the Fort Rock Basin within the Oregon portion of the Great Basin revealed almost 200 shell beads of which over half were olivella but only four were dentalium (Largaespada 2006:19). None of the dentalium was incised. Other dentalium in the Great Basin bordering on the Plateau are rare with Bonnichsen (1964:32) the only published source noted in southern Idaho.

The article by Clark (1963), in spite of having the Hidatsa and Gros Ventre speaking Salish in "Dakota Territory," presents good descriptions and illustrations of dentalium procurement equipment. For additional illustrations of shells and procurement equipment, *see* Andrews (1989), Barton (1991:8–9), Underhill (1945:163), Weld (1963:7), and in color, Nuytten (1993). For details on the antiquity of dentalium use, *see* Erlandson et al. (2001).

The term "dentalium" seems to be the preferred term in all situations for malacologists and others studying the animal while anthropologists, especially archaeologists, tend to use the correct Latin forms dentalium for the singular and dentalia for the plural. Of course, for the genus the correct form is *Dentalium*, always capitalized and italicized. The 11th edition of the *Merriam-Webster Collegiate Dictionary* (Mish 2003:333) continues the listing of dentalium with the plural form dentalia. For the benefit of copy editors and the sake of uniformity, the term dentalium will be used exclusively here but the arbitrary statement by Andrews (1989:14) based on one personal communication—"References referring to 'dentalia' in a plural sense are incorrect"—is rejected. Appending the word shell to dentalium, as in the title of this article, is considered redundant by some authorities.

The segmenting and decorating by incising or engraving of dentalium has not been adequately discussed in the literature of the Northwest, neither coastal nor interior. The present discussion will examine the distribution of sites in the Plateau containing shells with these unusual modifications. The important work of Hayden and Schulting (1997:53, 57, 65) makes such a task vastly easier because of their fairly complete listing of sites with incised dentalium. While the

Asotin site is listed as having dentalium, they missed it as having the incised styles. Caution should also be used when locating sites from their map. One interesting fact derived from this work is that all of the incised dentalium they list are from disposals (burials and cremations), a trait also true of Andrews' (1989) listing with the exception of one bead which, according to Andrews, was found by Greengo (1982) in a house excavation. Several other sources such as Osborne (1957) were not instructive as to usage.

The thesis by Andrews (1989) presents extensive information on the distribution of incised dentalium on the Northwest Coast but suffers major deficits for the Plateau. She has created a new cultural area from a physiographic region—the Okanogan Highlands—without a definition and no known previous use of the term in archaeology. Also, for unknown reasons, there is no mention of the extensive use of incised and unincised dentalium on the lower Snake River, yet southern Idaho and the area beyond is included in the discussion. Numerous publications and graduate studies from the lower Snake can be found prior to 1989, including the distribution notations of Erickson (1983).

In spite of these deficiencies, Andrews has a fairly thorough listing of dentalium excavated in the Plateau except those areas just mentioned. In her Table 3, notation is generally made of incised dentalium but numbers are not always available (Andrews 1989:77–84). Where figures are available, of a total of 7,978 beads, only 104 (15 from the Great Basin and California deleted) or 1.3% are incised. The actual number of incised specimens is probably much lower partially because each fragment of a broken incised shell is counted as one bead. For example, the original description of the seven count of Bonnichsen (1964:32) is possibly one and no more than three. Further research seeking more exact figures and comparing the Plateau to the Northwest Coast might yield significant data on incising and segmenting in the two areas. As noted above, only one of the 104 incised specimens was not located in a disposal area (0.96%).

Any study of distribution or statistical manipulation of dentalium data from the Plateau must await the analysis of the numerous minor reports sequestered in the British Columbia Heritage Conservation Branch, Victoria. Some of these reports are virtually impossible to obtain outside of Victoria except for those in a few repositories in microfiche format.

The work at the Asotin burial site (45-AS-9) near Clarkston, Washington (Sprague 1959), made it clear that four cultural forms of dentalium can be found: 1) whole, unincised dentalium (Asotin Type 46) which can be used in an unmodified state since they are naturally open at both ends; 2) whole, incised dentalium (Asotin Type 47) (Figs. 1–3, 5, 6a–b); 3) segmented, unincised (Asotin Type 48); and 4) the rare segmented, incised dentalium (Asotin Type 49) (Figs. 4, 6c). The Asotin burial site is especially significant to the study of Plateau dentalium not only because it contains all four types but because these beads are associated with historic grave goods with comparatively accurate dates, and the burials in the site represent the first and still basic chronology of the Plateau Burial Complex (Sprague 1959, 1967, 1971).

One major problem in the analysis of these bead types is the confusion in the writing of some researchers between broken (accidental) and segmented (intentional) dentalium, neither of which are complete shells. This problem is especially acute in the case of archaeological examples excavated from acidic soil. In every case where segmenting was found on recent samples, the bead still retained the hard shiny surface in contrast to the soft, chalky surface resulting from long burial. This difference is also useful in determining the unethical or even illegal use of archaeological (chalky) beads in modern jewelry reputed to be from ethnographic sources.

In the Plateau, whole beads do not appear to have served as actual money or for the accumulation of wealth as they often did on the Northwest Coast and clearly did in parts of northern California, but rather were more for ornamentation (Spinden 1908:220). Largaespada (2006:6–7), in a brief summary of ethnographic uses of dentalium in the Fort Rock Basin of south-central Oregon, similarly found decorative use preferred over a monetary use. The coast area preferred whole beads while the interior seemed to readily utilize, if not actually desire, the segments. This preference also affected the actual value of the beads as the whole shells were more highly valued closer to the source where the class structure was well developed. In the Plateau the segments were accepted because they were more practical for decoration and their monetary value was of less concern in the more egalitarian interior. It is not known which form was more valued among the Nez Perce at the time of the Asotin burials, but the presence of both is worthy of note. Hayden and Schulting (1997), among others, suggest we need to review the generally held view of the egalitarian Plateau culture. This challenge has recently been met, in part, by Quinn (2006).

The incised lines on the dentalium show a high degree of control in the use of stone tools to make these decorations. The frequency of incising during the late prehistoric, protohistoric, and historic periods suggests that this was a stone tool process that became lost rather than increasing with the introduction of iron and, later, steel tools for reasons we shall see. The patterns are ones typical of the Plateau as found on bone and other materials, even including

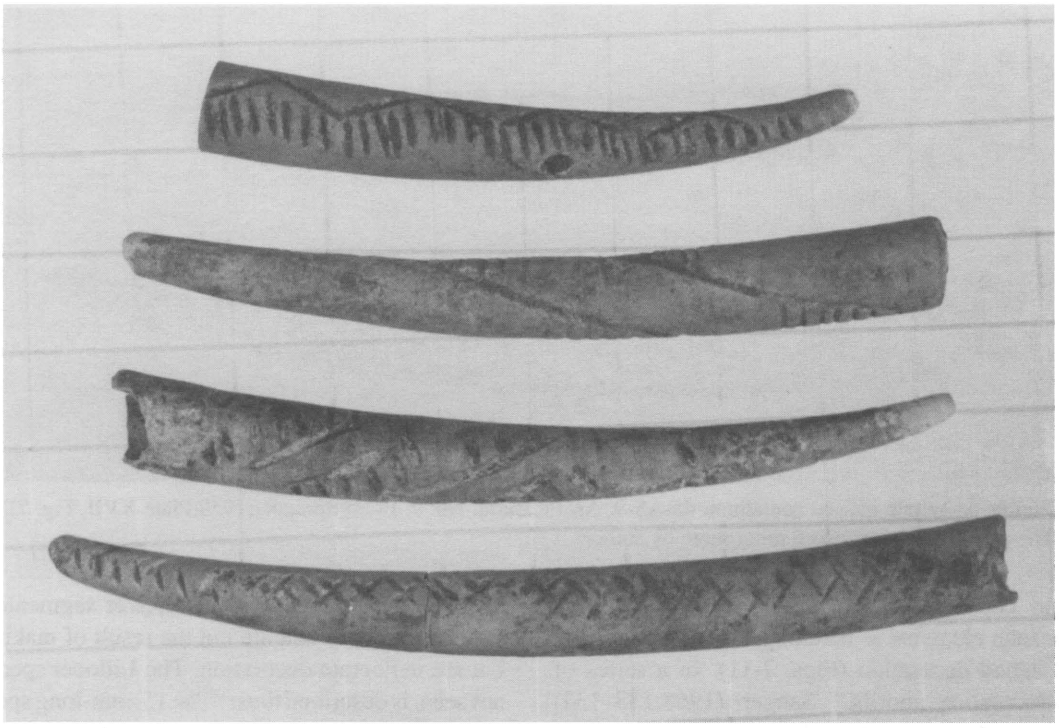

Figure 1. Whole incised dentalium, 45-AS-9, Asotin Burial No. 21. From Sprague (1959:Plate XVII, Fig. 1). The grid squares measure 5 mm (photo by author).

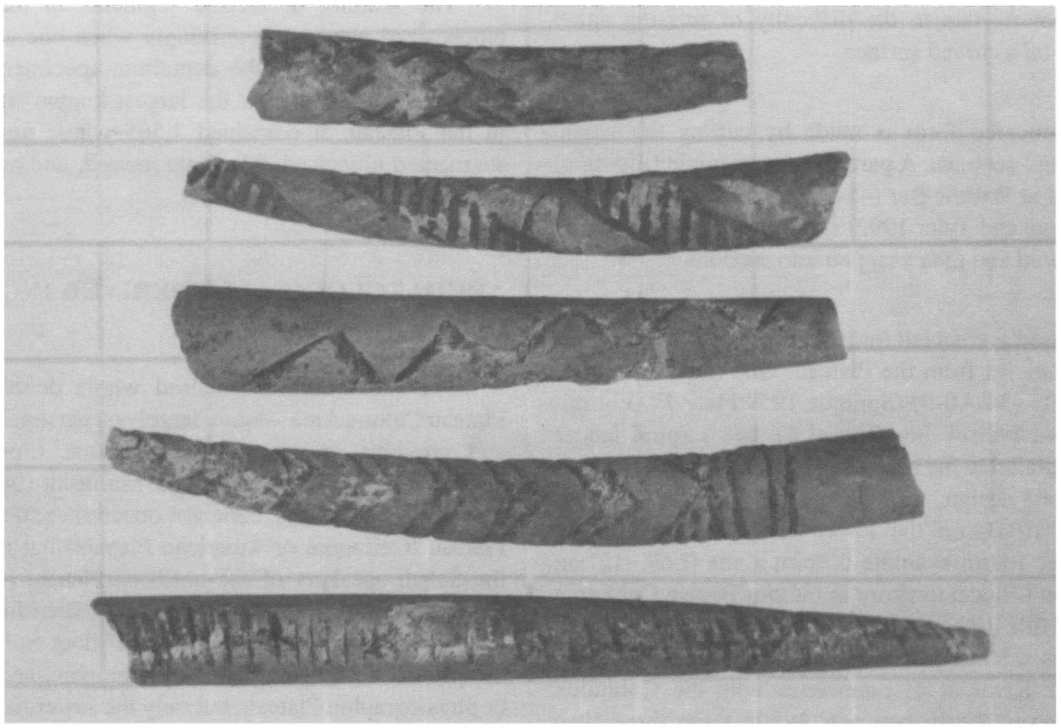

Figure 2. Whole incised dentalium, 45-AS-9, Asotin Burial No. 22. From Sprague (1959:Plate XVII, Fig. 2). The grid squares measure 5 mm (photo by author).

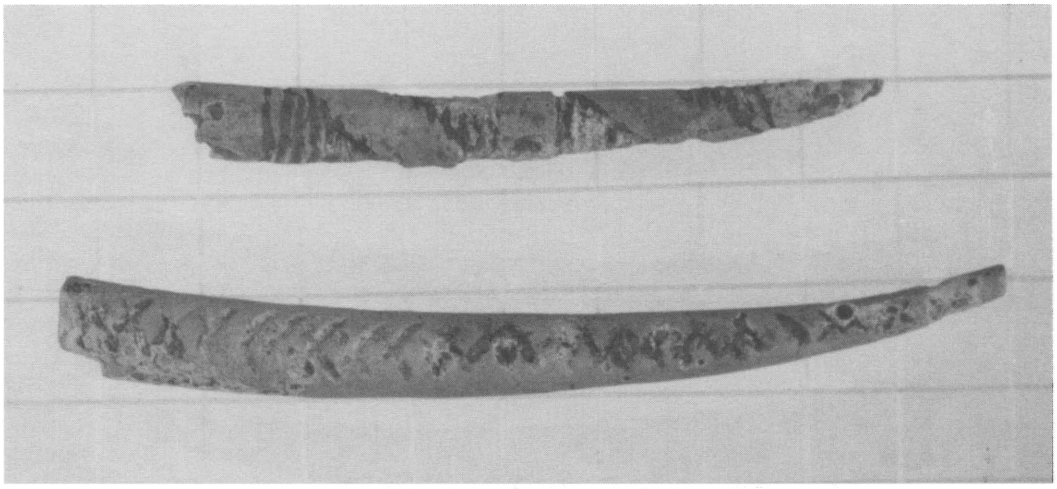

Figure 3. Whole incised dentalium, 45-AS-9, Asotin Burial No. 9. From Sprague (1959:Plate XVII, Fig. 7). The grid squares measure 5 mm (photo by author).

historic-period copper, that lend themselves to incising. They include such elements as hatching, zigzags, chevrons, ladders, and zoned decoration (Figs. 7-11). In a series of "geometric decoration motifs," Sanger (1968:133–134) labels the ladder design as "ticked lines." The surprising thing about Sanger's "Northern Plateau Design Elements" is how little they resemble the dentalium patterns. The circle and dot, a frequent and widely distributed Plateau element, is noticeably absent from the catalogue of incised dentalium designs, probably due to the difficulty of incising small curved lines on a curved surface.

The segmented form is made by cutting the whole shell into small sections. A partially cut example (Fig. 6, c) from a burial at Willow Bar (45-GA-2) on the lower Snake River (Sprague and Tyler 1992) shows how the shells were probably scored and then snapped into sections.

The incised segmented form is quite rare with only four recorded examples from the Plateau. One (Fig. 4) is from the Asotin site (34-AS-9) (Sprague 1959:Plate 17, Fig. 5). Another, from Willow Bar (Burial 4), has a spiral ladder with rungs parallel to the base (Fig. 6, c). The third one, with an undescribed design, was with Burial 39 at the Lawyer site (45-WT-101B) on the lower Snake River (Sprague 1978:31). The fourth example is from a site (EdRl-12) on Seton Lake in Lillooet territory in interior British Columbia (Stryd and Hills 1972). Asotin is at River Mile 146 and Willow Bar is at River Mile 86 as measured from the mouth of the Snake River at its confluence with the Columbia with the Lawyer site in between. While these three sites are located within a 60-mile stretch of the river, the British Columbia site is hundreds of miles to the north.

The designs on the Snake River segmented examples encircle the shell and are not the result of making segments but are deliberate decoration. The Lillooet specimen, while not seen, is described thus: "The 15-mm-long specimen is cut and ground at one end. The medial section is decorated by a single line continuously incised around the circumference of the shell to form a 9-mm-long spiral" (Stryd and Hills 1972:205).

The scarcity of incised segments in the Plateau is emphasized even more strikingly when one considers the relative frequency of the dentalium specimens recovered from the Pot Holes site, the largest known site collection in the Plateau. It contained 1,565 whole unincised, 632 segmented unincised, 83 whole incised, and no segmented incised (Crabtree 1957:97–98).

ARCHAEOLOGICALLY DERIVED INCISED DENTALIUM SOURCES

The distribution of incised whole dentalium in the Plateau Culture Area—based largely on personal observation and previous reviews of the literature (Sprague 1959, 1967, 1971, 1978; Sprague and Mulinski 1980)—reveals a pattern of relatively common occurrence in the southern Plateau (Columbia or American Plateau) but rarity among the Salish speakers of the northern Plateau (Canadian or Fraser Plateau). In spite of recent and increasingly frequent misuse, the term "Columbia Plateau" does ***not***—now or in the past—refer to the whole ethnographic, archaeological, or physiographic Plateau, but only the lower half.

Large-format illustrations of incised dentalium from the Asotin site are reproduced here from Sprague (1959).

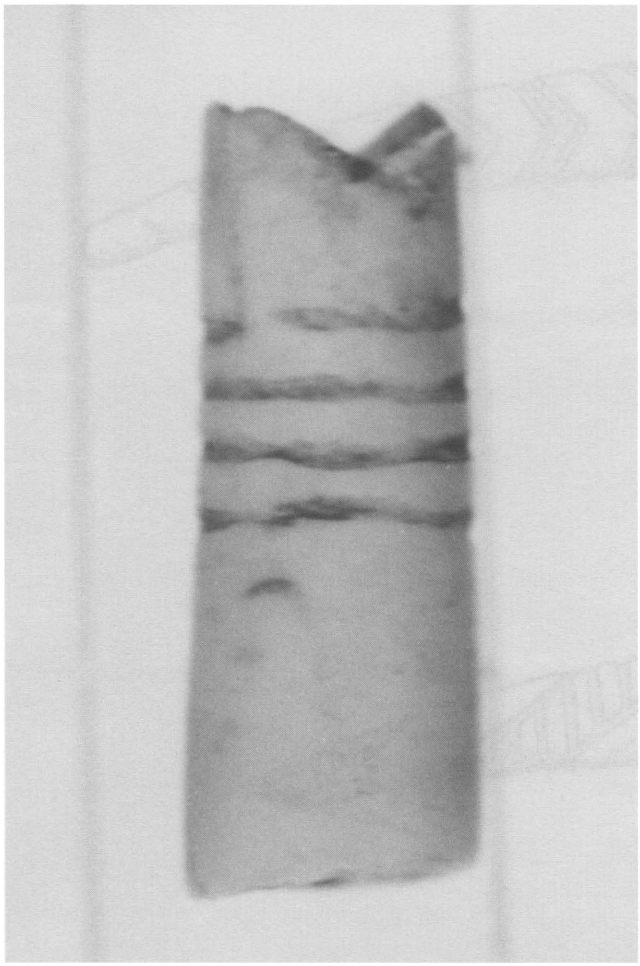

Figure 4. Segmented incised dentalium, 45-AS-9, Asotin Burial No. 15. From Sprague (1959:Plate XVII, Fig. 5). The grid squares measure 5 mm.

Other published illustrations of examples from the southern Columbia Plateau area include the Tucannon site on the left bank of the Snake River a few miles upriver from the Palus site at the confluence of the Palouse and Snake rivers (Iverson 1977:29, 32, Fig. 25); Berrians Island in the McNary Reservoir of the middle Columbia (Osborne 1957:Plate 24b; Shiner 1961:Plate 45); the Yakama (formerly Yakima) territory (Fig. 7, b) (Smith 1910:126, Figs. 117–118); the Pot Holes area, with its typology, in central Washington (Fig. 8) (Crabtree 1957:97–98, Plate 27); and the White Bluffs region on the Columbia River in central Washington (Krieger 1928:137, Fig. 162).

In the northern portion of the Columbia Plateau the published illustrations include the Freeland site on the upper Columbia River (Sprague and Birkby 1970:13, Fig. 7). Illustrated examples even further north, within the Canadian Plateau, include Kamloops (Fig. 7, a) (Smith 1900:431, Fig. 379). The published illustrations in Sprague and Birkby (1970) and Iverson (1977) were all so poor in quality that the original negatives had to be obtained for meaningful comparisons. Photographs in the *Bureau of American Ethnology, Bulletin* series (Osborne 1957; Shiner 1961), were not useful even when the original negatives were examined.

Other references to incised dentalium without illustrations include several on the Snake River upriver (south) of Lewiston, Idaho, across the river from the Asotin site (45-AS-9) and extending down (north) both sides of the Snake River. The Upper Tammany site (10-NP-109) was a badly looted, protohistoric site. Burial No. 12 contained two dentalia, both incised. Burial No. 14, one of the few with integrity, contained 17 dentalium, one of which was incised (Sprague 1978:5).

The Lower (Upper and Lower are based on local topography, not the Snake River) Tammany site (10-NP-110) contained numerous disturbed late prehistoric or protohistoric burials, 45 of which had dentalium in association. The number of dentalium per burial was generally one; however, one burial had 105 with others containing 85, 81, and 61. Seven specimens were incised and divided among four burials. These were Burial No. 16 with two incised, Burials No. 31 and 32 with one incised each, and Burial No. 36 with three incised (Sprague 1978:8–11).

The Asotin burial site (45-AS-9) was dug in 1956 (Sprague 1959) and served as the basis for a Master's thesis. A second phase was excavated in 1972 and has not been fully published. Burial 26 in Area No. 2 had four incised dentalium: one with an incised ladder, straight on one side and zig-zag on the other; one with a ladder without sides with occasional diagonal connectors; and two with zig-zag ladders, sometimes with sides and sometimes without. The Area No. 2 burials were all late prehistoric, or more likely, protohistoric.

The dating of dentalium by historic artifacts at Asotin is less than rewarding in spite of the occurrence of several well-dated artifacts in Area No. 1, as shown in Table 1. The frequency of dentalium at Asotin with such a tightly dated group of artifacts would suggest that the use of dentalium as grave goods lasted well into the historic period and has a strong and well known ethnographic usage, especially on women's dresses (Sprague 1959).

The burials numbered 9 and 10 are the only ones with *terminus post quem* dates and also containing dentalium, and only Burial 9 had incised specimens. Unfortunately, Burial 9 was badly disturbed but the association is reasonably secure. It was oriented east, extended, and apparently contained only buttons as well-dated historic grave goods. Based on

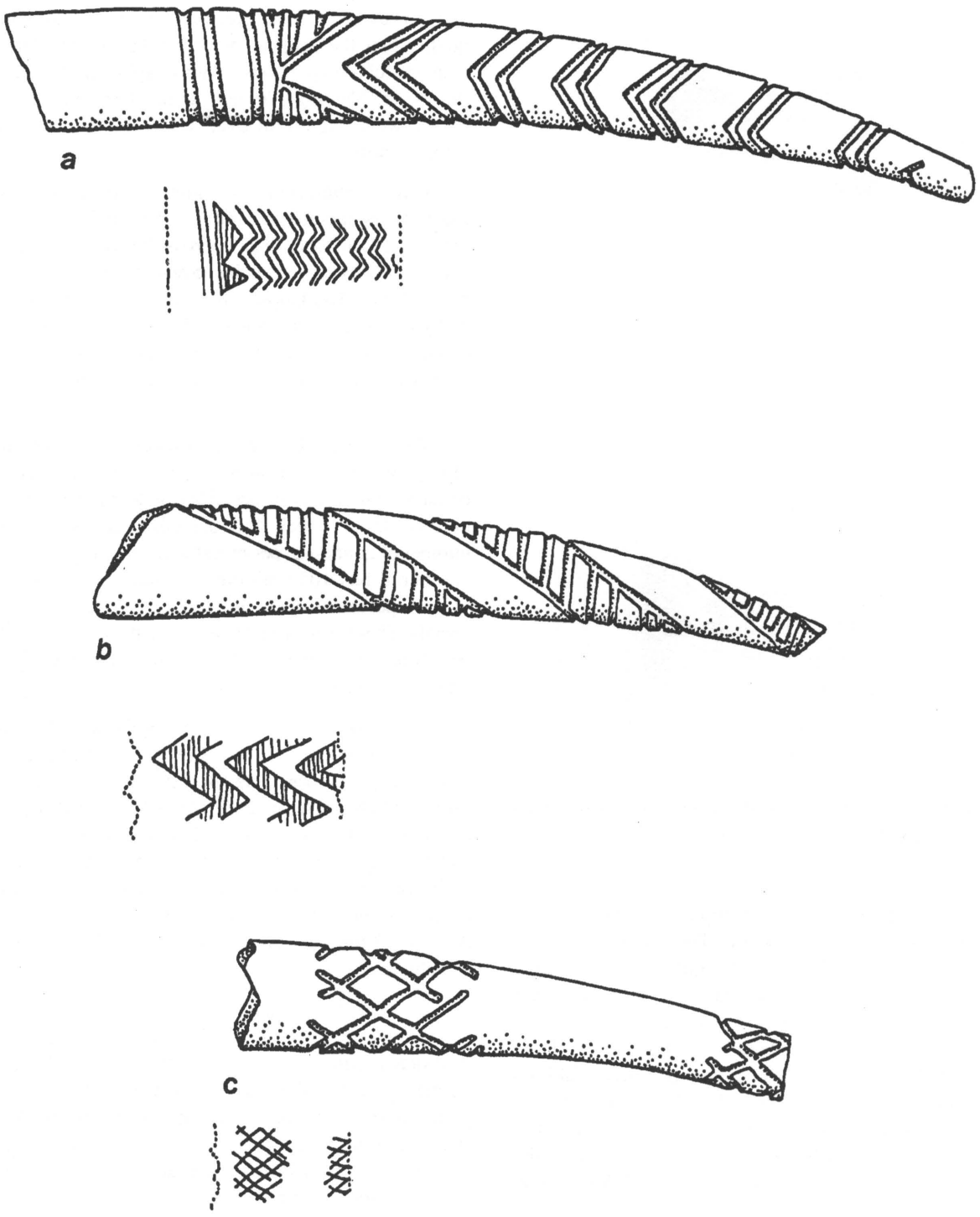

Figure 5. Whole incised dentalium, 45-AS-9, Asotin Burial No. 22: a, 36 mm long; b, 30 mm long; c, 22 mm long (drawing: Catrin Riggs).

previous work in the area (Sprague 1959), this series of traits suggests an early historic non-Christian burial. The Prosser button date of 1840 (Sprague 2002) thus appears to be too late for the date suggested by the series of burial traits.

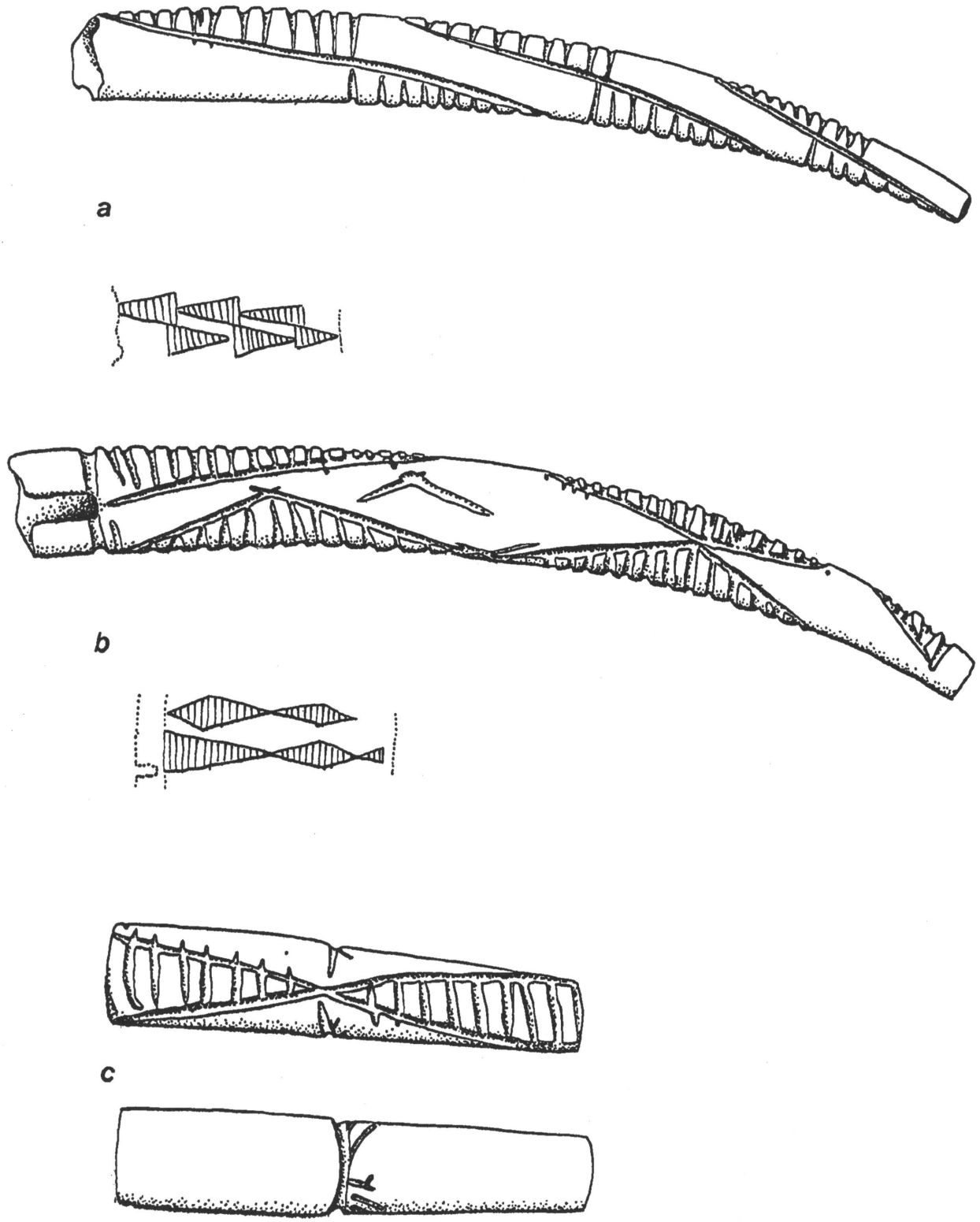

Figure 6. Incised dentalium, 45-AS-9: a, Asotin Burial No. 21, 36 mm long; b, 45-AS-9, Asotin Burial No. 21, 40 mm long; c, 45-GA-2, Willow Bar showing segmenting process, 19 mm long (drawing: Catrin Riggs).

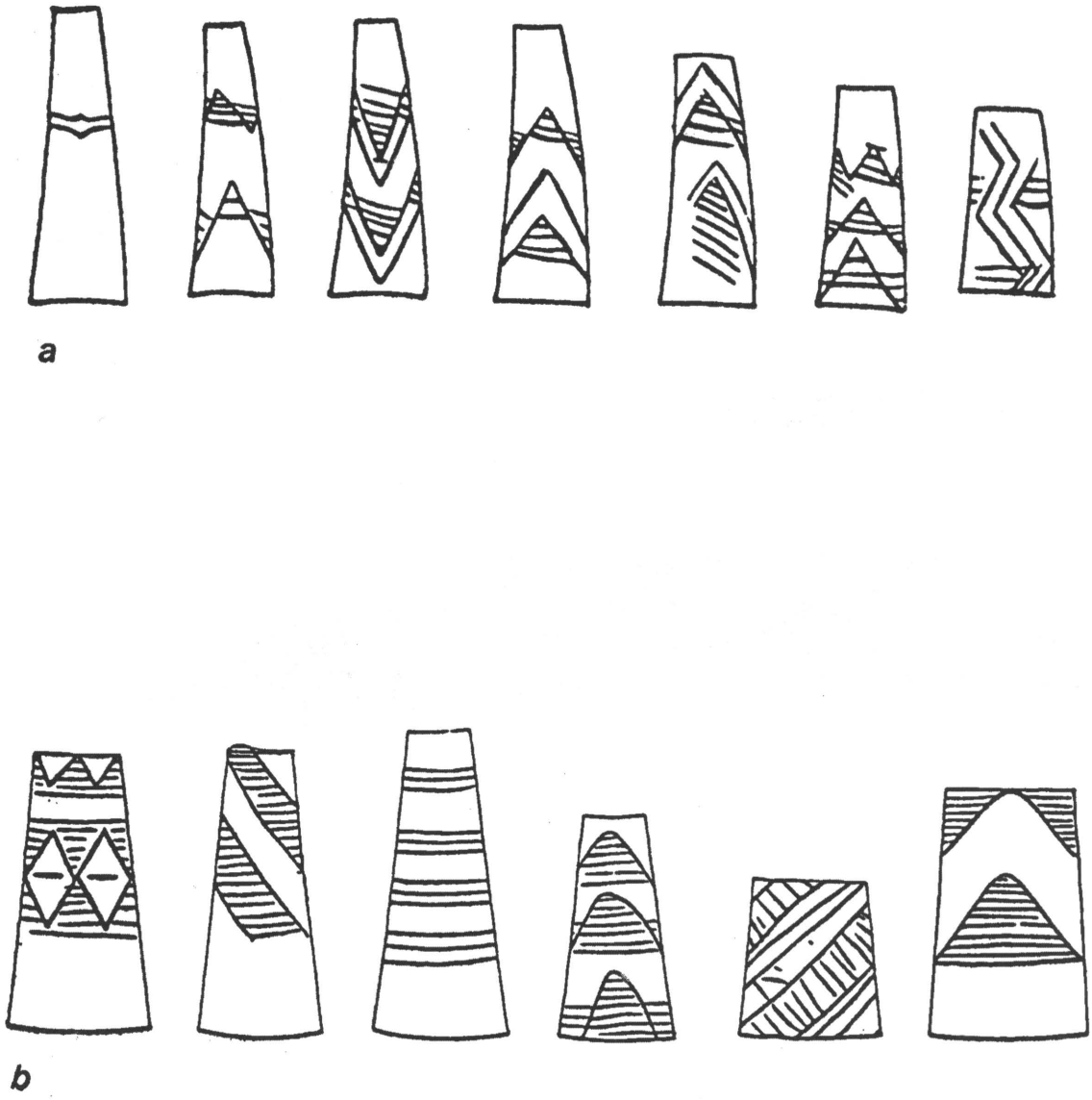

Figure 7. Incised dentalium: a, Kamloops area, after Smith (1900:Fig. 379); b, Yakama area, after Smith (1910:Figs. 117–118) (drawing: Catrin Riggs).

Burial 10 had the greatest number of associated artifacts of any burial excavated professionally at Asotin. The date derived from the associated hawk bell again seems later than the semi-flexed nature and easterly orientation of the burial would suggest. The sprinkling of segmented dentalium in the grave fill has been assumed to be an early trait but this burial would indicate otherwise.

The Lawyer site (45-WT-101B) was excavated on two different occasions. The first phase included several burials with often just one to three dentalium beads (Burials 3, 5, 6, 11, 22, and 33). Burial 34 contained four whole and eight segments and Burial 34A produced four whole ones, one of which was incised "with a zig-zag line, the side of which is intersected by horizontal lines about 1 mm apart" (Rodeffer, Rodeffer, and Sprague 1972:40). This same pattern was found on three of four incised shells in Burial 27. The full description of the dentalium in this burial reads:

> Six dentalia rested on the forward portion of the frontal bone, and one on either side of the skull, slightly above the sphenoid. In addition, twelve fragments were found in association with the upper torso and skull, and two dentalia were recovered from the fill above the burial. Four of the dentalia from the frontal area were decorated with two

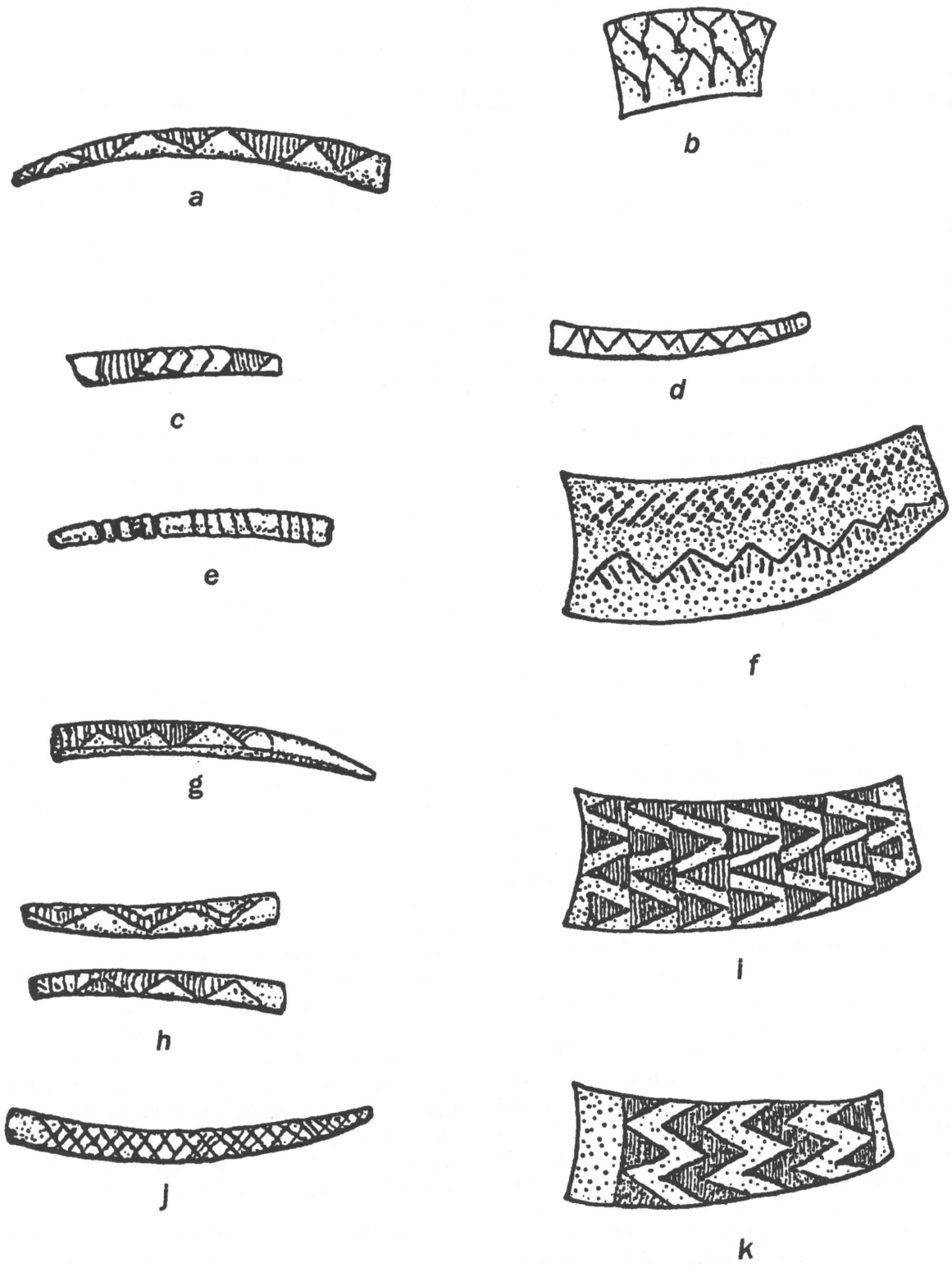

Figure 8. Incised dentalium designs after Crabtree (1957:Plate 27): a, Type 3; b, Type 4; c, Type 2; d, Type 8; e, Type 9; f, Type 5; g, Type 3; h - top, Type 6; h - bottom, Type 3; i, Type 1; j, Type 5; k, Type 7. The arrangement of dentalium and the identification letters are as originally presented in Crabtree. Not to scale (drawing: Catrin Riggs).

Table 1. Dated Artifacts Associated with Burials from 45-AS-9.

Burial	Item	Date	Source of Date	Dentalium		
				Whole	Incised	Segment
8	Hard rubber	1839	Greeley 1872:974–975			
9	Prosser button	1841	Sprague 2002	3	2	
10	Hawk bell	1853	Weatherford 1980:30–31			13
	Token	1856	Sprague 1959:20			
	Bell	1863	Weatherford 1980:33–34			
11	Bell	1863	Weatherford 1980:33–34			
17	Bell	1863	Weatherford 1980:33–34			

different incised patterns. The first, found only on one specimen, was formed by three incisions, spaced not more than 2 mm apart, encircling the shell on the proximal end. The second pattern, represented on three shells, consisted of a vertical zig-zag line, one side of which was intersected by incised horizontal lines spaced 1 mm apart. The latter pattern normally extended the length of the shell (Rodeffer, Rodeffer, and Sprague 1972:37).

For an illustration of this common design element in Nez Perce territory *see* the uppermost example in Fig.1.

The second phase of the Lawyer site (45-WT-101B) uncovered 10 additional protohistoric burials (Nos. 36–45) including four with dentalium (Burials 38, 39, 42, and 44). Included were 18 whole and 62 segmented (Sprague 1978:29-32). One of the rare incised segmented dentalium is recorded as being from Burial 39 but no further details are available (Sprague 1978:31).

The Alpaweyma site (45-AS-81), an historic period Nez Perce village at the mouth of Alpowa (a corruption of Alpaweyma) Creek with strong Christian influence, had a burial area (45-AS-81B) that was badly potted just prior to archaeological recovery for reburial (Rodeffer, Rodeffer, and Sprague 1972:48). Only one burial (Burial 86), contained dentalium—18 whole and 18 fragmented—out of a total of slightly less than 100 burials. The presence of a "sacred package" (containing a sucking tube [a shaman's tool], eagle claws, and a serpent side plate from a Northwest gun among other artifacts) and an easterly orientation (Rodeffer, Rodeffer, and Sprague 1972:112–114) would indicate a person not strongly influenced by Christianity in a predominately Christian site. Most of the burials were contained in wooden boxes or coffins and had a high degree of Christian influence as indicated by westerly orientation and the artifacts. The lack of dentalium in all but one of these late burials perhaps indicates Christian influence against the use of native ornamentation, or perhaps the breakdown of the native trading system, or most likely, both.

An infant burial (Burial No. 6) out of a total of 13 burials at the Alpowa Creek site near the Alpaweyma site had one dentalium in association (Roll 1971:15-16). This site is unquestionably Christian thus adding further evidence to the above conclusion.

The Nisqually John Canyon Talus burial site (45-WT-65B), approximately opposite Alpowa on the east side of the Snake River, was a very early contact site with unique glass trade beads also found at early fur trade period Spokane House (1810-1813) (Sprague 1967:113). Burial 6 contained 20 segmented dentalium but no incised examples (Rodeffer, Rodeffer, and Sprague 1972:11).

Other late prehistoric to protohistoric sites containing unincised dentalium on the middle Snake River, from the Lewiston, Idaho, area and down-river, include: Tammany Talus (10-NP-131), Wilma Bar Silo (45-WT-99), Wilma Bar Bench (45-WT-102), Blyton Landing (45-WT-53B), Knoxway Canyon (45-GA-110), and Wawawai (45-WT-47B) (Rodeffer, Rodeffer, and Sprague 1972). Other sites in the lower Snake River with dentalium included Steptoe Canyon (45-AS-2) (Daugherty and Dammel 1952; Rodeffer 1973). It appears from these sites that segmented dentalium was heavily traded into Nez Perce territory slightly earlier during the late prehistoric than was whole dentalium.

The Willow Bar site (45-GA-2), in addition to the rare incised segment and the only known partially segmented example, had one whole decorated shell with cross-hatching in three segments followed by blank spaces in both directions.

The recovery of dentalium at the Tucannon burial site (45-CO-1B) (Iverson 1977:29-31) opposite the mouth of the Palouse River cannot be considered a valid statistical sample because the site was so severely potted. It yielded 27 whole and 142 segmented dentalium. Four whole beads were incised; two with the typical spiral ladder and two so corroded that the design was unrecognizable.

The middle Snake River burial sites below Asotin Creek and above the Palouse River seem to indicate a dentalium sequence of late prehistoric trading of segmented shells and a slightly later influx of whole dentalia. Incised designs appear to be exclusively placed on fresh, whole shells. With missionary influence and the destruction of the trading systems, the use of dentalium in burials seems to have been replaced by glass trade beads and whole shells were used almost exclusively as ornaments by women on clothing, mostly dresses, and as earbobs and necklaces. This pattern was followed even in spite of nativistic religious dominance at the Palus site near the confluence of the Palouse and Snake rivers where a fully historic cemetery containing 249 individuals had only 12 burials (5%) with dentalium, none of which was incised nor sprinkled in the grave fill (Sprague 1965).

This survey now moves from the Snake River to the far north portion of the Plateau and proceeds south generally following the Fraser and Columbia rivers. North of Lillooet on the Fraser River, Stryd and Hills (1972:205) report that:

> One cut and incised piece of dentalium was collected from the wind blown sands of EeRl-1. The 15-mm-long specimen is cut and ground at one end. The medial section is decorated by a single line continuously incised around the circumference of the shell to form a 9-mm-long spiral.

Site EdRk-7, between Lillooet and Lytton on the Fraser River, produced four undecorated dentalium but "one may have been shortened by scoring and snapping" (Sanger 1970:101). On the Nicola River between Merritt and Spences Bridge, Burial EaRg-2 was recorded with two references to "fragments of incised dentalia beads" (Lawhead 1979). It is assumed that these were fragments of whole incised shells.

Teit (1900:336) described a multiple-grave site at Spuzzum, British Columbia, on the Fraser River north of Hope. It was probably protohistoric in date, with dentalium present. It was found and moved by the Thompson people themselves. Smith (1900:431, Fig. 379) illustrates a series of designs on dentalium recovered from a grave (Fig. 7, a) near Kamloops, British Columbia, on the Southern Fraser River. Smith's perspective of shell shape is distorted.

Burial site EeQw-6, near Chase, British Columbia, on the South Thompson River, contained eight dentalium of which only one was incised (Johnson-Fladmark 1973). No illustration is available.

Barlee (1969a), apparently an amateur archaeologist, reported a potted burial site in Similkameen territory that still contained artifacts including dentalium, blue glass trade beads, and rolled copper beads. One necklace included "135 pieces of dentalia." Some shells from a cremation were incised. It is not clear if this cremation is the same or a different disposal. A crude sketch shows patterns not found at any other Plateau site and are suspect. The same author (Barlee 1969b) reported a burial near Grand Forks, British Columbia, within the Columbia River drainage, with only prehistoric artifacts including "1,742 pieces of dentalia (7 only incised or decorated)." None is described and the difference, if any, between incised and decorated is not explained.

The ethnographic Salish territory of the upper Columbia region—Sanpoil, Nespelem, Colville, Lakes, and Spokan—was surveyed prior to the flooding of Franklin D. Roosevelt Reservoir behind Grand Coulee Dam where numerous dentalium were found and reported (Collier, Hudson, and Ford 1942:92–93). They list an estimated total of 1,140 whole shells and 4,150 segments. Seven whole shells are listed as "incised with transverse lines" but unfortunately none is illustrated. Dentalium were also found in the same area during additional salvage in the late 1960s (Sprague and Birkby1970:13). In this source, Burial 7 at 45-FE-1 is described as having "two carved dentalia segments." If true, and Sprague doubts his own terminology, this would almost double the number of engraved segments recovered in the Plateau. These examples have yet to be located in the Colville Tribal storage facility.

The territory to the south and west of the Lake Roosevelt Region produced very little in the way of incised dentalium, probably because the excavation of burials in that area has not been nearly as extensive as in the surrounding areas. Ironically this was the location of the single incised dentalium found in a house excavation by Greengo (1982).

In Yakama territory, Smith (1910:126, Fig. 117) reported four incised dentalium (Fig. 7, b) from the Tampico burial site. Another three samples came from a cremation pit at the confluence of the Naches and Yakima rivers (Smith 1910:126, Fig. 118).

On the middle Columbia near White Bluffs in what today is within the Hanford Atomic Reservation, Herbert W. Krieger (1928:137, Fig. 162) excavated a series of burials from the late prehistoric. While not described, he does illustrate some examples of "engraved dentalium shells" with typical spiral ladders and hachured triangles.

On the Columbia in the Tri-Cities (Pasco-Kennewick-Richland) area, and down river from the confluence of the Snake and Columbia rivers, there is a gap in our burial data because the evidence here has been very poorly recorded and virtually none of the work in this region has been adequately published. Further down river in the McNary Reservoir the work of Osborne (1957) produced a large number of shells totaling 210 of which 142 were associated with burials and 29 were incised. No indication is given of the designs except that they "are either rows of zigzag lines or single zigzags carrying short hachures perpendicular to the midline of the zigzag." The photographs are so poor as to be of no help (Osborne 1957:108, Plate 24). In contrast to the situation on the lower Snake River, Osborne (1957:108) notes that "There was extensive association of all shells with articles of white manufacture." Based on the proposed reduction of dentalium on the Snake River in the historic period, here we may be seeing less missionary influence (especially in the post-Whitman missionary period) and a greater retention of the shorter trade networks.

Shiner (1961:215) reported dentalium in burials at Berrian's Island (45-BN-3) approximately five miles upstream from McNary Dam with the "astounding" information that "*Dentalium* sp. was strung whole or cut into sections, and some of the shells were incised." Plate 45 tells even less.

Dumond and Minor (1983:184) report incised dentalium from the Wildcat Canyon site in the John Day Reservoir but due to the handicap of excavation prior to their involvement, no descriptions or illustrations were available to them. Strong, Schenck, and Steward (1930:72) state that dentalium "constituted more than half of all the shell artifacts" in The Dalles-Deschutes region, yet no mention is made of incised ones. Incised dentalium illustrated by Emory Strong (1959:196) are from the Buehler collection hence are undoubtedly from the lower Columbia from The Dalles down river to the Portland, Oregon, area. The Oregon Archaeological Society publication, *Screenings* (Buehler1956:1), at a time when it was strictly an amateur effort, has crude and questionable drawings of 11 incised whole dentalium, all with incised ladders spiraling down the shells.

THE POT HOLES TYPOLOGY

The only attempt at a classification of incised dentalium designs is found in the little-known and -used thesis from the University of Washington by Robert Crabtree (1957:98–99) which is based on a cache removed by an amateur. It is also reproduced in the original chart form by Andrews (1989:49). Crabtree's classification is reproduced below with those comments pertaining specifically to the Pot Holes collection (named for a geological land form, not for amateur despoliation). The number in brackets represents the sample size for a total of 81 (or 83) specimens. Crabtree's types included:

Type 1. A series of triangles on each side of the shell, on one side the apex points toward the small end of the shell and on the other side points away. Each triangle is filled in with horizontal lines. The design is on the large half of the shell. [2] [Fig. 8, i - flat perspective].

Type 2. A series of encircling chevrons, the top one (at the smaller end) and the bottom one being filled with horizontal hachure. The chevrons are based on an encircling triangle, also with horizontal hachure. The apex of the triangle is toward the smaller end. This design includes approximately three-fourths of this one shell. [1] [Fig. 8, c].

Type 3. A zigzag line with perpendicular hachure, generally on both sides of the shell. [65] [The most common (80%) design in the Pot Holes collection; Fig. 8, a, g, h - lower].

Type 4. This design consisted of a series of converging lines. [3] [Crabtree recommends seeing the drawing; Fig. 8, b - flat perspective].

Type 5. This is a criss-cross design which runs the length of the shell, on both sides, usually. [5] [Fig. 8, f - flat perspective, j].

Type 6. A double zigzag line with vertical hachure in between. [1] [Half of the other side is Type 3; Fig. 8, h].

Type 7. A series of encircling zigzag bands filled with horizontal hachure. This design is completely around the piece. [2] [Fig. 8, k - flat perspective].

Type 8: A series of acute angles running the length of one side of the shell, and terminating in several horizontal lines. Some of the angles are connected to form a type of zigzag line, the reverse is a series of horizontal dashes forming a zigzag line. [1] [Fig. 8, d].

Type 9. This consists of three bands of four or five rings around the shell. [1] [Fig. 8, e].

Type 10. A variant of the parallel zigzag line design. It is similar to Type 9. [1] [Not illustrated].

ETHNOGRAPHIC DENTALIUM DESIGNS AND USAGE

Comparative ethnographic examples from the Plateau reveal a dearth of examples of incised dentalium. No examination of museum specimens of dentalium on clothing or included in jewelry such as necklaces, bracelets, ear bobs, and nose piercing has been conducted to the author's knowledge. A review of Ray (1942:171–172) in the Culture Element Distributions series reveals its use in occasional nose decoration (far north), frequently in ear bobs but not ear pins (except Tenino and Chilcotin), and almost universally in necklaces (except Kutenai), but no mention of dentalium incising is made. Undecorated dentalium use was common among both Salish and Sahaptian speakers in the Columbia or American Plateau and Salish speakers in the Canadian or Fraser Plateau. Working from north to south and generally from early to late, the following very brief notes were gleaned from the ethnographic evidence regarding dentalium.

In the far north, the Sekani are described by Jenness (1937:32) as receiving dentalium by trade from the Carrier and coastal Gitksan. "They were worn both in the ears and noses."

The work of James A. Teit for Franz Boas and the Jesup North Pacific Expedition of the American Museum of Natural History includes much of the Salish territory. All of Teit's work must begin with his Thompson Indian study (Teit 1900). He mentions and illustrates the use of whole dentalium in women's head bands and for both sexes, necklaces and ear ornaments (Teit 1900:218, 222–223, Figs. 193, 195–196). Nose ornaments worn by women were made of two whole dentalium with "scalps of red-headed woodpeckers... in one or both ends" (Teit 1900:222, Fig. 197).

The Shuswap (Teit 1909:508–510) used dentalium for decorating clothing, ear bobs, necklaces, and ear ornaments (mostly for women) identical to the Thompson. Dentalium beads were common burial goods as among the Thompson (Teit 1909:592).

The Lillooet, like the Shuswap, varied little from the more detailed description of the Thompson in the use of dentalium for ornamenting caps, head bands, shirts, ears, and noses (Teit 1906:220). One important difference is that "dentalium-shells were sometimes notched around the edges or ornamented with incised lines." (Teit 1906:220). The notched form has not been recorded archaeologically nor seen in ethnographic museum collections. This is also the only ethnographic description of incising in the Plateau that was found in this survey.

For the more southerly Salish groups within the United States, Teit (1930) has even more abbreviated descriptions of dentalium use. In addition to ear ornaments, for the Coeur d'Alene he says "nose pins were used by many women and by some men." They were a single large dentalium shell or two shells fitting into each other (Teit 1930:82). Teit (1930:340) clearly states that no nose ornaments or nose pins were used by the Flathead and Pend d'Oreilles, and they were rare among the Kalispel and Spokan. Apparently a nose ornament is through the septum while a nose pin is horizontally through the lip just below the nose.

Among the Sinkaietk or Southern Okanogan (Okanagan—Canadian spelling), dentalium was used on women's dress fringe, as ear ornaments, and for nose pins and nose ornaments (Post and Commons 1938:45, 49; Teit 1930:236). For the Sanpoil and Nespelem, dentalium beads were used but "labrets and nose ornaments were not known" (Ray 1932:50–51). In spite of Ray's comments, the upper Columbia region including San Poil and Nespelem as well as Colville, Lakes, and Spokan territory was surveyed prior to the flooding of Franklin D. Roosevelt Reservoir behind Grand Coulee Dam, and numerous dentalium were found and reported in body locations suggestive of decoration in the head area (Collier, Hudson, and Ford 1942:92–93). Later archaeological research in the area provided further evidence of the use of dentalium as ear and nose ornaments in this portion of the Columbia River.

The Middle Columbia Salish, also known as the Moses-Columbia, are the most briefly described group by Teit (1928:117). Yet in addition to the mention of caps, shirts, and dresses he gives a concise description of the use of shells as follows:

> It seems that the Columbia Salish were noted for having an abundance of shell and other ornaments. Necklaces, pendants, ear-rings, nose-pins, hair-ornaments, and the like, were of shell. Dentalium and other ocean shells were common.

In support of Teit, the rich Pot Holes site is within the ethnographic Middle Columbia territory.

To the south of the Salish speakers, the Sahaptian (Nez Perce and Sahaptan) speakers represent an area of wider archaeological recovery of dentalium than the Salish but with fewer specific ethnographic data. Dress fringes and necklaces of dentalium have been observed on Yakama and Nez Perce museum materials, but none of the shells were incised.

Summarizing the various editions of Lewis and Clark, Sappington (1989:14–15) comes to the conclusion that the

Nez Perce used a single dentalium as a nose decoration. The early ethnographic authority for the Nez Perce, Herbert Spinden (1908:216), mentions only shell beads and no mention of nose ornaments. He does describe the use of dentalium in burials but this appears to be from archaeological observation rather than an ethnographic perspective (Spinden 1908:252). Teit (1930:340), when working with the Coeur d'Alene, noted that the nose ornament among the Nez Perce was "common." This may have been a Coeur d'Alene attempt to denigrate the Nez Perce as "bone-in-the-nose savages." This kind of rivalry between these neighboring tribes is still evident today and surely was when Teit was working there in 1909. A Plateau-wide ethnographic mention of nose decoration with dentalium and moderately frequent personal archaeological observations of one or two dentalium found in the nasal area of individuals buried along the lower Snake River strongly suggest that nose-piercing was a common trait that went out of fashion in the Plateau during the early historic period.

Gunkel (1978:298) describes the use of dentalium as money at Fort Wallawalla, among the Sahaptan speaking Wallawalla and Umatilla plus the Cayuse, but does not mention its use for body and clothing decoration. Stern (1998:413), however, shows dentalium-decorated women's dresses from approximately 1900 for these groups. According to Curtis (1911:159), the Yakama used dentalium ear ornaments and should be included among those who used nose ornaments of dentalium. The Klickitat also practiced nose piercing with "a long taper'd piece of Shell or beed put through the nose" (Moulton 1988[5]:318; Thwaites 1904–1905[3]:144).

Further down the Columbia River, the Wishram are described by Spier and Sapir (1930:207–208) as using dentalium, especially for ear bobs. Nose ornaments are not mentioned but are by Curtis (1911[7]:172) who said "the wearing of dentalium shell in the nasal septum were common to both sexes." Dentalium were especially important among the beads placed on a body at disposal in a burial shed (Spier and Sapir 1930:270).

According to Spier (1930:207), prior to contact, shell was not used on clothing by the Klamath but in the historic period, dentalium was used as an offering on cremations and as nose ornaments, ear ornaments, and necklaces. Ground dentalium was also used by both men and women as an aid to conception among the Klamath (Spier 1930:57, 139).

CONCLUSIONS

In spite of the Wishram being closer to the coast and living at the major trade center of the Plateau and its conjunction with the Northwest Coast, it is interesting that Spier and Sapir (1930:208) state that the source of dentalium for the Wishram is from California through the Klamath. Spier (1930:216) in his discussion of the Klamath questions the reliability of this information on direction of trade. To further confuse the source of trade via the Klamath, he says "Dentalium are not marked with incised designs, as among the Yurok" (Spier 1930:215). The lack of dentalium in the Fort Rock Basin also adds to the absence of strong evidence for trade from California through the Klamath to the Plateau (Largaespada 2006). The conclusion on the likely trade route of dentalium into the Plateau based on the present survey of incised examples tends to agree with Hayden and Schulting (1997:53) for trade along the Columbia and the Thompson and Fraser rivers rather than the earlier conclusion of trade from California. This study, however, shows a clustering of incised dentalium on the middle Columbia and the lower Snake region rather than the Deschutes to Yakima region of Hayden and Schulting (1997:53).

Curtis (1911[8]:72) cites 1845 as the terminal date for all nose ornaments among Salish groups below the Canadian border. The ethnographic evidence lists only one source for incised dentalium in the Plateau, the Lillooet, for whom Teit (1906:220) says, "dentalium-shells were sometimes notched around the edges or ornamented with incised lines." This scant evidence plus the lack of incised dentalium in historic period graves would seem to indicate that by the historic period, the incising of dentalium was largely a forgotten art form in the Plateau Culture Area. The fact that metal did not seem to improve on the stone incising may have played a part in this change.

The middle Snake River burial sites below Asotin and above Palus would seem to indicate a dentalium sequence of late prehistoric trading of segmented shells and a slightly later influx of whole dentalia. Incised designs were exclusively placed on fresh, whole shells. With the missionary influence and the destruction of the trading systems, the use of dentalia sprinkled in burials seems to have been replaced by glass trade beads. Whole dentalium became almost exclusively utilized by women on clothing, mostly dresses, and as ear bobs and necklaces.

The archaeological evidence in general—and especially at Asotin—shows that the dating of dentalium use is not clear and widely distributed over a long time period from the late prehistoric to the present with occasional earlier occurrences. The use of dentalium appears to be more prevalent in sites utilized by native religion practitioners rather than by Christians. The archaeological use of dentalium is virtually limited to burial sites in two distinct ways: 1) the ornamentation of the deceased, and 2) the sprinkling of shells, usually segmented, in burial fill or on

cremation hearths, apparently as offerings. The second use appears to have died out in the historic period, perhaps due to Christian influence or the loss of trade routes and sources. Not surprisingly, the frequency of use tends to be greater in those areas closer to the major trade routes with the notable exception of the Middle Columbia ethnographic region.

Valuable research is still possible on such factors as the distribution of specific design elements in time and space. Research by those trained in the art of the Plateau is also needed. More specific study of trade routes and the chronology of these routes would also be useful. The technology of dentalium engraving has not been studied even at the gross level, let alone microscopically. Since the source of virtually all incised dentalium is from burials, the timing of these suggested studies is urgent if not already past.

ACKNOWLEDGMENTS

Numerous people helped move this manuscript toward completion. Among them are Sharon Keen and Clarence F. Richie for finding references in Victoria; the Interlibrary Loan Office, University of Idaho Library with their usual friendly and extensive help; Mary Collins and Leah Lynn Largaespada for personal correspondence concerning specimen locations; Ray Tracy for determining river miles on the Snake River; J.S. Oliver on Latin usage; Linda F. Sprague, Karlis Karklins, Catherine Reiser, and Darby C. Stapp for much needed manuscript review; and Catrin Riggs for detailed drawings. Appreciation is expressed to the Nez Perce Tribal Executive Committee for permission to conduct the earlier studies upon which this report is based.

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BOOK AND DVD-VIDEO REVIEWS

Gem and Ornamental Materials of Organic Origin.

Maggie Campbell Pedersen. Elsevier Butterworth-Heinemann, Linacre House, Jordan Hill, Oxford OX2 8DP, UK, and 200 Wheeler Road, Burlington, MA 01803. 2004. i-xiv + 268 pp., 203 color figs., glossary, index. £35.00 (hard cover).

This is one in a series of technical books on specific gem materials, each written by an accredited specialist and FGA (Fellows of the Gemmological Association of Great Britain), and certainly a good reference book dealing with all the precious organic materials is a valuable addition to the series. It matches the other Butterworth Gem series books in size, hard-cover format, and price.

The majority of readers will probably be those who want to identify something they have in hand, and will consult a book like this to find the likeliest possibility. The book concentrates on materials valued highly in our western traditions rather than the common ones (such as seeds) so popular with less-developed cultures.

Maggie Campbell Pedersen is an experienced gemmologist as well as an excellent gem photographer, and treats the whole subject from a gemmologist's point of view. The book is much more readable and fun than some of the others in the series which concentrate on comparing physical and chemical data and geological statistics in order to identify stones. Organic materials are so varied and unique that identification has to be predominantly visual and, even so, the variations within one substance are enormous. Consequently, the book provides many clear objective photos and close-up details. The photos are numbered to reflect each chapter, which seems to match the system in the other books in the series. The materials are discussed in 13 chapters, and real and fake examples are dealt with under each heading.

The longest chapter is on Amber and Copal, which are both of particular interest to Maggie. She has visited numerous historic sources, researching these fossil resins in particular. There are a large number of good magnified images illustrating the many properties and variations of the substances, which are not easy to show when the materials may reflect light, transmit it, refract it, or even fluoresce. Amber inclusions, sunspangles, fractures, deterioration, and crazing on surfaces are all clearly shown.

Ivory, Bone, Antler, Rhino Horn, Horn, and Tortoiseshell each have a separate chapter. The rationale for this seems to be that the various common bone and horn-like substances divide into these categories by the composition of the material. Antler, though often called "deer horn" is in fact composed of the material of bone but contains more collagen, while rhino horn is composed of compacted hair fibers, so is correctly described as "keratin." Horn is mostly keratin as is Baleen, though the latter is discussed in the Miscellaneous chapter, where the reader will also find "Hornbill Ivory," yet another keratinous substance. The Ivory chapter includes tooth and tusk materials from elephants and other animals.

There are also chapters on Shell (which includes mother-of-pearl), Jet, Pearl, and Coral, while all the other substances she lists are found either in the Miscellaneous or Plastics chapters.

If your object is black, you may have to go through the alphabetical lists in the Jet chapter before you can determine that it might be "Bois Durci," though the only example of this is illustrated in the chapter on Plastics. You would then discover that it is made from albumen, possibly derived from ox blood, mixed with very fine sawdust and then molded. It was invented in France in 1855. Shellac, however, can look similar and the earliest shellac dates back to the same decade.

The Miscellaneous chapter includes animal vertebrae as beads, carved vegetable ivory, nuts, feathers, leather, and some insect parts, but quills and claws are only mentioned in passing. There are many omissions, however, including wood which is a huge category in its own right. Other disappointing omissions are natural flowerheads, grasses, seeds, shells used intact, fossils, and petrified organic materials which are so relevant to beads as the base material for the many decorated Pumtek beads—very important items in a bead collection. And what about Bezoar stones, the stomach stones of cattle, etc., which were preserved as charms against poison, cherished in former times and set into amuletic jewellery? Because of these omissions, a researcher will also need to consult other sources to get a complete picture of organic substances used for ornaments.

As far as I can judge, the information she does give is generally correct.

The author also discusses such issues as storage, conservation, and protecting endangered species. Of the 268 pages, there are seven near the end devoted to "charts," three to a glossary, and five for an index, which could have been much more comprehensive.

If you wish to consult this book in a practical way to identify or learn more about the material of a particular piece, you still have to start with some idea of the substance, then find the pages that refer to it and see if there is a match. This book should also be useful to those with a general interest in the subject but the price is steep unless you will be using it frequently, in which case I would certainly recommend it.

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World on a String: Parts One, Two, and Three.

Diana Friedberg and Lionel Friedberg. Zepra International, Los Angeles, CA. 2004-2005. $24.95.

For bead researchers, I recommend viewing each of the *World on a String* DVDs at least three times. Really!

The first viewing is to see what is included in this historic series. Parts One, Two, and Three are already being shown on Public Television. Diana is traveling from Guatemala to Tahiti, the U.K., Brazil, and onward to tell the story of stone and modern Art Glass beads for Parts Four and Five. Because all are bound to become the "lingua franca" between bead lovers and everybody else, bead researchers will want to be conversant with the material in *World on a String*.

The second viewing is to remind yourself of why you fell in love with beads in the first place. You will also reaffirm that beads are a touchstone to world cultures, social issues, history, and hope.

By the third viewing, you are familiar with the enormous content of the series, and can give yourself the pleasure of viewing each scene of each section of each part as an art piece. *World on a String* has so far won eight international awards for documentary film making.

I do want to offer this caveat: whatever your particular area of study or collecting, you will certainly wish that you had at least ten minutes on camera—or ten more minutes if you are one of the many interviewees—to present your special knowledge and expertise. As you see, however, the scope of the film and consider the range of the potential audience, you are likely to accept the necessity of a simple overview of history, theory, and current bead research. What is in the films is documentation of beadmaking and bead use as it has never been shown before... in all its dynamic, gritty glory.

Each of the DVDs has a theme. Part One, The Eternal Bead, is an overview of all types of beads. Part Two, The Tiny Mighty Bead, is about glass seed beads. Part Three, The Sacred Bead, views beads being used in various religious contexts. Each part is an international journey. Diana is often invited to lecture at screenings, and her tales of reaching some of the locations (26 countries so far) sound like Doctor Seuss and the troubles of getting to Solla Sollew.

Here is the itinerary for *World on a String, Part One: The Eternal Bead* (2004, 93 minutes): Bead beginnings and early beadmaking and use; Bushmen in Southern Africa; The Fertile Crescent; The Indus Valley, agate, and carnelian; Mesopotamia and Egypt; India, beads made by cottage industry and mass production; Venice, glass working traditions; Ghana, beadmaking and the marketplace.

After watching The Eternal Bead, I appreciate the beads that I wear, study, and string even more than before. For example, the portraits of "the men who breathe glass" had a profound impact on my feeling for the simplest glass beads from India. Now when I look at those beads I see not only their shape and color and translucence, but the fierce heat of the glass furnaces, the traditions and economy of entire communities, and the smokey, handsome faces of the glassworkers who accept beads as their life.

"The men who breathe glass" is my lone reference to the commentary of the films. I had planned to use many quotes from each part's narrative, but as I prepared this text I realized that all the narrative, as written and read by Lionel Friedberg, is itself a work of art. Trying to select an occasional elegant phrase was just too difficult because the whole narrative is beautiful and expertly designed to be part of the viewing experience.

World on a String, Part Two: The Tiny Mighty Bead (2005, 94 minutes). This part presents vivid images that include the following cultures: Central and South America, rituals of the Huichol of Mexico; North America, Native Americans of many tribes at an annual dance festival; Nepal, India, the Newar People and the Rabari People of the Ran of Kutch; Myanmar, the Naga People, Southeast Asia, Vietnam Hilltribe Flower Hmong and Red Mao; South Africa, the Ndebele and Zulu Peoples.

In the course of Part Two, Diana brings us up close and personal to bead-bedecked opium smokers, reformed headhunters, mescal inspired artists, dedicated social activists, festival dancers and solemn, lovely Naga women whose only personal possessions are their beads.

The next time I am about to complain as I am caught in Los Angeles traffic on the way to a Bead Society meeting, I am going to put things in perspective by remembering the uniquely dressed widowed or deserted Zulu women of Southern Africa as they walk together for hours through their lush hill country, then help one another across a rushing river to reach their daily beading circle. Their determination to sustain themselves and their group through beads is inspiring. Seeing it through Diana's camera is amazing, and humbling.

World on a String, Part Three: The Sacred Bead (2005, 93 minutes) covers bead use in Christianity, Islam, Hinduism, Buddhism, and Shamanism. Scenes in Part Three range from demonstrations of passionate public religious ritual to serene private worship. Beads appear on gilded statues, village costumes, and rosary strings. There are many dazzling displays, but amid all the color and action I found most touching the scene focused on an elderly woman in a Northern Spanish town, a town so small and so remote that there was no church or resident priest. We see her as she sits alone next to a vintage radio, listening to a broadcast of a Catholic mass. She does this faithfully twice each day, counting her prayers on a rosary of simple black beads. One gets the feeling that those beads are her lifelong dearest companions.

Part Three also features a very informative visit to a monastery in the United States. Here we see rose petal rosary beads being made, from blossom to bead, by chatty, good-natured monks. It is a rare and delightful addition to bead lore.

Participating with the Friedbergs to produce the *World on a String* series, the Bead Society of Los Angeles has taken a unique opportunity to fulfill its original mandate to find and share information about beads. Diana and Lionel have been working on major productions together for 35 years, first in South Africa, then in the United States. Their extensive experience writing, directing, producing, photographing, and editing documentaries in many parts of the world, plus their compassion for people and passion for beads, gives this documentary series top professional polish and genuine insight.

By contributing to general as well as specific knowledge about beads, *World on a String* will create a better informed, more receptive audience for bead research. With this in mind, I suggest that you not only watch your copies three times, but recommend *World on a String* to your local public lending libraries and college and museum reference libraries.

The *World on a String* website is <http://www.worldonastringmovie.com>.

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Beads of Life: Eastern and Southern African Beadwork from Canadian Collections.

Marie-Louise Labelle. Canadian Museum of Civilization, *Cultural Studies Paper* 78, Gatineau, Quebec J8X 4H2, Canada. 2005. 186 pp., 109 color figs., 64 b&w figs. Canadian $45.00 (paper cover).

The book opens with a map of Africa that shows the countries covered. The author elected to cover the subject in a thematic and sociological way, to reflect how the exhibits themselves were arranged. This is not, however, a catalog-style publication, but rather a companion to the exhibition with the same title, which opened at the Canadian Museum of Civilization in Gatineau, Quebec, on 14 April 2005, and ran until 26 February 2006.

The first chapter after the Introduction covers Eastern and Southern African Beadwork from Canadian Collections. It comes as something of a surprise to find out just how

extensive those collections are, and we are told the story of how they came to arrive in Canadian museums.

A chapter follows on Materials of Early Ornament and Clothing in which the diverse natural materials are discussed and illustrated, along with comments on the social significance of the ways in which they are used. Stages of personal life, often called *rites de passage*, and status are reflected in the ornaments and beadwork worn; local customs and polite usage also govern the selection of clothing and adornment that gets worn. The author rightly notes the way in which similarities in life style, such as pastoralism, bring about apparent similarities in beadwork styles. The white beads and other ornaments enabled diviners to carry out their mission, furnished links to the ancestral world, and also identified them for what they were. The author expounds interestingly (pp. 23-30) on the important and significant part that metal ornaments and beads played in the culture of eastern Africa. Southern Africa, where glass beads arrived earlier, has less documentation on the use of natural materials used as adornment.

The next section, on Glass Beads and Colour Interpretation, is perhaps the one that will be of most interest to readers of this book. The chapter starts off with a review of where the earliest glass beads originated, and how they came to take an increasingly important part in clothing and adornment, taking the place of metal and natural materials such as feathers, shells, bone, and vegetable fibers. A parallel is drawn between African womenfolk occupying themselves with beadwork, and the beadwork and embroidery practiced by women and girls in polite Western society, with the observation that this missionary-fostered, peaceful activity could be read as a form of cultural colonialism. Most of this chapter addresses widely held notions and misconceptions about the significance of color meanings and combinations, and the ways in which color is perceived in various African communities, especially in southern Africa. Names given to bead colors are discussed, the varying significance of color, also the whole issue of coded messages through beadwork. The author made good use of her fieldwork experience in eastern Africa, especially among the Masaai, and ethnic informants who were able to offer insights and comments to support her arguments.

The chapter Aesthetic Principles of Beadwork deals with the importance of color, especially white, as used in eastern and southern Africa. Before glass beads became available, white body paint was widely used, with white beads made from ostrich eggshell, cowries, and olivella shells. When glass beads became common, white as a background, along with red, plus black or dark blue, became the principal colors used. The women doing the beading would aim for a balanced design. As colors became more diverse, color harmonies and sequences became important, and individual styles of different culture groups could be better identified. Beadwork techniques and materials varied according to the groups involved, and whether beads were assembled to make a fabric, or applied onto leather, cloth, or wire.

Next comes a section on Status Clothing and Ornaments which points out that beadwork is important as an indicator of status—not merely social standing, but more importantly, a means of "reading" the person concerned: age grouping, marital status, number of children, the children's status, family grouping, or whatever. Small children may wear a string of beads that is added to as they grow. Young men and girls tend to wear a quantity of beadwork before marriage, and the amount worn may be a measure of the individual's attractiveness. Widows obviously wear only a few pieces of beadwork; their ornaments may be buried with them, or go to her daughters. Stylistic confusion may arise if a beadworking woman "imports" the beading style of her own locality when she moves after marriage to a different area.

The last section, called Beads of Life, reviews the important part that beads and beadwork play in contemporary eastern and southern Africa, whether as a means of raising cash, or making political statements and affirming African identity.

The illustrations are excellent and clear. A bonus is that the dimensions of each piece are given in centimeters, which is most necessary due to the varying scales of reproduction used (e.g., on p. 123 where the pieces illustrated in figs. 114-116 are of very different sizes, but are given similar amounts of space on the page). The illustrations that show how beadwork is worn have captions giving extra background information. But the design and layout of this book leaves something to be desired; the reader needs to flip back and forth between the text and the figure referred to. There is no index, which seems to be a glaring omission in a book of this type, where beadwork is discussed thematically rather than geographically. The bibliography, though, is full and up to date. There are very few typos.

Beads of Life gives an excellent sociological introduction to the role that beadwork plays in the life of this large and diverse area, without being too technical, and as such, is worth having; the numerous illustrations of beadwork pieces and beadwork in different contexts add to the book's value.

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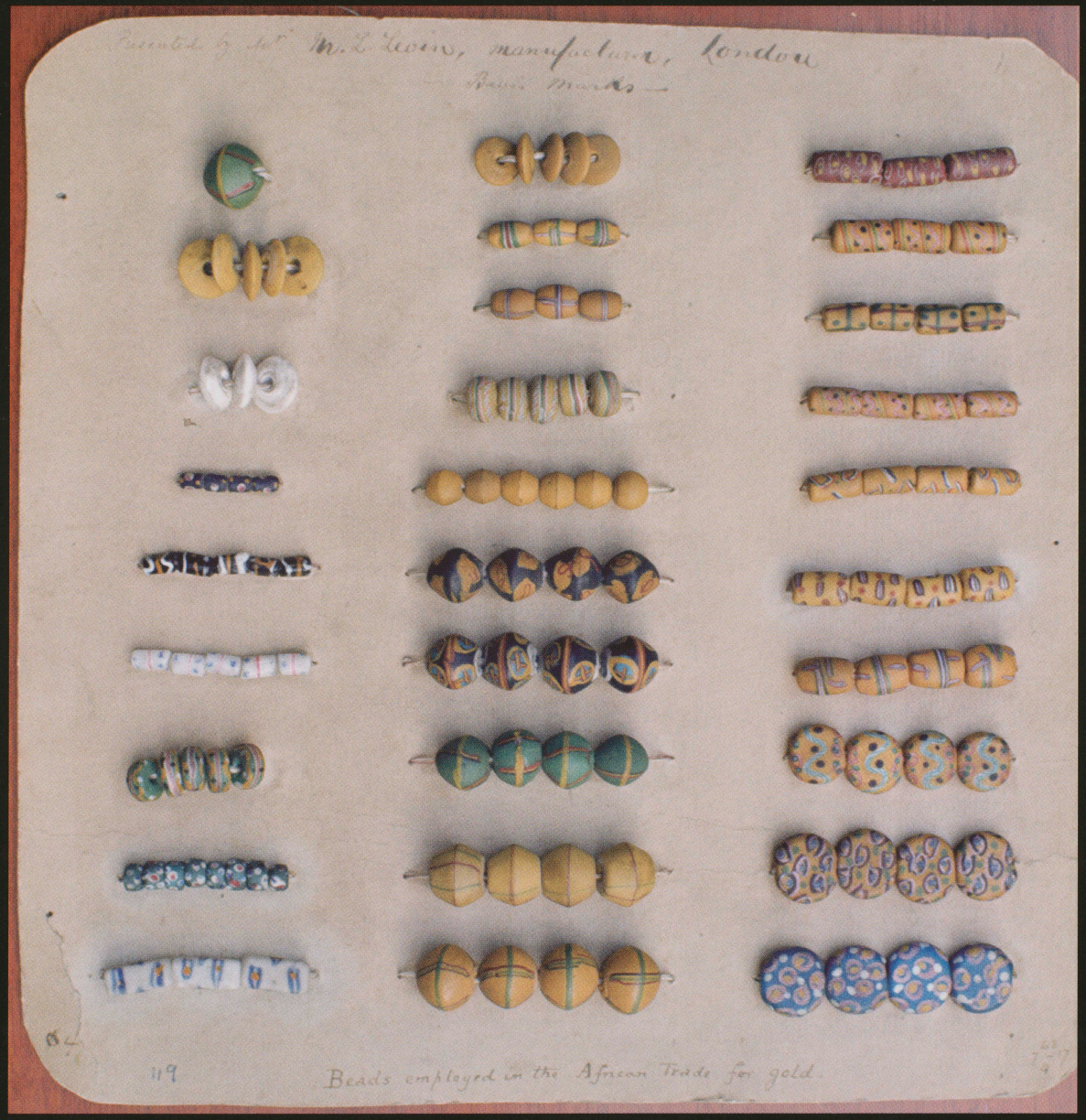

Plate VA. *Levin Catalogue:* Sheet no. 4 of the 1863 collection: "Beads employed in the African Trade for gold."

Plate VB. *Levin Catalogue:* Box A of the 1960 collection: "Beads such as are used by Traders in West Africa, & given in exchange for Palm Oil & other African produce."

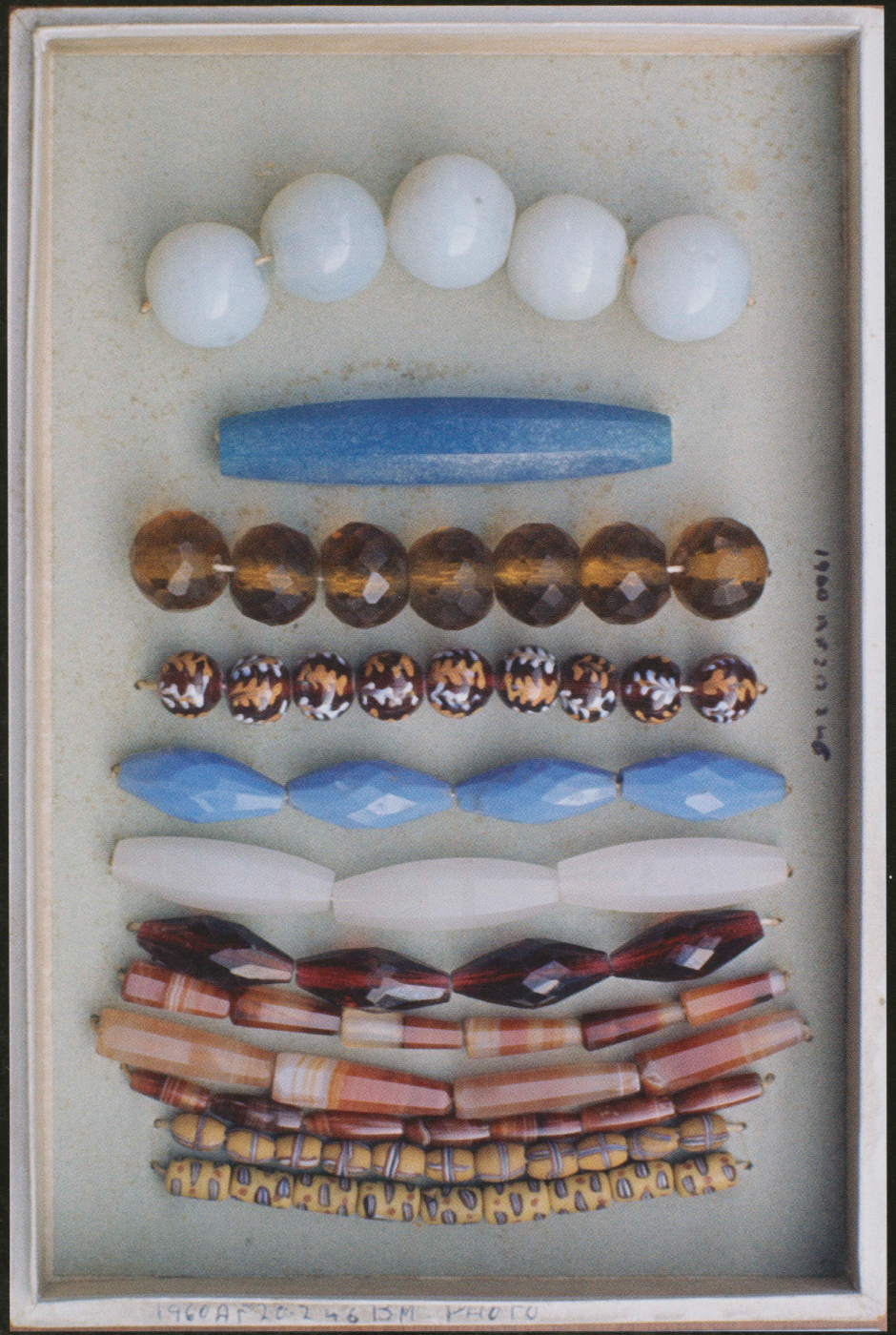

Plate VIA. *Levin Catalogue:* Box B of the 1960 collection: "Beads such as are used by Traders in West Africa, & given in exchange for Palm Oil &. other African produce."

Plate VIB. *Levin Catalogue:* Box C of the 1960 collection: "Beads such as have been used by Traders in West Africa as barter for Palm Oil and other African produce."