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Journal of the Society of Bead Researchers

KARLIS KARKLINS, editor

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OBSERVATIONS AND PROBLEMS IN RESEARCHING THE CONTEMPORARY GLASS-BEAD INDUSTRY OF NORTHERN CHINA

Roderick Sprague and An Jiayao

The status of glass-bead manufacturing in northern China is undergoing rapid change due to the development of the plastic-bead industry. Several manufacturing plants, including the large Beijing Glass Ware Factory, are no longer making beads and several other plants are contemplating changes. The variety of domestic glass beads available for purchase today would indicate a greater number of manufacturing sites than are mentioned in the popular literature.

INTRODUCTION

In October 1986,[1] while a visiting scholar at Inner Mongolia University, Sprague was able to visit the Beijing Glass Ware Factory and the Qianyang Brigade of the Taihu Commune with and through arrangements made by An who had previously observed work at these two facilities. The Beijing Glass Ware Factory, under the Beijing Arts and Crafts Corporation, is a large, three-story factory employing 700 workers and covering 16,000 m^2 in the Chongwen district of southeast Beijing. We were given an excellent tour of the glass-figure section by Sun Can Geng, an engineer in the factory complex. She explained that the factory no longer makes beads because plastic beads have replaced the glass ones in brilliance and cost. There can be no doubt about the cost factor, but the appearance argument is open to serious question.

Because we have no detailed description of post-liberation glass-beadmaking in China, it is our purpose here to describe the technology and social aspects of a large glass-object manufacturing plant that only a few years ago included glass-bead manufacturing as one process and still carries an inventory of glass beads in the sale's store. The processes and factory layout described below are unchanged from when beads were manufactured here, as well as in the farm shops to be described later. The technology involved today in the manufacture of small glass objects as described here is an important source in reconstructing glass bead manufacture in post-liberation Beijing. For a brief but excellent overview with color plates of Chinese glass beads from all time periods see the recent article by Peter Francis, Jr. (1990).

BEIJING GLASS WARE FACTORY

Small glass figures, mostly animals, are made for domestic and tourist consumption in six large rooms with from 12-20 workers in each room (Fig. 1). The women in the jet rooms outnumber the men about three to one with no discernible difference in rank or tasks. The gas jets create a deafening roar and heat the rooms to well above normal room temperature with the men working in only the typical Chinese undershirt.

The objects are made from solid glass rods that vary in diameter from 1 to 30 mm. The rods are round (Fig. 2) unlike the flattened stock shown by Kan and Liu (1984: Fig. 13). During our first visit to the factory, a request was made to see the portion of the works where the glass rods are made. In spite of prior arrangements, this was denied because the director was "unavailable out of the country and he was the only one with whom the arrangements had been made." On a second visit this request was again denied without any explanation.

Manipulation of the glass is mainly with large tweezers used as tongs on the tweezer end and as a

Figure 1. Workers in one of the large glassworking rooms in the Beijing Glass Ware Factory (photo by R. Sprague).

Figure 2. Glass rods used in the manufacture of glass objects at the Beijing Glass Ware Factory (photo by R. Sprague).

Figure 3. The use of tweezers to manipulate a glass object at the Beijing Glass Ware Factory (photo by R. Sprague).

Figure 4. Gas-heated, glass-melting furnaces at the Beijing Glass Ware Factory (photo by R. Sprague).

Figure 5. Worker in the Beijing Glass Ware Factory making jade trees from glass components (photo by R. Sprague).

spatula or rod on the handle end (Fig. 3). Glass shears were observed being used by a few workers. Large objects are occasionally heated in gas furnaces (Fig. 4).

In addition to the figures, one specialty of the factory is glass plants, flowers, and fruit. These are made up in the same section of the factory by women (Fig. 5) who work with large bins full of glass leaves, petals, stamens, and fruit, all made at the jets or outside the factory as described below. The making of some of these parts is virtually identical to the making of wound beads. Wire holds the parts together; some have holes in them and others have a knob on one end for attachment. Jade plants are a traditional gift during marriage negotiations, hence the glass plants still have a clear cultural function.

During a second trip to the factory on 20 March 1987, we were given a demonstration of wound-bead manufacture by worker Zhang Yuxia. She was 49 years old and had been working in the factory for 30 years. She has not made beads as a regular part of her job since before the Cultural Revolution (prior to 1966) and apologized for her technique and the quality of the beads. The beads were made by the well-known technique of covering iron wire (18.5 - 20.5 cm long by 1.18 - 1.24 mm in diameter) with white clay-like material for approximately 5 cm on each end and winding viscous glass from rods onto the wire as it is turned one revolution (Fig. 6). The size of the bead is a product of the diameter of the glass rod, the degree of heating of the rod in the gas flame, and the speed with which the wire is turned. If, after being attached to the wire, the bead is irregular, it is further heated and the wire quickly turned to shape the bead through centrifugal force. The beads are removed from the wire after cooling. The samples, which we were kindly permitted to keep still on the wire (Pl. VIA), were not annealed, but this was a normal part of the process. All of the samples were slightly translucent with a high luster.

The factory sales shop sells "seed" beads (Pl. VIB) with an average range in size from 2.20 mm to 3.35 mm with exceptions from 1.65 mm to 3.50 mm. All the perforations are less than 1 mm in diameter. The surprising thing about these small beads is that they are wound, not drawn. No samples of these were

Figure 6. Zhang Yuxia of the Beijing Glass Ware Factory making wound beads (photo by R. Sprague).

seen elsewhere and, unfortunately, we did not ask about their place of manufacture but it was implied that they were local. These beads represent a refinement in wound-bead production that is difficult to match in the world today or very often in the past. Francis (1990: pers. comm.) indicates that beads of similar size and technology are currently being made in India and were made in China from the 9th to the 17th century, as well as being the dominant bead in Southeast Asia from the 13th to the 16th century.

QIANYANG BRIGADE

We next traveled well out of urban Beijing to the eastern rural outskirts. A brief taxi ride from the bus stop brought us to a farm commune, thoroughly involved in harvest. All of the men and most of the women in this 400-family operation were in the fields, but we found one young woman tending her infant niece. She proceeded to put on a demonstration of the manufacture of ear bobs, small flower stamens, large sunflower heads, and animal eyes. Until quite recently, beads were also manufactured here. Again, as in the Beijing Glass Ware Factory, the procedures, the equipment, and the social structure associated with the work are identical to those employed for the making of glass beads, some of which we obtained.

The Beijing Glass Ware Factory provides the glass rods to these workers, referred to by the factory personnel, somewhat derogatorily, as the "farmers." One of the major problems in China today is the large rural population that the central government does not want to move into the cities but still desires to use as a large labor pool. Thus, in an effort to raise the rural standard of living and to help absorb this huge surplus of labor in the countryside, the government is promoting rural industries. In 1986, these enterprises accounted for 44% of the rural economic output. There is also encouragement of cooperation between state-owned and township industries by sending primary and semifinished products from the former to the latter for processing. Because of the success of the Beijing Washing Machine Factory in the production of its White Orchid machine this way, this process has become known as the "white orchid method" (Liang and Chen 1986: 26). This is exactly what has been

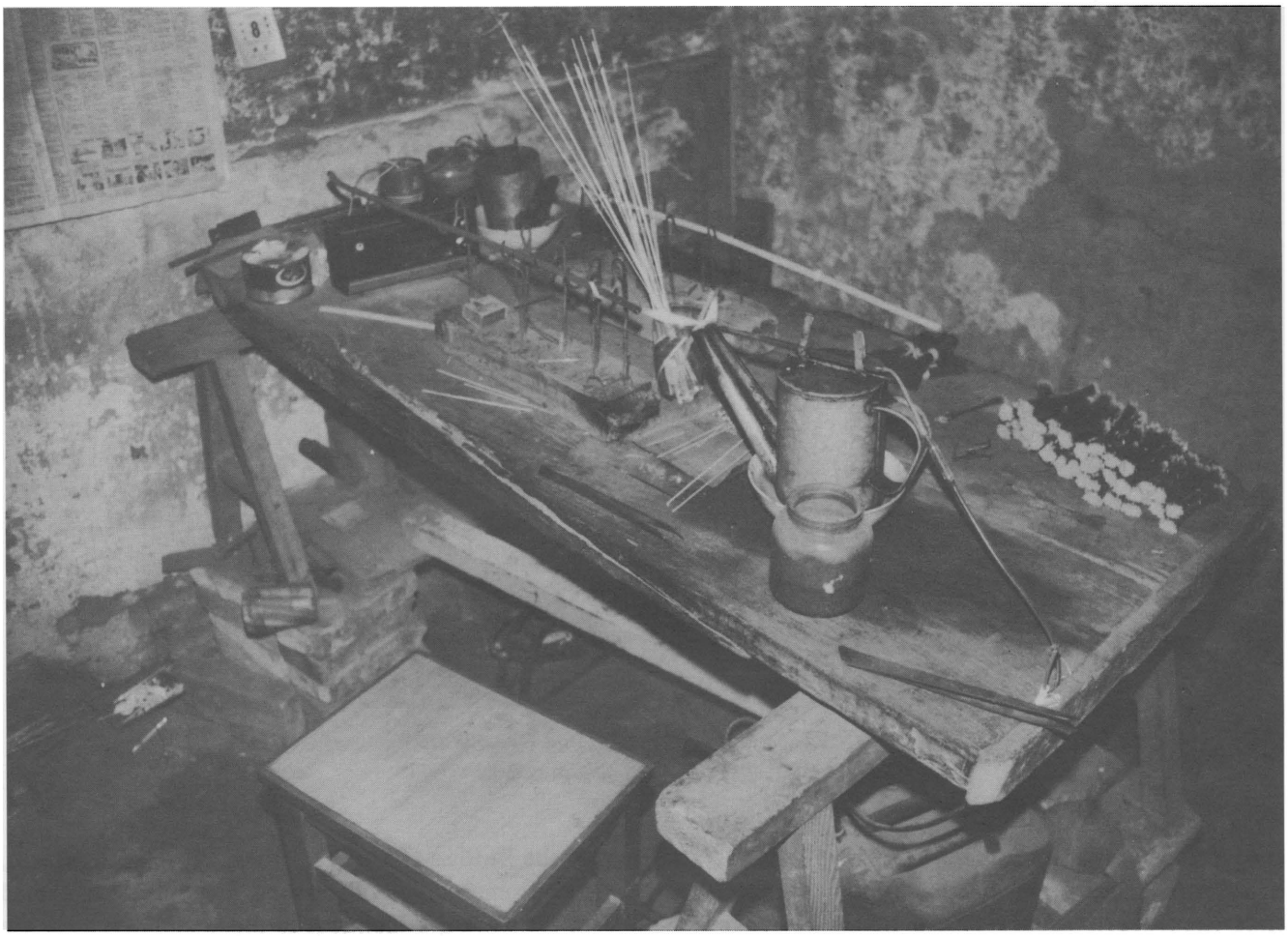

Figure 7. Workbench at Taihu Commune showing pump under the bench near the stool, jerry can to the right under the bench with the hose going up to the glass blow tube on top of the diesel fuel can, and red-glass rod in holder to the left. On the lower right corner are the tweezers and a jar of water. Bundles of finished small, yellow flower stamens are stacked in the upper right corner (photo by R. Sprague).

done between the Beijing Glass Ware Factory and the Qianyang Brigade.

Because the Beijing glass is high in lead oxide, it melts at a relatively low temperature. For this reason it is possible for the farm workers to use diesel fuel for working the glass rods (Fig. 7). The fuel is contained in a sheet-metal can about 15 cm high and 12 cm in diameter with a wick spout. A glass tube crosses the can and rests on the wick. This blow tube is connected by a rubber hose to a jerry can serving as a reservoir for the compressed air. The can is pressured by a foot-operated bicycle-tire pump that is worked only as needed to keep the diesel-fuel jet operating. The glass rod is held at the proper height on a series of three or four wire supports imbedded in holes drilled in a board. A wire hook held tight by a rubber band attached to the board keeps tension on the rod while it is cradled in the wire supports (Fig. 7).

Because beads are currently not being made in these shops, we have chosen to describe in some detail the obvious ability, of even a young worker, to deftly manipulate the glass in the making of a small and delicate object. The demonstration was of the making of a small, teardrop-shaped ear bob. This item is made without a wire insert from a clear-glass rod that turns ruby red when heated. First, the rod is heated to working temperature. With large tweezers, a round ball of glass is pinched from the end of the rod which is then returned to the support. A small glass rod is attached to the large end of the ball to serve as a pontil

and the object is broken from the large rod with a sharp tap from the end of the tweezers. As the small end of the teardrop is heated, it is pulled out with the tweezers to form the attachment loop. The loop is fire-polished after the free end is firmly attached. Next, the small rod is broken off, again with a tap from the tweezer handle, and the bob is fire polished. The final shape is checked and corrected where needed and the finished product is dropped into a metal pan to cool. The tweezers are occasionally cooled in a jar of water and defective objects or rejects are also dropped in the water.

Decorative dangles, glass-flower stamens, and eyes for soft toys and novelties are made on wires thus eliminating the need for the pontil-like glass rods. Eyes, the larger flower centers (such as for sunflowers), and large beads are given a final shaping in a depression in a stone form. Objects made on wires are usually made on each end of the wire. Very small yellow flower stamens are bundled in bunches often as much as 3 cm in diameter at the midpoint of the wires (Fig. 7).

Several other young women tending infants joined the discussion and various other products made in the past were brought out and donated to the project. Included in this collection were beads that are no longer being made due to the competition of plastic products. One former beadmaker gave us a string of reject beads that had been saved (Pl. VIC).

The Beijing Glass Ware Factory presented us with a sample of wound necklace beads ranging in size from 8.20 mm to 11.05 mm. The perforations are highly variable, from 1.2 mm to 1.9 mm in diameter, and not well-correlated with the bead size. These former sale items are identical to beads formerly made by the farm craftsmen.

BOSHAN

On 13 June 1987, Sprague traveled to the municipality of Zibu in Shandong Province, to visit the ostensibly only active bead factory still in operation in China. The Boshan (Poshan) District, formerly a separate city, is now one section of modern Zibu, a large center of ceramic and glass manufacture. Extensive correspondence carried on by An with researchers and the Zibu Municipal Foreign Affairs Office did not reveal at any time the situation described below in the Boshan bead factory.

Sprague was met and accompanied by interpreter Fu Jun and driver Zheng Shaoxing. First visited was the Boshan Glass Factory, the factory described by Kan and Liu (1984). The fact that it was the same factory was verified by several workers from copies of the photos contained in the original article. The first information received, which was apparently a surprise to the interpreter as well, was that they had "stopped making beads about three years ago." What was even more distressing was the information that they kept no samples of the beads and had discarded all of the beadmaking equipment. Paddy Kan, on the other hand, reported later that there are about five glass workers still making beads at the Boshan Glass Factory and that at least one other factory in the area still makes glass beads (Robert K. Liu 1987: pers. comm.). The reason for this discrepancy in information can only be speculated upon, but one anonymous informant in China suggested that the methods used are so primitive that they are an embarrassment to the factory. Another necessarily- anonymous informant in China, speaking only to Sprague, went so far as to say "they lied to you," an unusually harsh evaluation from a native informant.

Comparing the equipment at Beijing to that illustrated by Kan and Liu (1984) reveals that the Boshan process is indeed much less advanced, but also had some differing equipment such as a grooved marvering ramp. The factory public-relations director reported plans to import Czechoslovakian equipment to renew the glass-bead industry of Boshan. The limited discussion implied that a mold-pressed or Prosser-manufacturing process was being considered. The confusion that this may cause to future researchers is interesting to contemplate.

The market on Xi Yie Jie (Xi Yie Street) in Boshan had numerous stalls selling what are probably bead seconds. Prices were very low, even when compared to Beijing standards. In an hour, ¥13.20 ($3.57) purchased 18 necklaces and 14 specialized beads (Pl. VID, VIE). It is interesting to note that Yang (1987: 74) states that "During the Qianlong reign [1736-1795], glass shops concentrated on Xiye Street."

On a previous trip in 1983, Sprague purchased, in a small town on the grasslands of Inner Mongolia, a sample of buttons made from glass beads identical to ones later found in Boshan in 1987. Also, friends purchased for Sprague in 1984, a string of beads being worn by a native woman in Tibet that are also identical to beads seen in Boshan in 1987. All of the bead types definitively known to be from Boshan were found in shops during Sprague's visit.

OTHER LOCATIONS

One type of bead found in four basic colors (Pl. VIF) with a sunburst design was purchased in Huhhot, Inner Mongolia, purportedly with Boshan labels on the shipping crates, according to Sprague's informant. The sunburst design was not seen in the shops of Boshan. Sun Can Geng, engineer at the Beijing Glass Ware Factory, suggested that elaborate sunburst beads shown to her in pictures (supplied by Elizabeth Harris) were probably from Hong Kong. Thus, they may have been made in Guangzhou (Canton) or a more-southerly manufacturing center instead of Boshan.

These beads were strung on elastic to be used as infant-girl bracelets, a specialty item prepared for sale and, thus, like the buttons in the grasslands, may have a wider distribution than simple strings of beads. At no time did we observe any specific type of decorated beads outside of a specific city area except for one case. In Beijing, a single small string of beads was purchased in an antique shop that included six modern Boshan-like decorated beads strung with several plain beads. The price was vastly inflated at a markup from Boshan of over 200%.

Bead types purchased six months earlier in Xi'an, Luoyang, and Chengde (Pl. VIG, VIH) were not observed in Boshan or Beijing. Chengde, northeast of Beijing, should not be confused with Chengdu, the capitol of Sichuan Province.

The major glass product of Luoyang is flat glass, yet during the New Year's celebration, glass noise makers purchased on the street were said to be locally made. These noise makers, which look like a long-stemmed bulbous vase with a thin glass bottom that "twangs" in and out with a person's breath, represent an obvious local glass-blowing industry that surely could include beads. No one would clearly state that beads were made locally, but neither did anyone deny that they were. In the same class, but from Xi'an, were crude pipe mouthpieces made by winding and still containing red clay in the bore. Again the technology was extremely close to that used for beadmaking.

CONCLUSIONS

Our impression from these several experiences -- one that has also been expressed by Francis (1986: 29, 31, 36; 1990: 127) -- is that there are many more local beadmaking operations in China today than we are led to believe from the literature both from inside and outside the country.

The complexity and the workmanship of the fancy beads from Boshan will be difficult to replace. Also, the small size of the wound "seed" beads of Beijing represents a refinement of the art of wound beads that is exceptional. We have lost glass beadmaking in Beijing, both in the city and the surrounding countryside, and the future of Boshan is questionable. Let us hope that the craftsmen of the lesser-known areas will keep alive their bead technology until the plastic-bead phenomenon has run its course and glass beads are again properly appreciated for their beauty and as examples of a long tradition of excellence in craftsmanship.

Thus far the research on beads in China has posed more questions than have been answered. To answer some of these questions and to find out more about southern manufacturing centers we need more research in China, more publishing of the experiences of travelers in China concerning beads, more perusal of the original Chinese sources, and more sharing of data. We know far too little to hoard what few data we have.

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ENDNOTE

1. This work has been delayed an extra year in publication due to the inexplicable withdrawal of a firm commitment for publication in another outlet.

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BEADMAKING IN ISLAM: THE AFRICAN TRADE AND THE RISE OF HEBRON

Peter Francis, Jr.

This paper complements one which appeared in volume 1 of this journal, as it also deals with beads in the Islamic world. However, the present work takes a somewhat different approach, being based primarily on historical sources. It also has a different geographical orientation, dealing with commerce between the Islamic world and the northern portion of Africa. Concentrating mostly on the period from the 12th to the 20th century, it documents the rise of a new beadmaking center at Hebron, in the West Bank. The name "Kano beads" has recently been assigned to one class of Hebron beads, and their history is an object lesson in the complexities of the bead trade.

INTRODUCTION

The bead trade was an important element of commerce during the Early Islamic Period which lasted from the 7th to the 12th century. It extended east from the Islamic heartland into Asia, and west and south into the African kingdoms beyond the Sahara Desert. Major sources of the beads used in this trade were glassmaking centers in the Islamic world, which had inherited their craft from the Classical world.

However, this trade changed dramatically from the 12th to the 16th century. Glass beadmaking declined after the 12th century and came to be concentrated in a new center, Hebron. The rise of European traders along the West-African coast slowly eroded the monopoly of the North-African traders. Here we explore those changes.

A note on some of the terms used in this paper may help to avoid confusion. The names Ghana and Mali can apply to ancient kingdoms in West Africa or to modern states of that name. In both cases, the text makes it clear which is being discussed. More complex is the term "Sudan." Taken from the Arabic, *Bilad es-Sudan* (Land of the Blacks), it has referred to a large geographical area and two countries, one of which is now Mali. When the geographical area is being discussed -- roughly between the Senegal River and the Nile, and the Sahara Desert and the equator -- it will be distinguished by sector: the western Sudan reaches to the bend of the Niger River; the central Sudan stretches from there to and including Darfur; and the eastern Sudan is the area beyond Darfur to the Nile Valley (Fig. 1). The term "Sudan" without any modifier refers to the modern country of that name.

THE MUSLIM BEAD TRADE WITH AFRICA

When Arabs were sweeping across North Africa in the late 7th and early 8th centuries, the first West-African state -- the ancient kingdom of Ghana -- was developing south of the Sahara. Trade between North and West Africa, which had been conducted for a long time, was stimulated by the wealth in gold and slaves in the western regions which could be exchanged for goods that were fairly cheap in North Africa, such as salt. Beads were also commonly brought south across the Sahara. They became a staple in the trans-Saharan trade during the Early Islamic Period.

Yaqut (ca. 1124) wrote of merchants from Sijilmasa (Morocco) going to ancient Ghana: "Their wares are salt, bundles of pine wood,... blue glass beads, bracelets of red copper, bangles and signet rings of copper, and nothing else" (Levtzion and Hopkins 1981: 169). Al-Idrisi (ca. 1154) described the same trade as including "different kinds of beads of glass" (Levtzion and Hopkins 1981: 128). Two

BEADS 2:15-28 (1990)

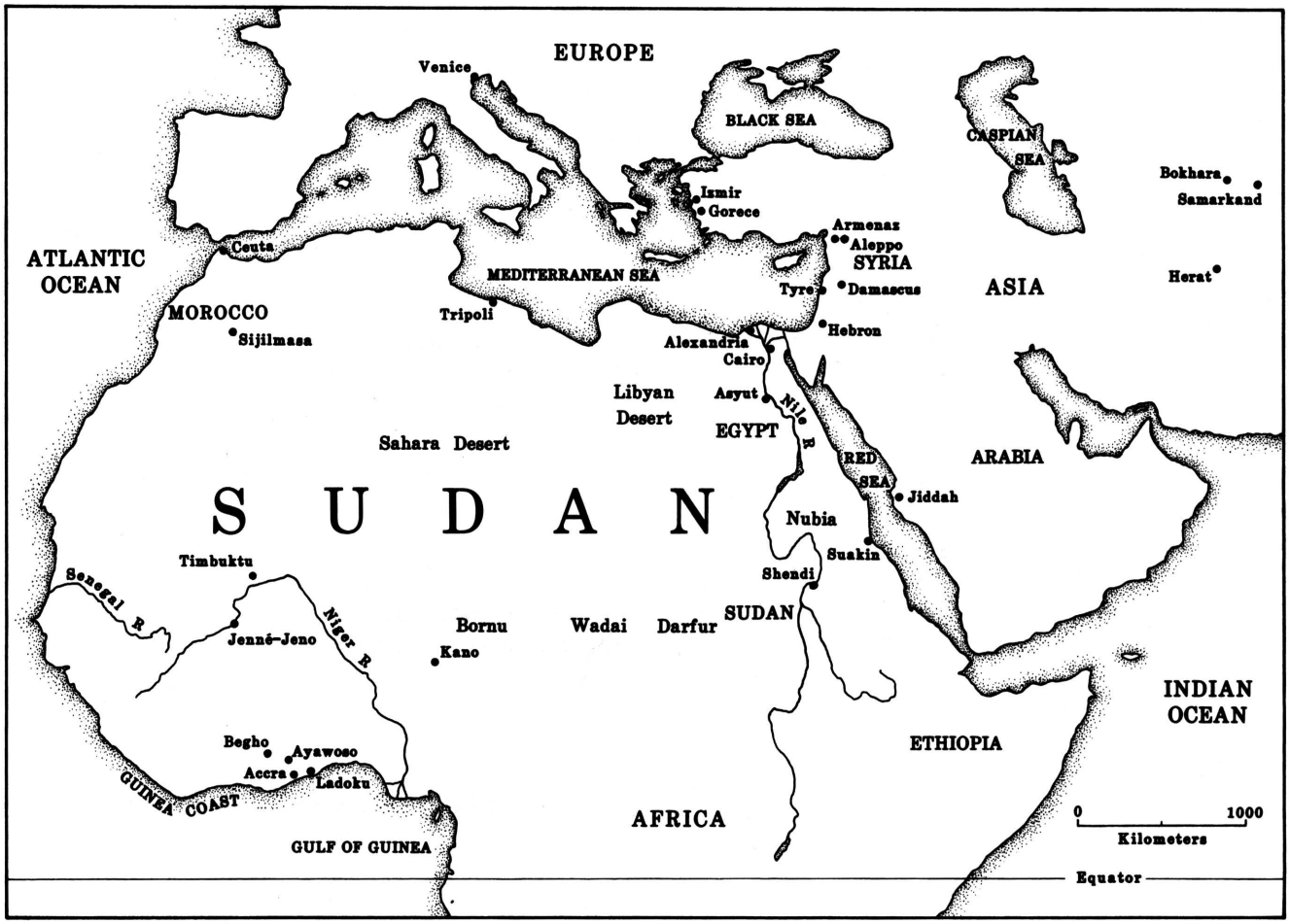

Figure 1. Map of the Middle East and northern Africa showing places mentioned in the text (drawing by D. Kappler).

centuries later (ca. 1353), Ibn Battuta told his readers: "The traveler, in these countries [the western Sudan], has no need to burden himself with provisions for the mouth [i.e., food], or mets, or ducats, nor of drachmas; one must carry with him a morsel of rock salt, ornaments or trinkets of glass, which they call *nazhm*, or rangee, and a few aromatic substances" (Defremery and Sanguinetti 1922: 394).[1]

No comprehensive study has yet been done on the beads traded during this period. At Jenné-Jeno, the capital of ancient Mali, excavations produced very few beads (McIntosh and McIntosh 1984: 90; S. McIntosh: pers. comm.), but beads looted from this and related sites that are presently on the antiquities market are mostly of three types. There are wound beads, especially round translucent blue ones with white circles and often also white zones, or cylindrical or barrel-shaped beads of black or dark glass, often decorated with white or yellow spirals; the same beads are present at Fustat (Old Cairo) in some numbers, and might reasonably be assumed to have been made there (Francis 1989c: Plate ID). There are also "torus folded" beads, now understood to be products of the Early Islamic Period (Francis 1989c: 29), as well as the small, drawn, Indo-Pacific beads, ultimately from South or Southeast Asia.

Some of these beads have been excavated as far south as Begho, the only site in modern Ghana mentioned by the early Arabic travelers and geographers (Posnansky 1971: 115-8). Included are round wound beads of black glass decorated with white circles, matching some found at Fustat, and Indo-Pacific beads. Both groups were found in early levels (11th to 12th centuries) at the site (Francis 1990: 4).

Beads of glass were not the only sorts in this trade. Al-Idrisi noted garnet and mother-of-pearl beads in the trade (Levtzion and Hopkins 1981: 128), and discussed the bead trade originating from Septa, Morocco, now the Spanish enclave of Ceuta: "At Sapta they fish for the coral tree which is unequaled by any kind of coral extracted in any regions of the seas and at Sapta there is a market where it is cut, polished, made into beads, pierced and strung. From there it is exported to all lands, but carried mostly to [ancient] Ghana and all the lands of the Sudan, because in those lands it is much used" (Levtzion and Hopkins 1981: 130).

The character of the bead trade in West Africa was drastically changed as the Muslims lost out to the growing power of European traders. This was a long and gradual process, and exactly how quickly it happened has yet to be learned. At Begho it appears to have been rather rapid. In the "artisan's quarter," dated ca. 1480 to 1600, the six beads found there by archaeologists were all European, including a seven-layered chevron (Francis 1990: 4). This is what we would expect on Ghanaian coastal sites of the same period, and is exactly what we find at places like Ladoku, the Dangme capital, and Ayawoso, the Ga capital. The beads uncovered at these three sites could have come from North American sites of the same age (Francis 1990: 4). Certainly by the early 19th century, European explorers such as Mungo Park (1815: 160-1) in 1805 and Heinrich Barth (1965: Vol. 1, 516; Vol. 2, 513) between 1849 and 1855 recorded only the use of European beads in the interior of Africa.

However, the eastern Sudan was a different story. There the Muslims were able to continue dominating the bead trade for much longer than in the western Sudan. In many parts of the eastern Sudan, Europeans found it very difficult to gain access. Not only was the bead trade in Muslim hands, but many of the beads were made in Islamic lands.

To illustrate this, we shall consider areas now incorporated into the modern countries of Sudan and Chad. In the 18th, 19th, and even early 20th centuries, they were independent kingdoms. These kingdoms are Nubia, in the eastern part of Sudan; Darfur, in the western part of Sudan; and Wadai, in the eastern part of Chad (Fig 1).

Four travelers to these areas recorded considerable information on the local bead trade in the years between 1792 and 1873. The earliest was the Englishman William Browne, the first European to enter Darfur. He resided there, mostly against his will, from 1792 to 1796, and left us a list of goods brought into Darfur from Egypt by the Jellaba merchants (Browne 1799: 302-3). The second is El-Tounsy,[2] a learned "sheik" born in Tunisia. He went to Cairo, then joined his father in Darfur in 1803, leaving in 1811 for a further year in Wadai where Europeans were forbidden. His books on Darfur (El-Tounsy 1845: 208-10) and Wadai (El-Tounsy 1851: 333-9) both have fairly long sections on beads. Our third traveler is John Lewis (Johann Ludwig) Burckhardt, an intrepid, well-traveled Swiss explorer who wandered throughout the Middle East, even visiting Mecca disguised as a Muslim savant, so well acquainted had he become with the language and customs of the regions. We shall examine his voyage to Nubia, especially his observations on beads at Shendi (Shendy), the great mart of the region (Burckhardt 1822: 269-70). Finally, Gustav Nachtigal visited Darfur and Wadai on a mission for the King of Prussia. He had a long and highly involved career in Africa, later as the administrator who annexed Togo, the Cameroons, and parts of Namibia for Germany. His volume on Wadai and Darfur (Fisher, Fisher and O'Fahey 1971) contains many scattered references to beads.

Beads identifiable as to origin which are discussed by these travelers fall into seven categories:

1) *Amber.* All four travelers affirmed the demand for amber, including El-Tounsy in both Darfur and Wadai. El-Tounsy (1851: 333) reported that at Wadai clear amber was the most valued, and Burckhardt (1822: 270) said that it was the only type wanted in Nubia. On the other hand, Nachtigal (Fisher, Fisher and O'Fahey 1971: 247, 254), coming from the west, spoke of milky amber being preferred in Wadai and west Darfur, but not in east Darfur. The amber, no doubt, came from the region of the Baltic Sea, but was most likely cut in Margouch, a quarter of Cairo, as reported by the French after the Napoleonic invasions (France 1829: Vol. 18, 400), and later by Clot-Bey (1840: 316) who may have been simply copying the earlier and more extensive work.

2) *Coral.* Along with amber, only coral is recorded by all the travelers, including El-Tounsy in Darfur and Wadai. Burckhardt (1822: 270) remarked that it was of low quality. El-Tounsy (1825: 208; 1851: 336) said there were two types of beads in use in Darfur and Wadai: the cylindrical *gass* and the small, round *mouderdem*. As with the amber, the coral was also cut in Margouch, Cairo (Clot-Bey 1840: 316; France 1829: Vol. 18, 400); the source of the raw material would have been the Mediterranean.

3) *Carnelian, agate, and reysh.* These three are grouped together because of their common source. Burckhardt and Nachtigal mentioned carnelian, Browne noted agate, and Burckhardt and El-Tounsy (in both Darfur and Wadai) mention *reysh*. The latter is banded agate, most likely that known as *babaghoria* in India, long a popular bead material with Muslim traders (Francis 1986b). Burckhardt (1822: 269-70) discussed *reysh* in some detail, relating that the beads went from Surat (a port near Cambay, India, where they were cut) to Jiddah, Arabia, where they were bought by the merchants of Suakin, the port of Nubia (just south of modern Port Sudan) for 15 Spanish dollars a thousand. They sold them at Shendi for 48 dollars, whence they were taken further inland and exchanged for six female slaves, who were then sold at Shendi for 150 dollars. El-Tounsy (1845: 206) also mentioned that the beads came from India. The bead trade of India was by this time firmly in the hands of the Muslims (Francis 1982: 21-7).

4) *Khaddur.* These beads were observed at Darfur by El-Tounsy (1845: 210) who said that they were long and red or white. He had more to say about them at Wadai, where he added blue to their color spectrum and stated that they were more valued than at Darfur (El-Tounsy 1851: 339). Nachtigal (Fisher, Fisher and O'Fahey 1971: 201) provided the most complete description of these "hidden" beads: "Imports from Cairo include the large red clay beads which, with the name *khaddur*, "hidden," are used as women's ornaments [in Wadai], worn under their clothing around the waist."

5) *European glass beads.* The false coral, listed by El-Tounsy in Darfur and Wadai and by Nachtigal, came from Venice, according to Burckhardt (1822: 207), who noted that it was sold to "western countries" (i.e., Darfur and Wadai). In both Darfur and Wadai, El-Tounsy (1845: 208; 1851: 336) discussed the *dem-er-raf* (nosebleed) bead, a cheap red-glass bead from Europe worn especially by the poor in Wadai. Nachtigal often mentioned glass beads without specifying their origin, while Browne (1799: 302) noted beads of Venice without specifying their type. Burckhardt (1822: 269) discussed European beads the most, including a white glass bead made in Bohemia called by the Italians *Contaria d'Olanda* (beads of Holland). He estimated that 400 to 500 chests of Venetian glass beads, each chest weighing ten hundredweight, were sold annually in Cairo. If this figure is correct, it would amount to 448,000 to 560,000 pounds of beads (204 to 254 metric tons) per year.

6) *Beads of plant materials.* Burckhardt was the only one of our informants to mention beads made from plant materials. The items he brought to barter included "several dozen of wooden beads" which he peddled on the street, as a Damer (northern Nubia) (Burckhardt 1822: 155, 239). He began his long section on beads at the Shendi market with the words: "I have already mentioned the use of beads in these countries, as a kind of currency. The most common are small wooden beads, made by the turners of Upper Egypt, which are bought up chiefly by the Bedouin and other peasants" (Burckhardt 1822: 269). He also listed beads made in Egypt from the doum-palm kernel, worn as a symbol of religious fervor.

7) *Mongur and harish.* At Darfur, El-Tounsy (1845: 209-10) described some rough glass beads called *mangour* and *harich* which he said were from Syria. At Wadai, he also described the *mangour* as being rough and coming from Galilee (El-Tounsy 1851: 334-5). Browne (1799: 303) mentioned "coarse glass beads made at Jerusalem, called Hersh and Munjir." Burckhardt (1822: 269) added: "Glass beads (*Kherraz*) have not the same currency here as they have in Abyssinia and Darfour, though they are constantly seen in the market. The better sort are of Venetian manufacture, but the greater part are made at El Khalil (or Hebron, near Jerusalem)."

In sum, of the beads used in the trade of the eastern Sudan during the late 18th to late 19th centuries, only European glass beads have unequivocal origins outside the Muslim world. If Burckhardt's figures can be believed, beads of European origin may well have made up a substantial part of the trade, but the observations of Browne and El-Tounsy indicate that they were of secondary importance in the interior kingdoms. Nor were they the most universal beads. That credit goes to amber and coral, the former ultimately from Europe, but both cut principally in Cairo. The most expensive beads were apparently the *reysh* or agate beads of India. The *mongur* and *harish* stand alone as the only glass beads recorded as being made in the Muslim world, and we shall focus on them subsequently.

GLASS BEADMAKING IN THE ISLAMIC WORLD TO THE 14TH CENTURY

As discussed elsewhere (Francis 1989c: 27-9), Fustat (Old Cairo) was a beadmaking center of importance. It was famed for its glass, as noted by the Persian Nassiri Khosrau during a visit in the middle of the 11th century: "They [at Fustat] also make a transparent and very pure glass which resembles an emerald which they sell by weight" (Schefer 1970: 151-2). That glass beads were among the products of Fustat is clear from both contemporary records (Goitein 1961) and archaeological discoveries (Francis 1989c: 28-9).

After Fustat was put to the torch in 1168, glassmaking continued in the ruins of the city. Ibn Douqmak (ca. 1400) noted that there were glasshouses in Fustat (Clerget 1934: 270), and evidence of one such glasshouse set up in the ruins was uncovered by Scanlon (1981: 60-1). But glassmaking was on the wane and beadmaking seems to have ceased (Francis 1989c: 29). Certainly there is no mention of beadmaking in the description of the Cairene glass industry derived from the studies of the French during the Napoleonic interlude:

> The glass of Cairo... is as imperfect as the pottery: one counts four establishments of this type in el-Hasaneyn, el-Faoualeh, and near the French quarter [all in Cairo] and another at Giza: they make the balloons, retorts, and *matras* for making and distilling sal ammoniac, common bottles, flares for ordinary lamps and others for illuminations, flat colored glass for use in the baths, glass mortars and polishers (France 1829: Vol. 18, 397).

Fustat was not the only Islamic glass beadmaker in the Early Islamic Period. There are several other glassmaking cities known from this time, and beads may have been made at some of them. They include Damascus, Allepo, Acre, Es-Samaryia, Antioch (Engle 1973b), and Tripoli (Schefer 1970: 42, n. 1). Lamm (1959: 376) noted that Islamic glass has a "cosmopolitan character" and that glassmakers probably moved around a great deal. Glassmaking was not confined to a single group. In Fustat, it was largely in the hands of Jews, but Copts and Muslims also made glass (Goitein 1961: 171, 187; 1973: 24). Jews also made glass in Tyre and Antioch, located in present-day Lebanon and Turkey, respectively, but whether they were the only glassmakers there is not known (Benjamin 1905: 538, 541; 1983: 77, 79).

Tyre, known for its glassmaking since Classical times, apparently also made beads. Engle (1973b: 21), quoting Lamm, quoting al-Muqaddasi around 985, said that Tyre exported "sugar, glass jewelry in the form of beads and bracelets and vessels of wheel-cut glass." An Arabic edition of al-Muqaddasi could not be found for consultation, but a recent translation in French mentions Tyre's exports as being: "*le sucre* [sugar], *la verroterie, les verres incrustes et les objects fabriques*" (Miquel 1963: 219). The term *la verroterie* refers to small glass trinkets and usually includes beads; we note, however, that there is no mention of wheel-cut glass.

The last we hear of glassmaking in Tyre is at the end of the 12th century. Benjamin of Tudela (1983: 79), a Spanish Jew who was probably a textile merchant, wrote: "The Jews [of Tyre] own sea-going vessels, and there are glass makers amongst them who make that fine Tyrian glass-ware which is prized in all countries." Benjamin visited Tyre in the 1160s, a time when William, the Archbishop of the city, wrote: "A very fine quality of glass... is marvelously manufactured... [in Tyre and] is carried to far distant places and easily surpasses all products of the kind" (Engle 1974: 35).

Tyre was caught in the center of a virtual world war, the Crusades, directed as much against the Byzantine Empire as against the Muslims; both Seljik Turks and Egyptians were set against by Western Europe. Tyre was captured in 1124 by Venetians, and for periods of different lengths was part of the Kingdom of Jerusalem. It was finally lost to the Europeans in 1291. Whether it was war or danger of war, or the earthquake of 1170 reported by William that caused the glassmakers to leave is not known.

There has been a persistent story that when the glassmakers left Tyre, they moved to a new place not far from Aleppo in present-day Syria, which they named Armenaz, after the suburb of Tyre where they had lived (Lamm 1959: 376). Details of this story have been called into question (Engle 1973a), but there is no doubt that Armenaz was a glass beadmaker, at least in the present century. J. Gaulmier, who visited the village in the 1930s, found glassmaking there depressed, with 15 people in four shops making only glass bottles (Engle 1973a). In 1979, there were only two shops in operation. Older workers, however, confirmed that they and their fathers had made beads and bangles some 50 years before. Despite a thrilling motorcycle ride with one of the younger workers through the village in an attempt to locate some of the old beads, none could be found (Francis 1981: 38).

The demise of the Damascus glass industry is better documented. The invasion by Timur (Tamerlain) in 1402 resulted in the forced expatriation of artisans to grace his Central-Asian capital, Samarkand. The memoirs of Ibn Arabshah (Sanders 1936: 161), who was taken at the age of eight with the craftsmen, and of Al-Hacen (1906: 439), who visited Samarkand at its height, include long lists of these artisans. Clavijo, who visited Samarkand in 1403-06, said Timur had brought "men who made bows, glass, and earthenware, so that of these articles Samarcand makes the best" (Nesbitt 1879: 651). A glass beadmaking shop of this age has been excavated in Samarkand (Besborodov and Zadneprovsky 1965: 129).

The glassmaking family operating in Herat, Afghanistan, in 1978 claimed to have moved there from Bokhara in 1917, perhaps having left Samarkand in the 18th century when it was largely desolated and under Bokhara control (Francis 1979: 7), though beadmaking was known elsewhere in the region (Besborodov and Zadneprovsky 1965: 131). There is apparently still a small bead industry in Uzbekistan at present (Pl. VA).

In sum, the glass craft that the Muslims had largely inherited from the classical world lost most of its former glory. What was once a large, flourishing bead industry centered especially at Fustat, Tyre and probably Damascus declined markedly in the space of two or three centuries. The remnants of this industry at Armenaz and Samarkand-Bokhara-Herat never approached the greatness of the former glassworks.

THE RISE OF HEBRON

But people need glass and, as we all know, they especially need glass beads. Thus, though truncated, the Muslim glass and glass-bead industry survived in a new location: Hebron, just a few kilometers south of Jerusalem.

Hebron is one of the oldest cities in the world. Flavius Josephus, the extraordinary Jewish historian and military commander, wrote at the end of the first century A.D.: "Now the people of the country [Palestine] say, that [Hebron] is an ancienter city, not only than any in that country, but than Memphis in Egypt, and accordingly its age is reckoned at two thousand three hundred years" (Whiston n.d.: 700). In the Bible and/or tradition, Hebron is connected with Abraham, Moses and Solomon, among other famous names. It contains the reputed graves of Abraham, Issac, Jacob and Adam, four patriarchs holy to three religions: Judaism, Christianity, and Islam.

Because of its importance to the devout, Hebron has long been a place of pilgrimage. Throughout the Middle Ages, European pilgrims streamed there before or after visiting Jerusalem. Among those who left memoirs of their journeys were Bishop Arecuff (ca. 700), Willibald (721-27), Bernard the Wise (867), Saewolf (1102-3), Sigeud the Crusader (1107-11), Benjamin of Tudela (1160-73), Sir John Mandeville (1322-56), Berthrandon de la Brocquiere (1432-33), and Henry Maundrell (1697), none of whom mention glassmaking at Hebron (Wright 1968: passim). It is known that glassmaking was established by the 14th century, so later pilgrims simply did not notice or mention the industry. In the case of Benjamin of Tudela, who did note glassmaking at Tyre, he may

have been silent about glassmaking if it was in the hands of Muslims, as it is today, since he was looking for Jewish communities. However, it should also be noted that al-Muqaddasi (Miquel 1963: 199-202), writing as complete an economic geography as possible in the middle of the 10th century, discussed Hebron at some length, but made no mention of glassmaking there.

The first written accounts of glassmaking at Hebron appear in the 14th century. Early in that century Estori Farchi noted glassmakers there, a statement that was echoed or cribbed by Chelo of Aragon in 1333 (Engle 1973b: 24). In 1345, Niccolo da Poggibonsi was the first of many religious pilgrims to note the glassworks there (Heyd 1959: 711). Engle (1974: 75) believes that glassmaking at Hebron may be much older, perhaps dating back to Roman times, but there is no evidence for such an age, and the silence of so many visitors, especially al-Muqaddasi, argues against it.

Hebron became a supplier of glass to the immediate region and, in time, to other Muslim lands. Henry Castella (1974: 129), who visited Egypt between November 1600 and February 1601, saw merchants from Hebron bringing glass products to sell at Cairo. In 1792, Browne (1799: 75) noted the importation of glass to Cairo from the area: "From Syria arrive cotton, silk, crude and manufactured, soap, tobacco, beads of glass." Burckhardt (1822: 269) wrote: "El Khalil (or Hebron, near Jerusalem)... furnishes the whole of southern Syria, and the greatest part of Egypt, and of Arabia, with glass-ware." One other note on Hebron's production and trade is found in a work by Perrot and Chipiez (1885: 328-9):

> I [apparently Perrot] remember seeing some fine bracelets of blue glass sold in the precincts of the Holy Sepulchre at Jerusalem; in form and color some among them reminded me of antique jewels. My curiosity was aroused. I asked where those things were made, and they told me at Hebron, where glass works still existed by which a very large trade was carried on, their manufacture being exported by Arab and Jewish traders, even as far as the Soudan. The character of these objects is always the same: little vases and other vessels, earrings and nose-rings, bracelets, anklets, and armlets [amulets?], among the last named some whose types have certainly been handed down from a remote antiquity. One is a human eye, the eye of Osiris; another represents a human hand with two extended fingers; this is a charm against the evil eye, and is known as the Kef-Miriam, "the Hand of Mary."

The reader may have noted that not all of the reports of imported glass or glass beads specifically mention Hebron. In fact, various places are mentioned by the writers we have cited (Table 1).

We may postulate two explanations for these various reported origins of glass products. One is that, in the 18th century, there was more than one Islamic glass and glass-beadmaking center. Syria is twice mentioned, and that could refer to Armenaz. We have no information on glassmaking in Jerusalem or Galilee at that time.

The more likely explanation is that all of the glass came from Hebron. Syria was a dominant power in the region, though it was under Ottoman hegemony. Browne's Jerusalem may only be a record of where merchants bought Hebron products (just as Perrot found them there first). El-Tounsy's Galilee could be a slip of the pen; Hebron is in Judea rather than Galilee. Such misidentifications of bead origins are by no means unusual; Burckhardt, for example, said that the agate beads used in the slave trade came from Surat, which was only exporting Cambay beads.

Aside from Armenaz, of whose output and history we really know nothing, there are no recorded glassmakers in the area but Hebron. Browne (1799) visited Jerusalem, Damascus and Tyre (but neither Hebron nor Armenaz), and never mentioned glassworking. In the mid-19th century, Olin (1846) also visited these places, but only mentioned glassmaking in Hebron: "[It] was stormed by the Egyptian army, under Ibrahim Pasha in the year 1834, when it was in rebellion against the government.... Its trade and manufacturers have suffered in an equal degree, and many of the shops are quite destroyed. There are still some manufacturers of glass..." (Olin 1846: 87). The same negative data are to be found in this century. Travel books often mention glassmaking at Hebron (e.g., Baedeker 1912: 111; Meistermann 1923: 359), but never anywhere else.

Table 1. Recorded Origins of Glass or Glass Beads.

Product	*Date*	*Destination*	*Origin*	*Source*
Glass	1600–1601	Egypt	Hebron	Castella
Glass beads	1792	Egypt	Syria	Browne
Glass beads	1792–1796	Darfur	Jerusalem	Browne
Glass beads	1803–1811	Darfur	Syria	El-Tounsy
Glass beads	1811–1812	Wadai	Galilee	El-Tounsy
Glass beads	1814	Sudan	Hebron	Burckhardt
Ornaments	1885	Sudan	Hebron	Perrot

HEBRON AND HER "CHILDREN"

In addition to its paramount position as glassmaker for the Arab world, Hebron also become an exporter of glass technology (Francis 1989a: 78; 1989b: 8). The Ottoman Empire encouraged the movement of craftsmen around its dominions, and in two cases beadmaking apparently was carried from Hebron to other locations where it still exists today. In every case, glass is presently only remelted from bottles.

One of these locations is in western Turkey. The story gathered from Zakai Erdal, a leading beadmaker of Gorece, Turkey, is that around 1880, two workers, Salim Halil and Hüsnü, migrated to Izmir from Lebanon intending to make bangles (an old Hebron product) and eventually concentrated on beads. Around 1930, the beadmakers were strongly encouraged to leave the neighborhood and settled in the village of Gorece (Francis 1979: 2-3). Later, disagreements between various parties led to one beadmaker moving to Bodrum (Z. Erdal 1979: pers. comm.), and another to Kamelpasha (Weinberg 1968; *see also* Sismanoglu 1978). As Erdal could not name the place in Lebanon from which Salim ve Halil and Hüsnü (both Turkish names) came when I asked him directly, I now strongly suspect that they came from Hebron, though they may have set up briefly somewhere in Lebanon before moving to Turkey. A more recent account of their history states that the Turkish beadmakers came from the "eastern Mediterranean," first settling in Izmir between 1940 and 1945 (Küçükerman 1988: 42).

Stylistically the Turkish and Hebron production is closely allied, especially the "evil eye" beads, traditionally blue tabular beads exhibiting yellow and white concentric circles (Pl. VB). They were being produced in Hebron by 1885, as described by Perrot (1885: 328-9). Some from the 1920s are to be seen in both the Beck collection at the Museum of Archaeology and Anthropology at Cambridge University, and the Girard collection in the Museum of International Folk Art in Santa Fe, New Mexico (Pl. VC). Van der Sleen (1975: 115) said that these beads were being made at Hebron, though on what basis it is difficult to tell. They are apparently not being made in Hebron today (Engle 1990: pers. comm.).

The other glass beadmaking industry associated with Hebron is something of a restitution, because it is located in Cairo, once a leading beadmaker of the Muslim world. The major glassworkers of Cairo belong to the family of the Al-Daours; they do not make beads. Beads are made by their cousins, the Al-Tahhuns. "During the Ottoman period a grandfather [of the Al-Tahhuns] emigrated to work in a factory at Al-Khalil (Hebron), in Palestine. He stayed there for many years and was married into the al-Da'or family, afterwards returning to Egypt" (Henein and Gout 1974: x).

This may be the reason why the Al-Tahhuns alone make beads on a small scale in Cairo (Fig. 2). On the other hand, Arkell (1937: 302-3) reported that in his time, no one in Cairo made beads. He had, however, met Mohamed Farrah, a glassworker who had been trained in Hebron. The establishment where Farrah worked was located at Bab Foutah, where beads are being made today. An attractive current product is a

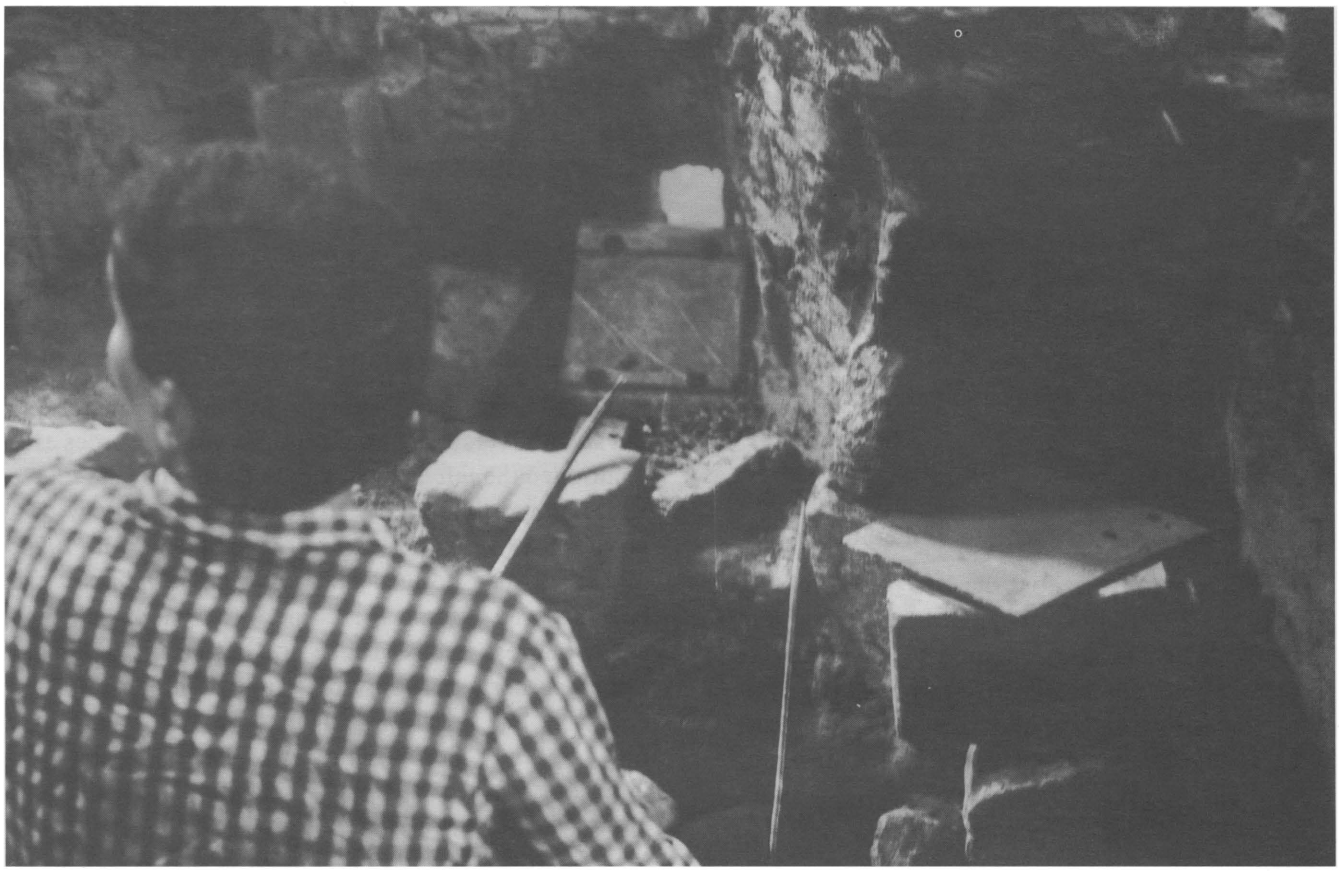

Figure 2. Glass beadmaking in Cairo, 1988. The setup is very similar to that used at Gorece, Turkey, and, other small beadmaking establishments, no doubt including Hebron. The beads are wound on the iron mandrel in the furnace, then removed to be shaped. When done they are knocked off into the small annealing chamber at the right. The blue beads in the center are rejects (photo by P. Francis, Jr.).

bead of swirled glass which closely resembles those made in Hebron in the 1920s. Interviews with the beadmakers in 1988 did not elicit any new information on their origins. Nonetheless, the Hebron connection seems to be of some standing and at least one of those who had been apprenticed there must have brought beadmaking back to Cairo.

THE BEADS OF HEBRON

In our discussion of the beads used in trade in the eastern Sudan, we identified only two glass beads that were made in the Islamic world (Pl. VD), almost certainly in Hebron. The most complete description of these beads is found in the works of El-Tounsy. In Darfur he observed:

> Around the waist and against the skin, the Fors wear different sorts of glass beads. Among the rich women the beads are the size of a nut, and are called *rougad-el-fagah* (the sleep of tranquility); among the women of medium means, it is the *mangour* and among the poor women the *harich* or the *khoddour*. These types of jewelry are made in Syria. The rougad-el-fagah is perfectly polished and of green color, or blue, or yellow.
>
> The *michahreh* is a black glass bead spotted with white points; it is a variety of *mangour* but it is smaller, with a rougher surface and the same size.
>
> The *harich* resembles a mangour and a michahreh, but the size of chaplet beads [small

rosary beads], rough and grooved with striations (El-Tounsy 1845: 209-10).

In Wadai, El-Tounsy (1851: 334-5) related:

The *mangour* is a round glass bead exported from Galilee. The Fons wear them frequently around the waist, next to the skin, five or seven turns of this bead strung on cords. The mangour is green, or yellow, or black and speckled. The black is better known under the name *michahreh.*

The *rougad-el-fagah* is more expensive than the mangour, larger, smoother and more beautiful. Also the rougad-el-fagah is found as secret jewelry by the Fons of comfortable means, and the mangour by the Fons of medium means.

The *mangour* is about the size of an ordinary nut and the rougad-el-fagah of a larger nut. Both are of terracotta covered with a glaze like that of faience. But the rougad-el-fagah is of more perfect work, better glazed and looks most agreeable and is more expensive. The mangour is rough, crinkled on the surface and grossly glazed. It is also sold cheap.

El-Tounsy or his translator apparently made an error in the last paragraph. Nowhere else is the *mongur* said to be made of anything but glass.

Long after William Browne and El-Tounsy visited Darfur, A.J. Arkell, the British administrator- turned-archaeologist and bead lover, published a seminal paper on these beads. He began by describing them this way:

There may be found to-day in Darfur, in the possession of women of the generation that is passing away, numbers of large opaque glass beads of which the colours are usually yellow or green, more rarely blue, and very occasionally black with coloured spots.

These beads are called *mongur* in local Arabic, and *galding* in the Fur language.

They are quite out of fashion and the younger generation will have nothing to do with them, occasionally referring to them with contempt as the jewellery of slaves. Anyone who has them will give them away and will usually refuse to take anything for them. They will very soon have vanished from the land, and it is therefore advisable that a record should be made before this happens.

These beads may be found on the sites of villages that were inhabited 50 to 100 years ago....

They are practically never worn. I have occasionally seen a single green one worn on a string round the ankle by old women as a cure for rheumatism (Arkell 1937: 300).

In addition to the *mongur* and *harish* (which are but smaller versions of the former), some sources also mentioned the *michahreh*, which El-Tounsy said have white spots, though Arkell found them only with a mixture of yellow, green or blue spots. Arkell (1937: 300, n. 1) also noticed that some green *mongur* had been squared off and the corners flattened; i.e., they are cornerless cubes. These are imitations of green-jasper cornerless cubes, of which Schienerl (1985) enquired, and are now known to date at least to the Early Islamic Period (Francis 1989b: 32). These imitations have been found in Egypt (Francis 1986a) along with the usual *mongur*.

Arkell combed old texts looking for references to these beads and made other enquires. Some had been found along the *Darb al-Arba'in* (the forty-day road), a trade route that crossed the desert from Asyut, Egypt, to Darfur, and he visited what he claimed to be all the glass factories of Cairo. He found no evidence for beads having been made there in recent times. Mohamed Farrah, the glassmaker who had been trained in Hebron, said that the *mongur* were probably Hebron products.

Arkell never got to Hebron but enlisted the aid of J.W. Crowfoot and W.B.K. Shaw to visit the glassmakers there. The beads then in production which were sent back by Shaw and pictured by Arkell (1937: XXIVb) resemble the *mongur* in color, form, opacity, and technique which Arkell called "wire-wound," having seen the process in Venice (they are, in fact, furnace-wound). Crowfoot met two retired glassworkers who assured him that the *mongur* were once made in Hebron and that beads like them are found in old graves around the city.[3]

Arkell sent some of the beads to Horace Beck, who affirmed that they were probably of Medi-

terranean glass, but thought that they did not resemble Hebron manufacture. Arkell (1937: 305, n. 2) suggested that this was because the Hebron glass-workers were no longer making their own glass. This would appear to be correct. The *mongur* and related beads were probably made from locally produced glass, using alkalies from the Dead Sea; late in the 19th century melting down glass bottles replaced glassmaking. The beads from Hebron in Beck's collection are unlike the *mongur* or the beads that Shaw sent Arkell. Rather, they are small tabular "evil eye" beads (Pl. VC) and beads of colored glass swirled together (personal observation).

At the end of the last footnote on the last page of Arkell's (1937: 305) article is a most intriguing observation:

> It may be of interest to record that I have obtained a few examples indistinguishable from the *mongur* from pilgrims and other wanderers from Northern Nigeria, and I have come across one or two Hausa bead peddlers who have been buying up these *mongur* in Darfur for resale in Nigeria, so that it is almost certain that some of these beads have found their way from Hebron to Nigeria.

Indeed, those familiar with the West-African bead trade would most likely call the *mongur* "Kano beads." Liu (1982) introduced this term, employed by Hausa bead traders in Sudan who claimed that the beads came from, or were even made in, the great, venerable market city of Kano in northern Nigeria. Eyo (1979: 57) may have had these beads in mind when he said that glass beads were made at Kano, as well as Bida, without describing them. There appears to be no foundation whatsoever for believing that beads were made in Kano; the name is merely a trader's term.

Liu (1982: 27) also mentioned a communication from Alastair Lamb (1980: pers. comm.) to Elizabeth Harris which stated that he thought these beads were European. He had first thought they might be Dutch, but grew to doubt that, saying that some were made in Venice, while not citing any reasons for his assertion which must now be called into serious question. He did add the interesting information that these beads were also being sold in modern Ghana.

We are now in a position to trace something of the commerce of the *mongur* and associated beads over the last few centuries. It is not known when they were first made, but it must have been at least by the mid-18th century, since they were so firmly established in Darfur by the time of Browne's visit in 1792. From Hebron they were taken by both Jewish and Arab traders to Cairo. They were apparently used in Egypt, as they are still found there occasionally. From Cairo they went up the Nile, either all the way to Shendi to be sold throughout the eastern Sudan, or to Asyut and across the *Darb al-Arba'in* to Darfur and on to Wadai.

They may not have gotten across northern Africa. G.F. Lyon (1821: 152), who traveled from Tripoli to Bornu (west of Wadai), Wadai, and the eastern Sudan between 1818 and 1820, did not mention them in his long enumeration of beads, which he ended by lamenting: "I have been thus particular for the information of future travellers, as the beads we took with us were unsaleable, and the above are always to be purchased at Tripoli."

Arkell (1937: 304) thought that the import of these beads to Darfur may have ended during the "unsettled times" of the Madhist movement and the subsequent battle of Khartoum with the English, based on the ages of the women who had them and of the abandoned villages where they were found. The fact that Nachtigal (Fisher, Fisher and O'Fahey 1971) did not mention them while in Wadai and Darfur in 1873 and 1874, strongly suggests that they were no longer being traded at that time. Though this is negative evidence, his narrative is very detailed, and he recorded the names, uses, and values of many beads; the absence of *mongur* beads in the presence of his thoroughness may well mean that they were no longer articles of commerce. Certainly the beads described by Perrot and Chipiez (1885: 328-9) were quite different types, and the *mongur* seem not to have been made then. A date between 1850 and 1870 would seem a likely time for the cessation of their production.

By the time that Arkell was investigating these beads, they were old and old-fashioned. They had depreciated in value, and no one wanted them anymore, at least in Darfur. This may have been because they were no longer imported or there may simply have been a change in fashion. But someone saw some value in the *mongur*. The Hausa traders,

famed from the western to the eastern Sudan and far beyond, bought them up, presumedly for a song (it is also possible that they had been traded into Hausa territory before this time, as well). It was apparently these traders who had the ends of the beads beveled so as to fit more snugly on the strands (Pl. VD). They found a market for them in Kano, and no doubt elsewhere. They were appreciated anew and sold at least as far as Ghana and, of course, have entered the modern American bead trade. They are also enjoying a resurgence in Sudan and now fetch high prices, their origins having been completely forgotten.

SUMMARY AND CONCLUSIONS

The trade in beads was a major part of commerce in the Early Islamic Period, during which glass beads made in the Muslim beadmaking centers, glass beads from Asia, and coral beads processed in North Africa were of considerable importance in commercial dealings with the kingdoms of West Africa. In later centuries, Europeans supplanted the Muslims in this region, though we have yet to learn how quickly this happened. In the eastern Sudan, however, Muslims dominated the bead trade much longer. The beads that can be identified in this trade were mostly made in the Islamic world or at least processed there, though European glass beads were gaining ground.

At the end of the 12th century, the once-flourishing glass-bead industry of the Early Islamic Period began a gradual decline. For various reasons, Fustat, Tyre and Damascus lost their glass industries within a few centuries of each other, disappearing by the beginning of the 15th century. Their remnants, Armenaz succeeding Tyre and the Central-Asian beadmakers succeeding Damascus, never regained the eminence of the old industries.

At least by the 14th century, a new glassmaking center arose at Hebron, the origins of which have yet to be learned. By 1600, it was supplying glass to Egypt and probably other neighboring countries. In addition to being the major glass beadmaker of the Muslim world for centuries, Hebron has apparently spawned at least two other beadmaking industries. One is now scattered in several places in western Turkey. The other, ironically, has come "home" to Cairo.

One of the striking elements of the Early Islamic Period was the self-sufficiency of the bead trade (Francis 1989c). The most popular beads were made in or at the edges of the Islamic world, and carried by Muslim sailors, especially Persians, far afield through the Indian Ocean, and by Muslim traders across the Sahara to the kingdoms of the western Sudan. Beginning in the 16th century, Europeans began to supplant the Muslims as chief supplier of beads to much of the world. In a few centuries the glass beads of Venice and Bohemia, the latter with production often geared especially to the Muslim market (Francis 1988: 42), became paramount. However, within regions still controlled by Muslim traders, beads from the Muslim world remained important. These included amber and coral, the former from Europe, but both cut in Cairo; agates from western India, now firmly in Muslim hands; clay, wooden, and doum-nut beads made in Egypt; and the *mongur*, *harish* and associated glass beads from Hebron.

The story of the glass beads made in Hebron is one of the more interesting finds of this study. It is a comment on the whims of fashion, as well as a useful reminder that the secondary trade of beads -- which can be documented for nearly all parts of the world -- can confound researchers. The history of these beads serves as an object lesson of the unending appeal of the oldest of all decorative goods and of the dangers of researching beads only through the tales carried by bead dealers.

ENDNOTES

1. Quotations from sources written in French have been translated into English by the author.
2. The spelling of "El Tunisi" would be more proper, considering modern orthographic practices. The translator's spelling of "El-Tounsy" has been retained here for convenience.
3. If these are Muslim graves, that would be most unusual, as Muslims do not normally bury the dead with ornaments or goods of any sort.

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TRADE BEADS FROM HUDSON'S BAY COMPANY FORT VANCOUVER (1829-1860), VANCOUVER, WASHINGTON

Lester A. Ross

Archaeological excavations conducted at Hudson's Bay Company Fort Vancouver recovered 100,000+ trade beads of 152 varieties, including 80 varieties of drawn, 57 varieties of wound, 10 varieties of mold-pressed and 3 varieties of blown glass beads, as well as one variety each of "Prosser-molded" ceramic and cut-stone beads. An additional 6000+ beads recovered from excavations at the HBC Kanaka village and riverside complex sites may included 39 additional varieties possibly associated with the HBC occupation: 17 varieties of drawn, 12 varieties of wound, and 5 varieties of mold-pressed glass beads, as well as one variety each of stone, bone, wood, metal, and shell beads. The bead assemblage has contributed to the initial definition of a complex temporal and cultural horizon marker dating from 1829 to 1860 for the Pacific Northwest, and provides insights into mid-19th-century Native-American and Euro-American bead preferences. Analysis of the assemblage demonstrates difficulties inherent in the existing archaeological bead classification system, and suggestions for revisions are discussed.

HISTORICAL BACKGROUND

Begun under a charter granted in 1670 by King Charles II of England, the Hudson's Bay Company (HBC) became the premier trading company operating throughout northern North America concentrating upon the acquisition, trade and marketing of furs. By the 1830s, after firmly establishing its commercial enterprise from coast to coast, the HBC expanded its operation by selling imported manufactured goods and locally made products to Euro-Americans moving into the Red River District of the Canadian prairies, the Willamette Valley of the American Oregon Territory, and the Columbia Plateau of the American Washington Territory. Eventually, these mercantile endeavors evolved into one of the largest commercial enterprises in North America, known in the 20th century as "The Bay."

Two major mercantile centers were operated by the HBC during the mid-19th century: Lower Fort Garry on the banks of the Red River near present-day Winnipeg, Manitoba, and Fort Vancouver on the Columbia River near what is now Portland, Oregon. Fort Vancouver was established in 1824 as the administrative headquarters and primary fur depot for the HBC Western Department. The original stockaded fort was abandoned in 1829 for an expanded establishment a few kilometers to the west and closer to the river (Fig. 1). Between 1824 and 1845, Fort Vancouver retained its prominence as department headquarters, servicing no fewer than 38 forts, stores, houses and warehouses throughout present-day Oregon, Idaho, Washington and British Columbia (Fig. 2).

Operations within the Western Department included: 1) maintaining a network of forts and houses to acquire furs for European and Asian markets; 2) supplying the Russian American Fur Company in southwestern Alaska with agricultural supplies; 3) maintaining mercantile and trading stores in San Francisco and the Sandwich (Hawaiian) Islands; 4) outfitting fur brigades venturing to the northern boundary of the Spanish territory in the American Southwest; and 5) operating a fleet of ships (the Marine Department) along the northwestern coastline.

To support these operations, manufactured goods were imported from London, England, with secondary imports from China via Boston merchantmen trading in the Sandwich Islands to circumvent the Asian trading monopoly of the East India Company, and eventually from New England to avoid import duties

BEADS 2:29-67 (1990)

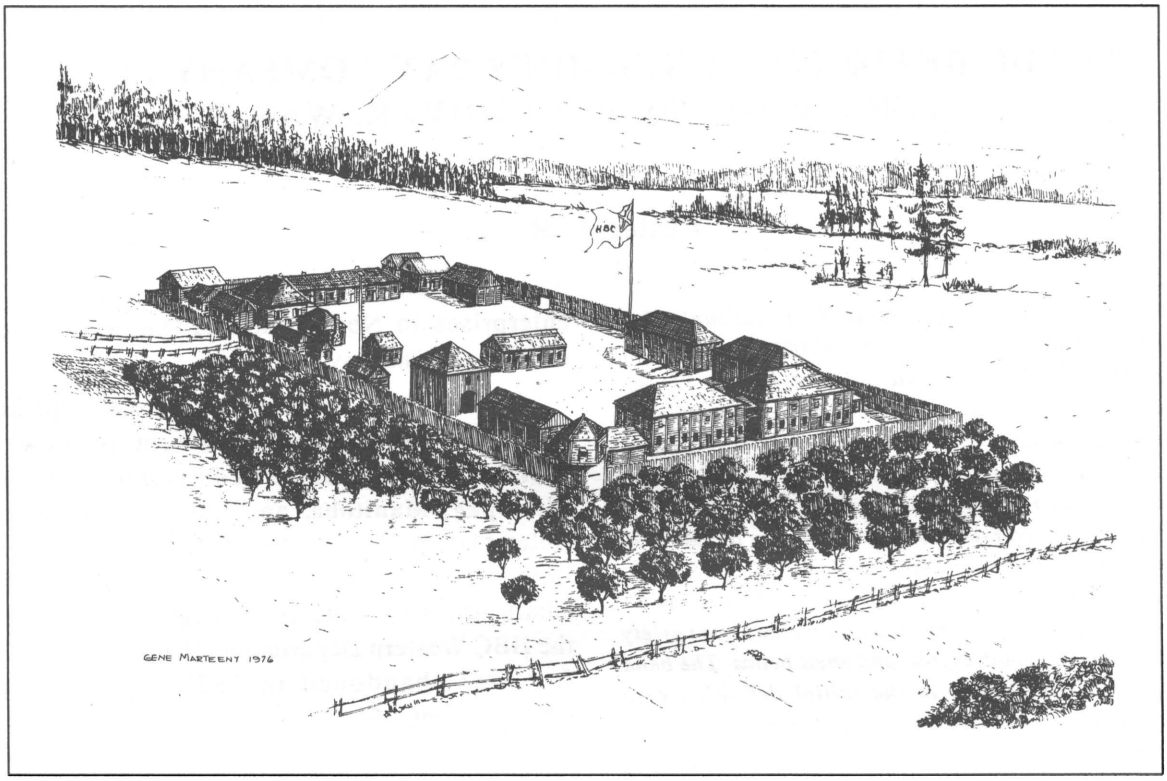


Figure 1. HBC Fort Vancouver as it probably appeared in 1845 (after Ross 1976).

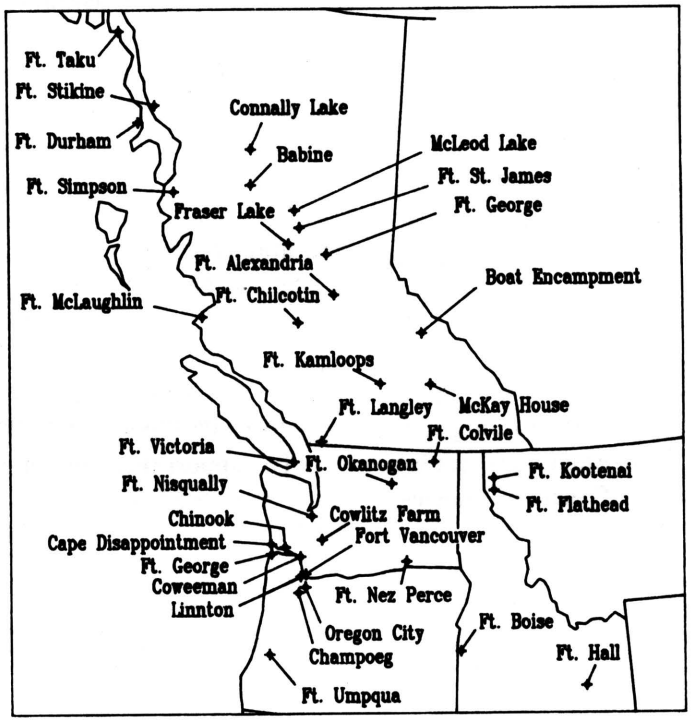


Figure 2. Establishments in the HBC Columbia Department that may have served as distribution centers for trade beads from 1824 to 1845 (after Ross 1976:4).

imposed by the United States when American custom houses were established for the Washington and Oregon Territories (Ross 1976:1-3).

Among the goods imported were tons of glass beads acquired from several suppliers, some of whom also provided commodities other than beads (Ross 1979):

John Towry Burgon and Son, London hardwaremen and gunflint manufacturers; known to have supplied the Company with gunflints, tobacco and snuff boxes, Dutch paper looking glasses, beads and finger rings for outfits 1823-1833 and 1844-1845.

Albert Pelly and Company, London merchant; known to have supplied the Company with beads for outfits 1852-1854, as well as oatmeal for outfits 1849 and 1851-1852.

Jonas Phillips and Sons, London merchants and importers of beads; known to have supplied the Company with beads for outfits 1826-1833 and for some of the outfits of 1843-1850.

Lawrence Phillips and Sons, London merchants and importers of beads; known to have supplied the Company with beads for some of the outfits of 1843-1850.

Octavius Phillips and Company, London colonial and general produce brokers; known to have supplied the Company with beads for some of the outfits of 1843-1850.

J.P. Sturgis and Company, Canton fur merchant; known to have supplied the Company with small blue glass beads for outfit 1828.

Perkins and Company, another Canton fur broker, was requested to acquire Chinese beads (Canada. National Archives. HBC Archives, A.6/21, fol. 88), but whether or not the request was fulfilled is unknown.

Historical terms for glass beads known to have been available in the HBC Columbia Department between 1824 and 1854 include (Ross 1976:227- 228):

- Bunche Beads
  - Barley Corn
    - White
    - Of Colors
  - Cut Glass
    - Crystal
      - White #4
      - Amber #4
      - Yellow #4
      - Green #4
      - Green Blue #4
      - Light Blue Opaqued #4 and #5
      - Blue #4
      - Blue Opaque
      - Lapis Blue #4
      - Lapis #4 and #6
      - Purple #6 and #7
      - Fine Purple #9
    - Brown Garnet
  - Pound Beads
    - Canton or Round Necklace #1, #2, #3 and #4
    - Common Round
      - White
      - Black
      - Clear Green
      - Light Blue
      - Blue
      - Dark Blue
      - White Enamel
        - Large
        - Small
      - Aquamarina Necklace
  - Yard Beads
    - Transparent Green

An example of the quantity and variety of beads imported by the HBC into the Columbia Department is provided in a manifest for a single shipment of beads received in 1844 (Canada. National Archives. HBC Archives, B.223/d/158, fols. 6-32):

30 bundles Aqua marina necklace Beads
240 bundles White barleycorn Beads
87 pounds Large white enamel Beads
290 pounds Small white enamel Beads Sample A
150 bundles Light Blue Cut Glass Beads Number 4
150 bundles Lapies Blue Cut Glass Beads Number 4
100 bundles Light blue cut glass opaqued Beads No. 4
60 bundles Green cut glass Beads Number 4
2 bundles Fine purple cut glass Beads Number 9
30 pounds Common round black Beads
48 pounds Common round dark blue Beads
350 pounds Common round light blue Beads B
200 pounds Common round clear green Beads C
316 pounds Common round white Beads D
69 bundles Sample G Beads

19 bundles Sample H Beads
25 bundles Sample I Beads
46 bundles Sample K Beads
50 bundles Sample L Beads
50 bundles Sample M Beads
100 bundles Sample N Beads
100 pounds Sample O Beads
50 pounds Sample P Beads
50 bundles Sample Q Beads
27 pounds Sample R Beads blue pipe

Of the historic varieties, colors and sizes of beads shipped to the Columbia Department, very few positive correlations can be made with archaeological specimens recovered from excavations conducted at Fort Vancouver. Terminology utilized by the Com-pany to identify beads was relatively non-descript, and the only countries positively identified as bead distribution sources were Great Britain and China; with probable manufacturing sources being China, Bohemia (now part of Czechoslovakia), probably Venice and perhaps Great Britain. John McCullogh (1840:126) observed that "the glass beads sent from England are all imported, principally, we believe, from Venice." Equation of this statement with the beads recovered at Fort Vancouver cannot be verified, but it is assumed that such was the case.

Canton beads were identified as round necklace beads, sold by the pound in four sizes. Bohemian beads consisted of the mold-pressed beads discussed below and identified historically from early 20th-century technical literature (Ross and Pflanz 1989). Venetian beads are assumed because this city was the major bead manufacturing center during the 19th century (e.g., Bussolin 1847). British glass-bead manufacturing during the mid-19th century presumably was limited to a few, very small-scale producers, and the diversity and quantities required by the HBC probably could not have been secured from local manufacturers.

Glass beads imported to Fort Vancouver were sold by the bunche, pound and yard. Beads sold by the bunche were strung according to predetermined lengths (Sprague 1985:92), and were generally relatively large and expensive. Normally, beads sold by the pound were small, sorted in discrete sizes, and re-sold by lesser weights. Beads sold by the yard were strung and sold in strands. Beads excavated at Fort Vancouver undoubtedly represent each of these bead groups, but positive correlations with the historic terminology cannot be accomplished with any degree of certainty.

ARCHAEOLOGICAL EXCAVATIONS AT FORT VANCOUVER

When the National Park Service acquired the site of Fort Vancouver in 1947, nothing remained of the stockade or the buildings. Louis Caywood was the first archaeologist to undertake excavations at the site to identify the dimensions of the stockade and to map the locations of the fort's buildings. Begun in 1947, the work was concluded in 1952 (Caywood 1947, 1948a,b, 1949, 1955). To augment this fieldwork, John Hussey (NPS historian) conducted archival research which initially culminated in two studies (Hussey 1949, 1957). These efforts established the physical dimensions of the site, the wealth of its artifact assemblage and the extent of its historical significance.

During the 1960s, additional archaeological investigations located horse barns to the northeast of the fort (Schumacher 1961), documented stockade features which were to be destroyed during reconstruction (Combes 1966; Larrabee 1966), and located and documented HBC Kanaka village, the settlement occupied by the laborers employed at the fort (Kardas 1970, 1971; Larrabee and Kardas 1968). Beads from these early excavations have not been inventoried in the present study.

With the reconstruction of the northern stockade in the late 1960s, a more ambitious program was undertaken for reconstructing the remainder of the stockade and many of the major structures. In 1970, John Hussey initiated historical-structure reports on the individual buildings (Hussey 1972a,b, 1973a,b, 1974, 1976); and John Hoffman (NPS archaeologist) and Lester Ross (NPS museum specialist) excavated and interpreted the archaeological remains of selected structures (Hoffman 1972, 1974; Hoffman and Ross 1972a,b, 1973a,b,c, 1974a,b, 1975, 1976; Ross 1974, 1975; Ross and Carley 1976; Ross and others 1975). As a part of this program, the Oregon Archaeological Society excavated the fort's sales shop (Steele, Ross and Hibbs 1975). Culminating this research, final

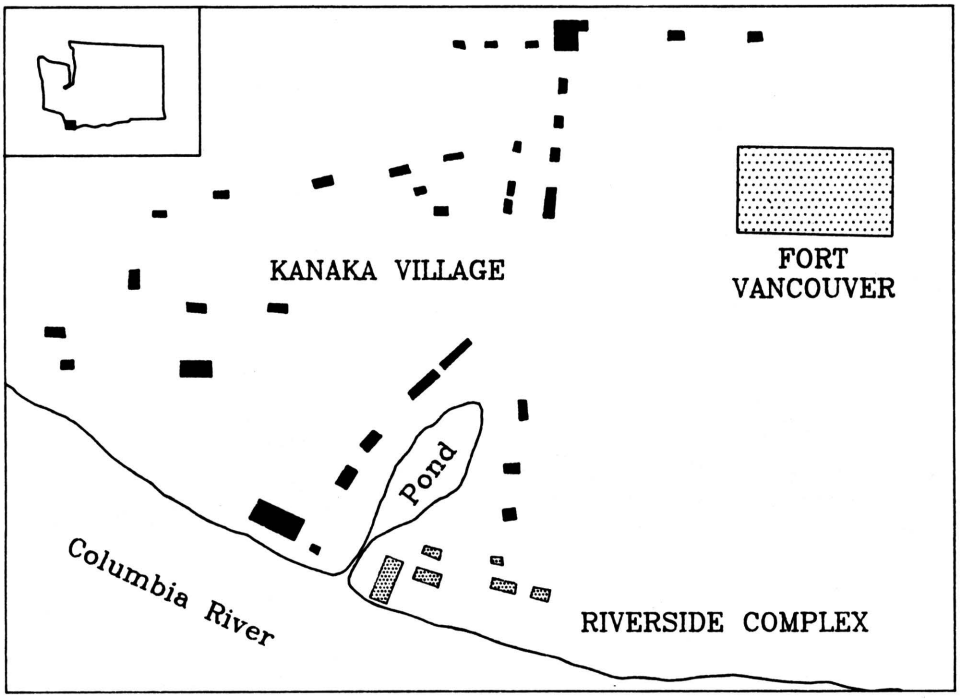


Figure 3. Fort Vancouver, Kanaka village and riverside complex sites, Washington (after Covington's Map of 1846).

reports were completed on the archaeology of the structures (Gray 1978) and the material culture of the site (Ross 1976). Subsequently, Parks Canada documented the history of the commercial suppliers of goods to the Columbia Department (Ross 1979). All of these studies contributed to the recovery, analysis, interpretation and reporting of the trade beads uncovered at Fort Vancouver.

Additional archaeological research was undertaken at the HBC Kanaka village and riverside complex sites (Fig. 3) between 1974 and 1981 (Carley 1982; Chance and Chance 1976; Chance and others 1982; Thomas and Hibbs 1984). Over 6000 beads were recovered from these excavations, generally duplicating varieties from the fort. However, 39 possible new varieties (mostly new colors for previously defined types) were recovered from HBC-period contexts, including glass, stone, bone, wood, metal and shell beads. The author has not examined these beads, and the possible new varieties are identified solely on the basis of published descriptions.

BEAD CLASSIFICATION SYSTEMS

Identification and description of the bead assemblage from Fort Vancouver is based on the classification system developed for archaeologists by Kenneth and Martha Kidd (1970), as modified and expanded by Karlis Karklins (1982, 1985). Additional descriptive nomenclature follows various authors who have addressed specific bead groups and classes (Allen 1983; Ross and Pflanz 1989; Sprague 1983, 1985). Colors are identified using Munsell notations (Munsell Color Company 1966).

The Beads were analyzed for a variety of attributes, following a four-fold, hierarchical classification scheme: 1) material and manufacturing techniques; 2) stylistic class and type attributes, including monochrome vs. polychrome, unfinished vs. finished, and undecorated vs. decorated; 3) stylistic variety attributes, including color, diaphaneity, shape, and type of decoration; and 4) bead sizes as defined from measurements of bead least diameter (LD) and length (L) with statistical samples measured for varieties with the greatest quantities.

In an attempt to conform to the Kidds' revised system of classification, codes for the Kidds' major bead groups are employed to identify beads types (e.g., IIa, WIIIb). However, use of these codes is not completely satisfactory because many attributes are lumped under a single code. To identify types clearly and discriminate specific attributes, letter modifiers have been employed to indicate such attributes as shape, type of decoration and subtle manufacturing techniques (e.g., WIb-*s* to indicate a spherical bead, WIb-*js* to indicate a conjoined spherical bead, WIIi-*sgf* to indicate a spherical bead with ground facets, and WIIIb-*eclcs* to indicate an ellipsoidal bead with combed loops and complex stripes). Finally, to further distinguish relevant attributes at the variety level, additional letter modifiers and variety numbers are employed to signify diaphaneity, short vs. long bead forms, orientation of decoration, and to identify the number of variations of a single bead type or subtype (e.g., IIf-*tps-2* to identify the second variation of a transparent short bead variety, and IVa-*op/ops-3* to identify the third variation of an opaque-on-opaque short bead variety). This allows types, their varieties and their attributes to be identified by a unique code, yet preserves the Kidds' codes for comparative purposes.

Bead descriptions have been organized to present relatively precise information within a tabular format. Thus, the variety descriptions are given in tables, with general technical information provided, when required, in the text. Possible new bead varieties not examined by the author are listed in the text, following a uniform descriptive format. Comparative information regarding the occurrence of bead varieties in other archaeological contexts has neither been exhaustive nor complete for all reported varieties. Rather, varieties which are regarded as unique or possibly significant for geographical, cultural or temporal affiliations have been documented.

Archaeological sizes are defined on the basis of a correlation of least bead diameter to length. When the quantity of beads was relatively high, statistical calculations of mean sizes were computed. However, only a sample of the documentation is reported here and then only as figures illustrating examples of population curves and isoarithms (*see* Hoffman and Ross 1974b, and Ross 1976 for specifics).

FORT VANCOUVER BEAD ASSEMBLAGE

Archaeological excavations conducted within the fort resulted in the recovery of 104,680 trade beads. Of these, 94,877 (90.6%) came from five structural areas (Fig. 4):

Fur Store, with a portion of the building used as the first Indian trade store (structure 16.1), ca. 1829 to 1843-44; second hospital dispensary (structure 15.2), ca. 1829 to ca. 1843-44; and as the second fur store (structure 11.2), ca. 1841-44 to 1849-53. As a fur store, it served both as a storehouse and packing house for imported goods (including beads) and for furs awaiting export. This site produced at least 50,671 trade beads (48.4% of the fort bead assemblage) which reflect the use of the structure as a fur store. Due to the quantity of beads present in the structural area, and because of the time required to sort beads from the bead-sized-gravel matrix, only a representative sample of beads was recovered. All beads larger than "seed" beads were removed from the matrix, and the remaining unsorted matrix is stored for future study at Fort Vancouver National Historic Site.

Sales Shop (structure 31); used ca. 1829 to 1860 as a store for the sale of goods to Euro-American settlers; 22,675 trade beads (21.7% of the fort bead assemblage) were recovered.

Indian Trade Store and Missionary Store; served as the second Indian trade store (structure 16.2) ca. 1829 to 1843-44 for trade with Native Americans. A portion of the building was used as the missionary store (structure 20) ca. 1834-36 to 1843-44, with temporary living quarters and a storehouse for American missionaries. It also served as the third hospital dispensary (structure 15.3), ca. 1843-44 to 1852-53, and the third fur store (structure 11.3), 1849-53 to 1860. There was also a missionary-store privy (structure 44.10) behind the store adjacent to the stockade which was used from ca. 1834-36 to ca. 1860. This building site and associated privy produced 15,235 beads (14.6% of the fort bead assemblage) attributed primarily to the use of the structure as an Indian trade store.

Bachelors' Quarters Privies, including two second bachelors' quarters late privies (structures 44.9.4

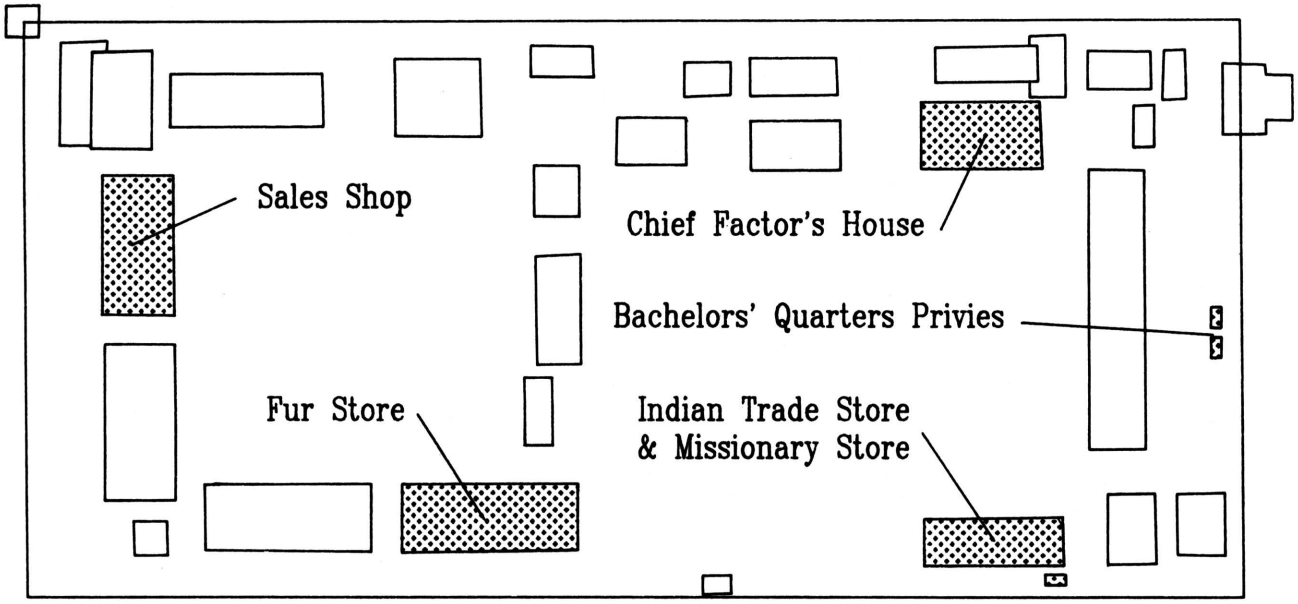


Figure 4. The five major bead-recovery areas within Fort Vancouver (after Ross 1976:23).

and 44.9.5) behind the bachelors' quarters adjacent to the stockade, used ca. 1841 to ca. 1860. Excavations uncovered 5686 trade beads (5.4% of the fort bead assemblage) attributed to the families of the HBC officers who inhabited the bachelors' quarters.

Chief Factor's House, or second chief factor's house (structure 10.2), used 1837-38 to 1860 as the family residence and dining hall for the principal officers and gentlemen of the Columbia Department. Excavations recovered 610 trade beads (<0.001% of the fort bead assemblage) attributed to the families of the principal HBC officers who inhabited the house.

The remaining 9803 beads (9.4% of the fort bead assemblage) came from a variety of structures including the stockades, bakery, wash house, harness shop, kitchen, bastions, blacksmith shop and iron store. Beads associated with these structures were included within the typological classification for the entire fort assemblage, but structure-specific assemblages have not been compared to the above-mentioned assemblages.

Glass Beads (n = 104,677)

Drawn Beads (n = 102,135)

Drawn beads were manufactured from hollow canes drawn from a molten gather of glass. The canes were chopped into bead-length segments for subsequent finishing, sorting and packaging. They are the most common beads at fort Vancouver, comprising 97.6% of the fort bead assemblage. They are grouped into four major classes based on the attributes of monochrome vs. polychrome, and unfinished vs. finished.

Class Dtum – Monochrome Beads with Chopped Ends (n = 276)

Type Ia – Undecorated Cylindrical Beads (n = 33)

These are the simplest of the unfinished monochrome beads. They have circular cross-sections, consist of short to long segments chopped from the drawn canes, and do not appear to have been fire-polished or hot tumbled. Seven varieties are recorded (Pl. Ia-e, Fig. 5, and Table 1). The HBC Kanaka village site produced one possible new variety: opaque, dark purplish blue, long variety (K81 A-9; n = 2), 1.7-1.9 mm (LD) x 9.1-10.5 mm (L) (Thomas and Hibbs 1984:244).

Type If – Complex, Multi-sided Cylindrical Beads with Ground Facets (n = 243)

The tubes used to make these beads were manufactured from a gather of glass that was probably

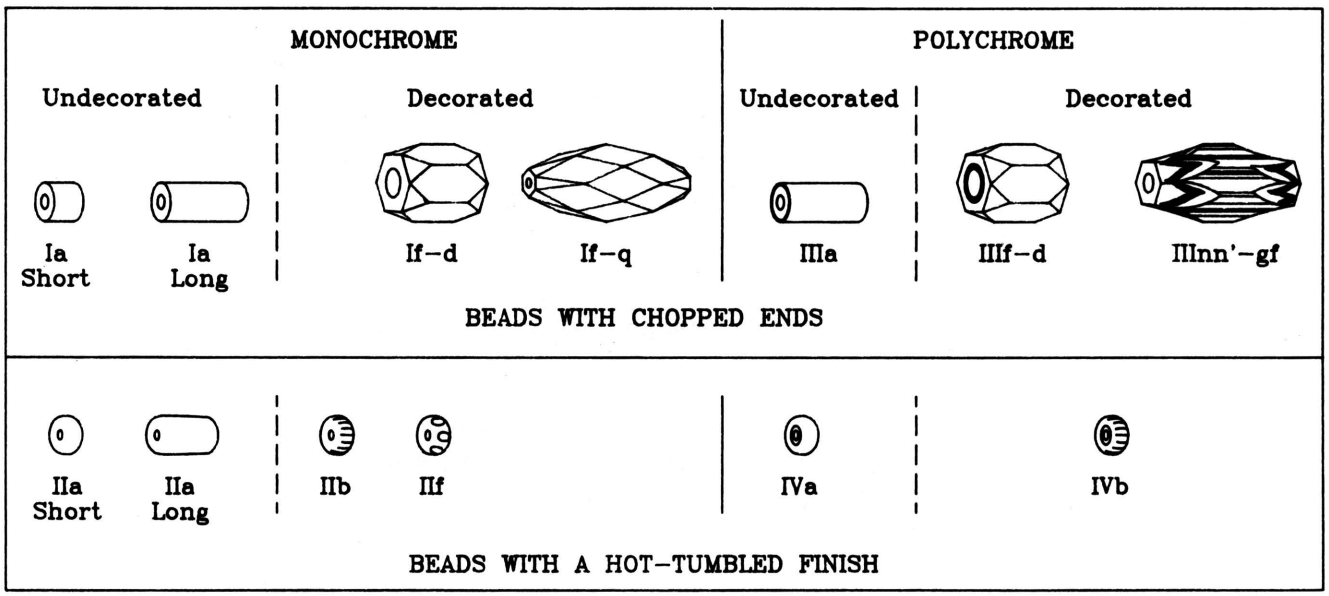


Figure 5. Drawn glass bead types.

pushed into a multi-sided mold to create a polyhedral form, and then drawn into a multi-sided, hollow cane. In an earlier report, it was speculated that the multi-sided shape may have resulted from marvering or an extrusion process (Ross 1976:686, Fig. 338), but no historical evidence for these alternatives has been located. Two subtypes were identified based on the number of rows of facets.

Subtype If-d – Beads with Two Rows of Facets (n = 241). These were manufactured by grinding two rows of facets, consisting of a facet on each corner of each end. This resulted in a 6 or 7-sided bead having 18 or 21 flat surfaces: 6 or 7 molded sides and 12 or 14 ground facets, respectively. Subtype If-d beads, and their polychrome counterparts (*see* subtype IIIf-d), have been referenced variously, and often incorrectly, as "Russian," "Bristol," "Hudson's Bay," "chief" and "ambassador" beads, or described as "cornerless hexagonal, septagonal or octagonal," "short bugle," "multi-faceted" or "cut" beads (e.g., Mille 1975; Pfeiffer 1983:209-10; Woodward 1965:12). Seven varieties of transparent and opaque beads were recorded (Pl. If-l, Fig. 5, and Table 1).

The HBC Kanaka village and riverside complex sites produced five possible new varieties: 1) translucent purple (2.5RP 3/4), long variety (II.3.; n = 1), 3.9 mm (D) x 4.9 mm (L) (Carley 1982:164); 2) transparent pinkish purple (10RP 3/10), short variety (II.b.; n = 7), 5.6-7.0 mm (D) x 4.9-6.0 mm (L) (Chance and others 1982:44; Storm 1976:108); 3) opaque dark blue (7.5PB 3/12), long variety (II.h.; n = 1), 4.7 mm (D) x 5.8 mm (L) (Storm 1976:109); 4) opaque blue (5PB 5/10), short variety (II.14.; n = 1), 8.4 mm (D) x 7.5 mm (L) (Carley 1982:164); and 5) translucent light aqua (2.5B 6/8), short variety (II.1.; n = 1), 4.3 mm (D) x 3.9 mm (L) (Carley 1982:164) .

These facetted beads, along with their polychrome counterparts (*see* subtype IIIf-d), possibly correspond to the historical "cut glass" beads of the HBC. There is a strong correlation between historical and archaeological color groupings, but whereas historical records denote five sizes (#4-7 and #9), only two statistically valid archaeological sizes were observed: 1) small, 4.6-6.8 mm (LD) x 3.5-7.1 mm (L), and 2) large, 6.4-9.6 mm (LD) x 4.4-8.8 mm (L). Generally, these archaeological sizes correspond respectively with 6 and 7-sided beads. Six-sided beads normally occur in the small size, whereas 7-sided beads are always found in the large size. Some varieties have 6-sided beads in the large size, but whenever these large 6-sided beads occur, there are also 7-sided beads. Thus, it appears that size, rather than the number of sides, was the determinant factor for historical groupings of this bead subtype. Since only two sizes were observed, it is possible that the HBC "cut glass" beads (listed historically as sizes #4

Table 1. Drawn Beads, Class Dtum – Monochrome Beads with Chopped Ends.

Type Ia – Undecorated Cylindrical Beads (n = 33)

Variety	Decoration	Diaphaneity	Color	Shape	Size (mm) Least Diameter x Length (Number of Sides)	FOVA Variety Number	Kidds' No.	Quantity	Figure No. Plate No.
Ia-tls-1	Undecorated	Translucent	Yellow 2.5Y8/12	Short	2.2 x 1.3	1085	---	1	Fig. 5
Ia-tpl-1	Undecorated	Transparent	Colorless	Long	---	1091	Ia3	1	Fig. 5
Ia-tll-1	Undecorated	Translucent	Pale Yellowish White 7.5YR8/2	Long	1.8–2.3 x 15.7–23.4	1064	Ia4	2	Fig. 5 Pl. Ia
Ia-tll-2	Undecorated	Translucent	Green 5G4/8	Long	1.7 x 2.0	1066	---	1	Fig. 5 Pl. Ib
Ia-tll-3	Undecorated	Translucent	Yellow 5Y6/8	Long	5.8–7.0 x 9.8–25.9	1001	---	26	Fig. 5 Pl. Ic
Ia-tll-4	Undecorated	Translucent	Dark Purple 5PB2/2	Long	7.0 x 12.3	1020	---	1	Fig. 5 Pl. Id
Ia-opl-1	Undecorated	Opaque	Black N 0.5/	Long	2.0 x 7.7	1007	Ia2	1	Fig. 5 Pl. Ie

Type If – Complex, Multi-sided Cylindrical Beads with Ground Facets (n = 243)

Subtype If-d – Beads with Two Rows of Facets (n = 241)

If-d6/7tps/1-1	Complex; straight, 6–7 molded sides with 2 rows of ground facets	Transparent	Colorless	Short to Long	4.9–5.3 x 4.2–5.2 (6) 7.7 x 6.4 (6) 8.6 x 7.4 (7)	1067	If2	6	Fig. 5 Pl. If
If-d6/7tps/1-2	Complex; straight, 6–7 molded sides with 2 rows of ground facets	Transparent	Amber 10YR5/10	Short to Long	8.3 x 8.8 (6) 7.8–9.9 x 6.5–8.7 (7)	1043	---	17	Fig. 5 Pl. Ig
If-d6/7tps/1-3	Complex; straight, 6–7 molded sides with 2 rows of ground facets	Transparent	Yellowish Green 2.5–7.5G4/8–10	Short to Long	7.7 x 6.0 (6) 8.3–9.0 x 6.5–7.9 (7)	1044 & 1045	If3	9	Fig. 5 Pl. Ih
If-d6/7tps/1-4	Complex; straight, 6–7 molded sides with 2 rows of ground facets	Transparent	Green 2.5–5G3–4/8	Short to Long	6.1 x 5.9 (6) 8.3–8.6 x 7.1–8.6 (6) 7.8–8.8 x 7.6–8.6 (7)	1021 & 1065	If4?	7	Fig. 5 Pl. Ii
If-d7tps-5	Complex; straight, 7 molded sides with 2 rows of ground facets	Transparent	Light Purple 2.5PB6/8	Short	8.0 x 6.1 (7)	1046	---	1	Fig. 5 Pl. Ij
If-d6/7tps/1-6	Complex; straight, 6–7 molded sides with 2 rows of ground facets	Transparent	Dark Purple 7.5PB2/10	Short to Long	4.8–8.6 x 3.5–6.2 (6) 8.1–9.2 x 6.2–8.7 (7)	1002	If5?	42	Fig. 5 Pl. Ik
If-d6/7ops/1-1	Complex; straight, 6–7 molded sides with 2 rows of ground facets	Opaque	Black N 0.5/	Short to Long	4.6–6.7 x 3.6–6.3 (6) 7.0–7.3 x 5.7–6.1 (7)	1057	If1	159	Fig. 5 Pl. Il

Subtype If-q – Beads with Four Rows of Facets (n = 2)

If-q7tpl-1	Complex; straight, 7 molded sides with 4 rows of ground facets	Transparent	Colorless	Long	7.8 x 16.4 (7)	1011	---	1	Fig. 5 Pl. Im
If-q7tpl-2	Complex; straight, 7 molded sides with 4 rows of ground facets	Transparent	Green 2.5BG4/4	Long	5.6 x 16.9 (7)	1017	---	1	Fig. 5 Pl. In

through #9) might denote other groups, classes or types of beads (*see*, especially, mold-pressed beads below).

In the Pacific Northwest, these beads, along with their polychrome equivalents (subtype IIIf-d) have been identified incorrectly as "Russian" facetted beads due to their late 18th and early 19th-century introduction into the Alaskan region by Russian fur traders. The Russian American Fur Company did trade these beads, but the Russians probably did not manufacture them. Arthur Woodward (1965:9) observed:

> Other beads, such as the large ultra marine blue faceted beads found along the coast of southern Alaska and British Columbia and as far south as Washington and Oregon, became "Russian beads", in spite of the fact that original packages of these beads, wrapped in grey coarse paper, were found unopened in the warehouse of the Russian American Fur Company at Sitka in 1867, marked "Brussels". In the latter case it was probably a repackaging job done by an export company in the Belgian city.

Subtypes If-d and IIIf-d beads may represent items manufactured in Bohemia, possibly Venice, but I doubt they are of Russian manufacture. The Russian American Fur Company was not the primary source for the Pacific Northwest, at least for areas beyond Alaska and the region of northern California near the Russian trading site of Fort Ross. In the Pacific Northwest, these bead subtypes are associated primarily with post-1820 fur-trade and Native-American sites, none of which were associated with the Russian trade. It would be just as incorrect to identify them as "Roman" beads because of their association with the Late Roman period site of Corinth in southern Greece (Davidson 1952:294, Pl. 122), or as "Viking" beads because of their association with 10th-century Viking sites in Europe (Klindt-Jensen 1970:170-71).

Subtype If-q – Beads with Four Rows of Facets (n = 2). These were manufactured by grinding four rows of facets, consisting of two rows with a facet on each corner of each end and two rows between the end rows and the molded sides. This resulted in a 7-sided bead having 35 flat surfaces, consisting of 7 molded sides and 28 ground facets. Two varieties of transparent beads were recorded (Pl. Im-n, Fig. 5, and Table 1). Both were recovered from the site of the Indian trade store and missionary store, and may represent an American, rather than HBC, import.

Beads of this subtype have been recovered from mixed 18th and 19th-century contexts on St. Eustatius, Netherlands Antilles (Karklins and Barka 1989:59, 61, and Table 1); the 1832-44 American Fur Company Fort McKenzie (24CH242), Montana (Shumate 1973:Fig. 10); and 1834-75 Fort Laramie, Wyoming (Murray 1964:Pl. II, Vars. 8109 and 8112).

Class Dtup – Polychrome Beads with Chopped Ends (n = 230)

Beads of this class exhibit multi-colored layers produced in at least two manners: intentionally, and fortuitously. Beads with intentionally applied layers were drawn from a gather of glass of one color covered with one or more layers of differently colored glass. Beads with fortuitous layers (generally of the same color hue, but with a different chroma, color value and/or diaphaneity) appear to have been produced naturally when a gather of one color cooled. It is speculated that this phenomenon results as glass cools from its surface to its interior, causing different chemical elements to migrate slower or faster. As coalescing elements "freeze," concentric layers which are brighter or duller, lighter or darker, or more opaque, translucent or transparent than adjacent layers are created. Whether or not beadmakers consciously created polychrome beads to exhibit these traits remains unknown. No historical evidence for Fort Vancouver indicates recognition of this attribute.

Once cooled, the polychrome canes were chopped into bead-length segments for subsequent sorting and packaging. Beads of this class do not appear to have been fire-polished or hot tumbled.

Type IIIa – Undecorated Cylindrical Beads (n = 4)

These have circular cross-sections with a thick core and a very thin covering. One variety is recorded (Pl. Io, Fig. 5, and Table 2).

Type IIIf – Complex, Multi-sided Cylindrical Beads with Ground Facets (n = 225)

These are fortuitously layered, polychrome beads, created in the same manner as the equivalent type If discussed above. One subtype is recorded.

Table 2. Drawn Beads, Class Dtup – Polychrome Beads with Chopped Ends.

Type IIIa – Undecorated Cylindrical Beads (n = 4)

Variety	Decoration	Diaphaneity	Color	Shape	Size (mm) Least Diameter x Length (Number of Sides)	FOVA Variety Number	Kidds' No.	Quantity	Figure No. Plate No.
IIIa-tp/opl-1	Undecorated	Transparent on Opaque	Thin Colorless on Thick White N 9/	Long	6.1–7.5 x 12.1–25.7	1024	---	4	Fig. 5 Pl. Io

Type IIIf – Complex, Multi-sided Cylindrical Beads with Ground Facets (n = 225)

Subtype IIIf-d – Beads with Two Rows of Facets (n = 225)

IIIf-d6/7tp/tls/l-1	Complex; straight, 6–7 molded sides with 2 rows of ground facets	Transparent alternating/w Translucent	Colorless alternating/w White N 9/	Short to Long	4.7–5.6 x 4.1–7.1 (6) 7.3–7.8 x 5.8–7.8 (6) 8.4–9.1 x 7.6–8.3 (7)	1036	IIIf1	25	Fig. 5 Pl. Ip
IIIf-d6/7tp/tls-2	Complex; straight, 6–7 molded sides with 2 rows of ground facets	Transparent alternating/w Translucent	Light Purple 5PB3/6 alternating/w Light Purple 5PB6/6	Short	7.4–7.5 x 6.2–7.2 (6) 8.2 x 6.7 (7)	1079	---	3	Fig. 5 Pl. Iq
IIIf-d6/7tp/tls/l-3	Complex; straight, 6–7 molded sides with 2 rows of ground facets	Transparent alternating/w Translucent	Dark Purple 7.5PB3/10–max alternating/w Light Purple 7.5PB6–7/6	Short to Long	4.8–6.2 x 4.5–6.3 (6) 6.5–8.1 x 6.0–8.0 (6) 7.5–9.4 x 5.8–8.5 (7)	1018, 1035, 1077 & 1078	---	102	Fig. 5 Pl. Ir
IIIf-d7op/ops/l-1	Complex; straight, 6–7 molded sides with 2 rows of ground facets	Opaque alternating/w Opaque	Light Blue 7.5B7/4 alternating/w Light Blue 7.5B8/4	Short to Long	7.4–9.6 x 6.0–8.8 (7)	1030	---	29	Fig. 5 Pl. Is
IIIf-d7op/ops/l-2	Complex; straight, 6–7 molded sides with 2 rows of ground facets	Opaque alternating/w Opaque	Purple 5–7.5PB4–5/8–10 alternating/w Light Purple 5–7.5PB5–6/6–10	Short to Long	6.4–9.4 x 4.4–8.8 (7)	1031, 1032 & 1033	---	58	Fig. 5 Pl. It
IIIf-d7op/ops/l-3	Complex; straight, 6–7 molded sides with 2 rows of ground facets	Opaque alternating/w Opaque	Dark Purple 7.5PB3/10 alternating/w Light Purple 7.5PB5/10	Short to Long	7.6–8.9 x 6.6–7.8 (7)	1034	---	8	Fig. 5 Pl. Iu

Type IIInn'-gf – Complex "Chevron" Beads with Complex Straight Stripes and Ground Facets (n = 1)

IInn'-gf-1	12 ground facets (6 at each end) over 2 complex stripes alternating with 2 complex stripes on a plain layer on a 12-grooved molded layer on a plain layer on a 12-grooved molded core	2 opaque on opaque stripes alternating with 2 opaque on opaque stripes on translucent plain layer on opaque molded layer on opaque plain layer on opaque molded core	2 Narrow Black N 0.5/ on Wide Yellow 10YR6/8 Stripes alternating with 2 Narrow Yellow 10YR6/8 on Wide Red 7.5R3/10 Stripes on Green Plain Layer 2.5BG3/8 on White N 9/ Molded Layer on Red Plain Layer 7.5R3/10 on White N 9/ Molded Core	Long	12.4 x 20.1	1039	---	1	Fig. 5 Pl. Iv

Subtype IIIf-d – Beads with Two Rows of Facets (n = 225). Six varieties of transparent and opaque beads are recorded (Pl. Ip-u, Fig. 5, and Table 2).

The HBC Kanaka village site produced two possible new varieties: 1) translucent light blue (2.5B 5/6), short variety (II.a.; n = 1), 8.8 mm (D) x 7.0 mm (L) (Storm 1976:108); and 2) opaque milky (5YR 9/1), short variety (II.d. and II.e.; n = 2), in two sizes: 6.0 mm (D) x 5.0 mm (L), and 9.0 mm (D) x 7.5 mm (L) (Storm 1976:108).

For a further discussion on this bead subtype, its sizes and cultural affiliation, *see* subtype If-d above.

Type IIInn'-gf – Complex "Chevron" Beads with Complex Straight Stripes and Ground Facets (n = 1)

This is a polychrome specimen, best identified as a hybrid-cane rosetta bead, often referred to as a "chevron" (after Allen 1983). It was manufactured by alternately pushing a gather of glass of one color into a twelve-pointed star mold, then covering it with a layer of glass of a second color and later a third. Complex straight stripes were next laid onto the gather, and the entire mass was drawn into a hollow cane. Finally, the cane was chopped into bead-length segments and six facets were ground at each end forming a bead with a circular cross-section and 12 facets. One variety is recorded (Pl. Iv, Fig. 5, and Table 2).

Class Dtfm – Monochrome Beads with a Hot-tumbled Finish (n = 72,959)

These are hot-tumbled versions of class Dtum beads. After the drawn canes were cut into

Table 3. Drawn Beads, Class Dtfm – Monochrome Beads with a Hot-tumbled Finish.

Type IIa – Undecorated "Cylindrical" Beads (n = 72,410)

Variety	Decoration	Diaphaneity	Color	Shape	Size (mm) Least Diameter x Length	FOVA Variety Number	Kidds' No.	Quantity	Figure No. Plate No.
IIa-tps-1	Undecorated	Transparent	Colorless	Short	2.0–4.3 x 2.0–4.5	1060	----	74	Fig. 5 Pl. IIa
IIa-tps-2	Undecorated	Transparent	Dark Red 7.5R3/12	Short	1.5–2.6 x 0.9–1.9	1027	----	734	Fig. 5 Pl. IIb
IIa-tps-3	Undecorated	Transparent	Red 5R5/12	Short	1.4–1.5 x 0.8–0.9	1071	----	3	Fig. 5 Pl. IIc
IIa-tps-4	Undecorated	Transparent	Amber 7.5YR6/10	Short	1.3–1.4 x 0.8–1.0	1022	----	4	Fig. 5 Pl. IId
IIa-tps-5	Undecorated	Transparent	Yellow 2.5Y8/8	Short	1.3 x 0.8	1090	----	1	Fig. 5 Pl. IIe
IIa-tps-6	Undecorated	Transparent	Yellowish Green 2.5G3–4/6–8	Short	2.1–3.9 x 1.1–2.5	1061	----	3,855	Fig. 5 Pl. IIf
IIa-tps-7	Undecorated	Transparent	Green 5–10G3–4/6–8	Short	2.0–4.3 x 1.0–3.9	1016	IIa27?	7,382	Fig. 5 Pl IIg
IIa-tps-8	Undecorated	Transparent	Blue 2.5B3/6	Short	1.3 x 0.9–1.0 2.2–3.0 x 1.4–2.0	1074 & 1075	----	65	Fig. 5 Pl. IIh
IIa-tps-9	Undecorated	Transparent	Dark Purple 5PB2/4	Short	6.7–8.5 x 4.9–9.0	1049	----	8	Fig. 5 Pl. IIi
IIa-tps-10	Undecorated	Transparent	Purple 5–7.5PB2/6–8	Short	1.8–3.3 x 1.3–2.2	1025, 1026 & 1047	IIa56	607	Fig. 5 Pl. IIj
IIa-tls-1	Undecorated	Translucent	White N 8/	Short	1.3–1.8 x 1.0–1.2	1009	IIa12	10	Fig. 5 Pl. IIk
IIa-tls-2	Undecorated	Translucent	Yellow 5Y8.5/6	Short	1.2–1.4 x 0.8–1.0	1023	----	18	Fig. 5 Pl. III
IIa-tls-3	Undecorated	Translucent	Bluish Green 10BG4/4	Short	8.1 x 7.3	1006	----	1	Fig. 5 Pl. IIm
IIa-tls-4	Undecorated	Translucent	Blue 7.5–10BG–2.5–10B3–6/2–10	Short	1.2–3.0 x 1.2–2.5 2.4–4.1 x 1.7–3.7 3.2–5.3 x 2.5–5.9	1063	----	22,528	Fig. 5 Pl. IIn

Table 3 (Contd.)

Type IIa – Undecorated "Cylindrical" Beads

Variety	Decoration	Diaphaneity	Color	Shape	Size (mm) Least Diameter x Length	FOVA Variety Number	Kidds' No.	Quantity	Figure No. Plate No.
IIa-ops-1	Undecorated	Opaque	White N 9/	Short	1.1-1.8 x 0.7-1.4 1.5-2.4 x 1.0-2.0 1.9-3.0 x 1.4-2.6 2.6-3.3 x 1.7-2.6	1003	IIa14	31,279	Fig. 5 Fig. 7 Pl. IIo
IIa-ops-2	Undecorated	Opaque	Black N 0.5/	Short	1.8-5.3 x 1.0-4.1	1050	IIa7	331	Fig. 5 Pl. IIp
IIa-ops-3	Undecorated	Opaque	Dark Brownish Red 5R3/6	Short	2.8 x 1.8	1008	---	1	Fig. 5 Pl. IIq
IIa-ops-4	Undecorated	Opaque	Brownish Red 7.5R3/6	Short	1.5-2.0 x 1.1-1.7 1.9-2.8 x 1.3-2.2	1051	IIa2	464	Fig. 5 Fig. 6 Pl. IIr
IIa-ops-5	Undecorated	Opaque	Amber 5YR6/10	Short	1.0-1.2 x 1.2-1.4 2.6-3.2 x 1.7-2.1	1052	IIa19?	14	Fig. 5 Pl. IIs
IIa-ops-6	Undecorated	Opaque	Yellowish Amber 10YR6/10	Short	2.2-2.3 x 1.1-1.3	1084	IIa19?	2	Fig. 5 Pl. IIt
IIa-ops-7	Undecorated	Opaque	Yellow 7.5Y8.5/10	Short	1.2-1.8 x 0.9-1.3 2.6-3.5 x 2.3-2.7	1004	---	2,477	Fig. 5 Pl. IIu
IIa-ops-8	Undecorated	Opaque	Greenish Yellow 5GY6/8	Short	1.4 x 1.0	1019	---	1	Fig. 5 Pl. IIv
IIa-ops-9	Undecorated	Opaque	Yellowish Green 10GY5/6	Short	1.3-1.8 x 1.0-1.3	1076	---	16	Fig. 5 Pl. IIw
IIa-ops-10	Undecorated	Opaque	Green 2.5G3-4/6-8 with White speckles N 7.5/	Short	2.7-3.4 x 2.2-2.4 4.1-5.4 x 2.8-4.7	1053	---	51	Fig. 5 Pl. IIx
IIa-ops-11	Undecorated	Opaque	Bluish Green 10G7/6	Short	1.3-1.7 x 0.9-1.3	1062	---	556	Fig. 5 Pl. IIy
IIa-ops-12	Undecorated	Opaque	Blue 10B6/4	Short	1.2-1.5 x 0.7-1.1	1010	---	13	Fig. 5 Pl. IIz
IIa-ops-13	Undecorated	Opaque	Grayish Blue 10B6/4	Short	3.6 x 3.9	1073	---	1	Fig. 5 Pl. IIaa
IIa-ops-14	Undecorated	Opaque	Light Purplish Blue 2.5PB7/2	Short	2.1-2.7 x 1.4-2.1	1054	---	28	Fig. 5 Pl. IIbb
IIa-ops-15	Undecorated	Opaque	Dark Purplish Blue 2.5PB4/4	Short	3.3 x 2.2	1081	IIa47	1	Fig. 5 Pl. IIcc
IIa-ops-16	Undecorated	Opaque	Light Purplish Blue 5PB6/4	Short	1.2-1.6 x 0.9-1.1	1068	---	7	Fig. 5 Pl. IIdd
IIa-ops-17	Undecorated	Opaque	Bluish Purple 5PB5/8	Short	1.5-2.0 x 0.8-1.3	1055	---	171	Fig. 5 Pl. IIee
IIa-ops-18	Undecorated	Opaque	Dark Bluish Purple 7.5PB4/10	Short	1.3-1.6 x 1.0-1.3	1056	---	19	Fig. 5 Pl. IIff
IIa-ops-19	Undecorated	Opaque	Dark Purple 5-7.5PB2-3/6	Short to Long	2.0-4.5 x 1.7-3.2	1012 & 1083	---	1601	Fig. 5 Pl. IIgg
IIa-ops-20	Undecorated	Opaque	Purple 2.5P7/4	Short	1.6 x 1.1	1013	---	1	Fig. 5 Pl. IIhh
IIa-ops-21	Undecorated	Opaque	Light Purple 7.5P7/6	Short	1.1 x 0.9	1014	---	1	Fig. 5
IIa-ops-22	Undecorated	Opaque	Light Reddish Purple 10P8/4	Short	1.0-1.3 x 0.9-1.1	1069	---	9	Fig. 5 Pl. IIii
IIa-ops-23	Undecorated	Opaque	Pink 7.5RP5-6/8-10	Short	1.1-1.3 x 1.0-1.5 3.1 x 2.3	1015	---	55	Fig. 5 Pl. IIjj
IIa-opl-1	Undecorated	Opaque	Dark Blue 2.5B3/6	Long	7.0-8.8 x 7.0-10.2	1041	---	15	Fig. 5 Pl. IIkk
IIa-opl/s-2	Undecorated	Opaque	Blue 5B5/8	Long to Short	6.7-7.3 x 6.3-8.6	1042	---	6	Fig. 5 Pl. IIll

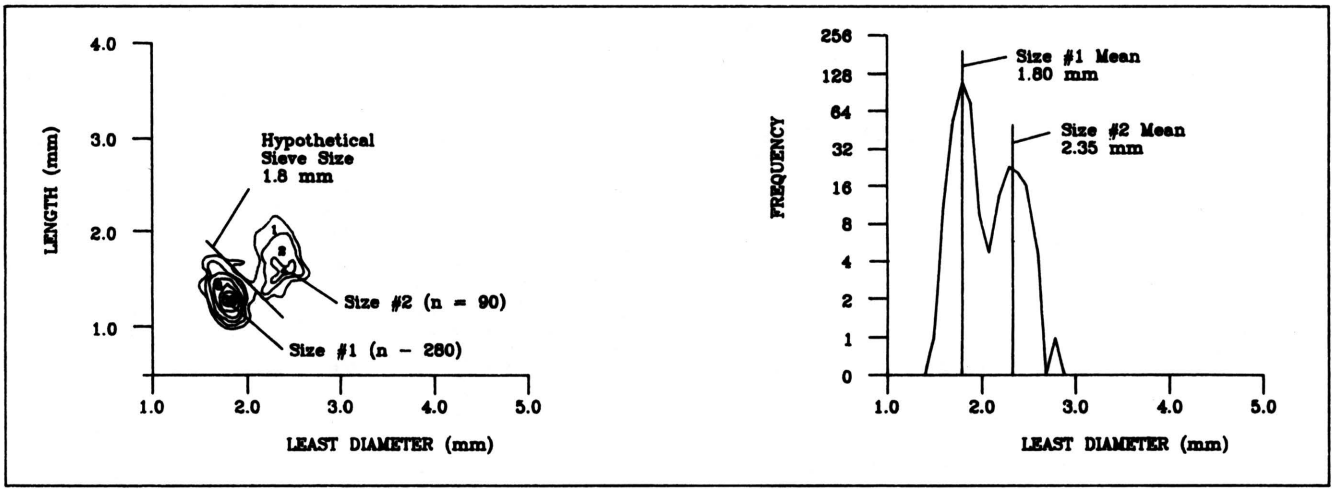


Figure 6. Hypothetical sizes of variety IIa-ops-4 beads (after Ross 1976:718-19).

bead-length segments, they were tumbled over a fire in a rotating container which, during the period that Fort Vancouver was occupied, may have contained ash and sand (Hoppe and Hornschuch 1818), sand and charcoal (Bussolin 1847), or plaster and graphite, or clay and charcoal dust (Francis 1979:10).

Type IIa – Undecorated "Cylindrical" Beads (n = 72,410)

The simplest type of finished, monochrome, drawn bead is an undecorated one with a circular cross-section. It is the most common type at Fort Vancouver (69.2% of the fort bead assemblage), and exists in two forms: short (with a torus to round shape) and long (with a rounded cylindrical shape). It is composed of transparent, translucent, and opaque glass. Thirty-nine varieties are recorded (Pl. IIa-ll, Fig. 5, and Table 3).

The HBC Kanaka village site produced three possible new varieties: 1) translucent greenish blue, short variety (K81 A-1; n = 1), 2.4 mm (LD) x 2.0 mm (L) (Thomas and Hibbs 1984:502); 2) translucent blue, long variety (K81 A-8; n = 1), 4.4 mm (LD) x 8.3 mm (L) (Thomas and Hibbs 1984:244); and 3) translucent dark purple, short variety (K81 A-2; n = 2), 2.7-3.0 mm (LD) x 2.6-2.7 mm (L) (Thomas and Hibbs 1984:502).

Because of the high frequency of many of the bead varieties at the fort, it is often possible to calculate relatively tightly defined sizes. Typically, a single bead variety occurs in a single size, as defined by the correlation of least diameter (LD) to length (L). Occasionally, two sizes exist (Fig. 6), and sometimes even three to four sizes (Fig. 7). Sizes tend to occur at regular intervals (e.g., a 0.8 mm interval for variety IIa-tls-4, and a 0.45-0.56 mm interval for variety IIa-ops-1). To obtain sizes measured to such fine intervals, beadmakers sorted beads by sieving, using stacked, graded wire screens (Bussolin 1847) with mesh openings decreasing 0.4 to 0.8 mm per screen. Hand-sorting might have resulted in the creation of these subtle and regular sizes, but it would have been labor intensive, more costly and perhaps not as accurate.

Type IIb – "Cylindrical" Beads with Simple Straight Stripes (n = 81)

These have simple stripes ranging in number from 4 to 26. Three varieties are recorded (Pl. Iw-y, Fig. 5, and Table 4).

Type IIf – "Cylindrical" Beads with Ground Facets (n = 468)

These are monochrome "seed" beads (type IIa beads) with 2 to 6 randomly ground facets. Three varieties are recorded (Pl. Iz-bb, Fig. 5, and Table 4).

The HBC listed "brown garnet" beads that might possibly represent this bead type. However, only red, dark purplish red and black specimens were excavated at the fort.

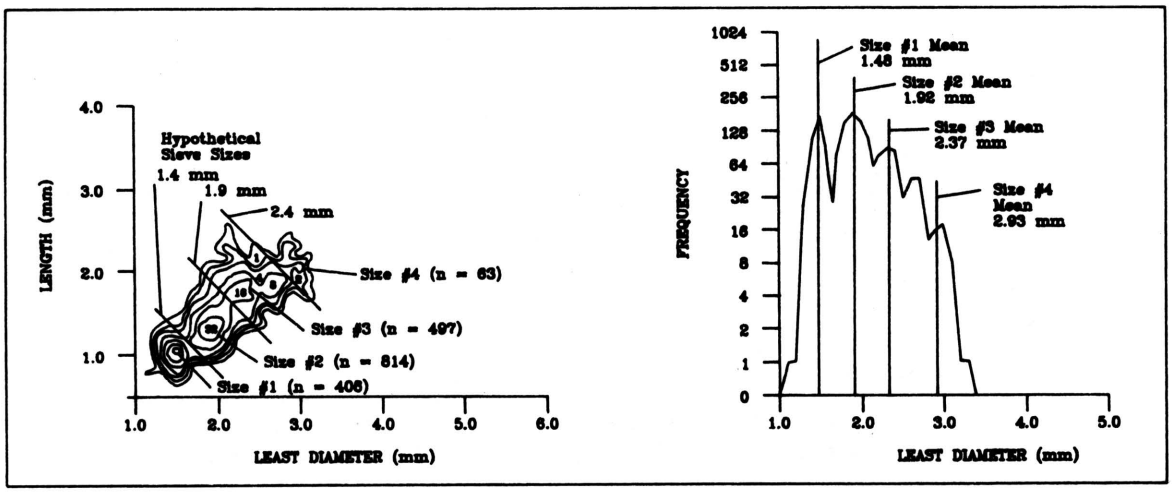


Figure 7. Hypothetical sizes of variety IIa-ops-1 beads (after Ross 1976:713-14).

Table 4. Drawn Beads, Class Dtfm – Monochrome Beads with a Hot-tumbled Finish.

Type IIb – "Cylindrical" Beads with Simple Straight Stripes (n = 81)

Variety	Decoration	Diaphaneity	Color	Shape	Size (mm) Least Diameter x Length	FOVA Variety Number	Kidds' No.	Quantity	Figure No. Plate No.
IIb-op/tps-1	11-17 simple, straight stripes	Opaque Stripes on Transparent	White Stripes N 8/ on Colorless	Short	5.5-6.6 x 3.5-6.1	1048	----	9	Fig. 5 Pl. Iw
IIb-op/ops-1	4 simple, straight stripes	Opaque Stripes on Opaque	Purple Stripes 7.5PB4/6 on White N 8/	Short	2.4-3.0 x 1.4-2.6	1028	----	70	Fig. 5 Pl. Ix
IIb-op/tpl-1	26 simple, straight stripes	Opaque Stripes on Transparent	White Stripes N 8/ on Purple 7.5PB2/6	Long	6.9 x 7.0 8.9 x 12.9	1029	----	2	Fig. 5 Pl. Iy

Type IIf – "Cylindrical" Beads with Ground Facets (n = 468)

IIf-tps-1	2-6 randomly ground facets	Transparent	Red 7.5R3/12	Short	1.9-2.9 x 1.3-2.1	1058	----	107	Fig. 5 Pl. Iz
IIf-tps-2 (beads often fused in pairs)	2-5 randomly ground facets	Transparent	Dark Purplish Red 7.5RP2/8	Short	2.2-4.2 x 1.6-3.7	1059	----	359	Fig. 5 Pl. Iaa
IIf-ops-1	2 randomly ground facets	Opaque	Black N 0.5/	Short	2.8-3.0 x 1.8-2.2	1005	----	2	Fig. 5 Pl. Ibb

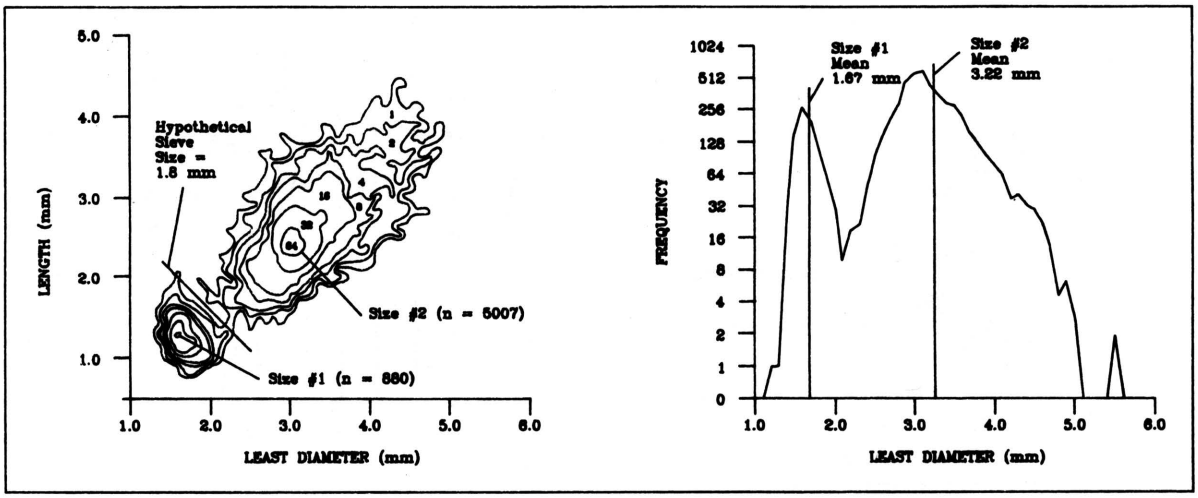


Figure 8. Hypothetical sizes of variety IIa-op/ops-1 beads (after Ross 1976:729-30).

Class Dtfp – Polychrome Beads with a Hot-tumbled Finish (n = 28,670)

These are hot-tumbled versions of class Dtup beads. Both intentionally and fortuitously layered polychromes (*see* class Dtup above) are recorded.

Type IVa – Undecorated "Cylindrical" Beads (n = 28,662)

This is the second most common bead type recovered (27.4% of the fort bead assemblage) with eight varieties recorded (Pl. Icc-jj, Fig. 5, and Table 5). Two varieties, IVa-op/tls-1 and IVa-op/ops-1, are fortuitously layered.

The HBC Kanaka village site produced six possible new varieties: 1) transparent purplish blue on opaque light blue, short variety (K81 A-6; n = 1), 5.0 mm (LD) x 4.3 mm (L) (Thomas and Hibbs 1984:244); 2) translucent blue on opaque green, short variety (K81 A-3; n = 1), 5.0 mm (LD) x 4.3 mm (L) (Thomas and Hibbs 1984:502); 3) translucent purple on opaque green, short variety (K81 A-4; n = 1), 2.4 mm (LD) x 1.8 mm (L) (Thomas and Hibbs 1984:502); 4) opaque black on opaque dark grey, short variety (K81 A-5; n = 1), measuring 4.2 mm (LD) x 3.3 mm (L) (Thomas and Hibbs 1984:244); 5) opaque grayish blue on opaque blue, short variety (K81 A-10; n = 5), 1.5-1.7 mm (LD) x 1.1-1.2 mm (L) (Thomas and Hibbs 1984:244); and 6) opaque purplish blue on opaque light blue, short variety (K81 A-7; n = 1), 4.7 mm (LD) x 4.1 mm (L) (Thomas and Hibbs 1984:244).

Only one variety (IVa-op/ops-1) from the fort occurs in sufficiently large numbers to allow multiple sizes to be defined (Fig. 8). The smaller size of this variety is tightly defined, while the larger size represents multiple, combined sizes which cannot be further subdivided.

The red-on-white (IVa-tp/ops-1), red-on-yellow (IVa-tp/ops-2), red-on-light pink (IVa-tl/ops-1), and brownish red-on-green (IVa-op/tps-1) varieties are often termed "cornaline d'Aleppo" or "Hudson's Bay Company" beads (e.g., Jenkins 1975; Mille 1975). They are commonly associated with Native-American sites, and are especially common during the early and mid-19th century.

Type IVb – "Cylindrical" Beads with Simple Straight Stripes (n = 8)

These exhibit 4 to 6 simple stripes. Three varieties are recorded (Pl. Ikk-mm, Fig. 5, and Table 5).

Wound Beads (n = 2371)

Simple wound beads were manufactured individually or conjoined (probably accidentally) by wrapping or winding molten glass around a rotating mandrel, such as a wire, rod, or straw coated with a clay slip. They were then removed from the shafts, annealed, cleaned, sorted and packaged. Complex and decorated wound beads were altered by molding or shaping, by applying stripes, by facetting, etc.

Table 5. Drawn Beads, Class Dtfp – Polychrome Beads with a Hot-tumbled Finish.

Type IVa – Undecorated "Cylindrical" Beads (n = 28,662)

Variety	Decoration	Diaphaneity	Color	Shape	Size (mm) Least Diameter x Length	FOVA Variety Number	Kidds' No.	Quantity	Figure No. Plate No.
IVa-tp/ops-1	Undecorated	Transparent on Opaque	Red 6.25R3/12 on White N 9.5/	Short	2.3–3.6 x 1.6–2.5	1037	----	37	Fig. 5 Pl. Icc
IVa-tp/ops-2	Undecorated	Transparent on Opaque	Red 10R4/8 on Yellow 5Y8.5/8	Short	1.8–1.9 x 1.1–1.3	1072	----	2	Fig. 5 Pl. Idd
IVa-tl/ops-1	Undecorated	Translucent on Opaque	Red 5R3/10 on Light Pink 10RP8/2	Short	4.4–5.1 x 3.0–4.0	1068	----	74	Fig. 5 Pl. Iee
IVa-op/tps-1	Undecorated	Opaque on Transparent	Brownish Red 7.5R3/6 on Green 10GY6/6	Short	1.9–2.8 x 1.1–2.2 2.6–3.7 x 2.2–2.9	1038	IVa6	529	Fig. 5 Pl. Iff
IVa-op/tls-1	Undecorated	Opaque on Translucent	Blue 7.5B7/4 on Blue 7.5B5/6	Short	1.9–2.1 x 1.0–1.8	1062	----	2	Fig. 5 Pl. Igg
IVa-op/ops-1	Undecorated	Opaque on Opaque	White 10Y9/1 on White 10Y8.5/1	Short	1.2–2.2 x 0.7–2.1 1.6–5.5 x 1.3–5.0 8.4–10.4 x 6.5–7.4	1040	----	28,014	Fig. 5 Fig. 8 Pl. Ihh
IVa-op/ops-2	Undecorated	Opaque on Opaque	White 10Y8.5/1 on Gray N 5.5/	Short	2.2–2.6 x 1.6–1.7	1069	----	2	Fig. 5 Pl. Iii
IVa-op/ops-3	Undecorated	Opaque on Opaque	White 10Y8.5/1 on Dark Brown 10YR3/2	Short	2.9–4.3 x 1.8–3.2	1060	----	2	Fig. 5 Pl. Ijj

Type IVb – "Cylindrical" Beads with Simple Straight Stripes (n = 8)

IVb-op/op/ops-1	4 simple, straight stripes	Opaque Stripes on Opaque on Opaque	Purple Stripes 5/PB2-3/4-6 on White N 9/–5PB6/1 on Purple 5PB6–8/2–6	Short	2.5–2.9 x 1.7–2.5	1070 & 1067	----	6	Fig. 5 Pl. Ikk
IVb-op/op/ops-2	6 simple, straight stripes	Opaque Stripes on Opaque on Opaque	Purple Stripes 5PB4/6 on White 5PB8/1 on Light Purple 5PB7/2	Short	4.6 x 3.6	1066	----	1	Fig. 5 Pl. Ill
IVb-op/op/opl-1	4 simple, straight stripes	Opaque Stripes on Opaque on Opaque	Pink Stripes 10RP6/6 on White 10RP9/2 on Light Pink 10RP7/2	Long	2.5 x 2.7	1092	----	1	Fig. 5 Pl. Imm

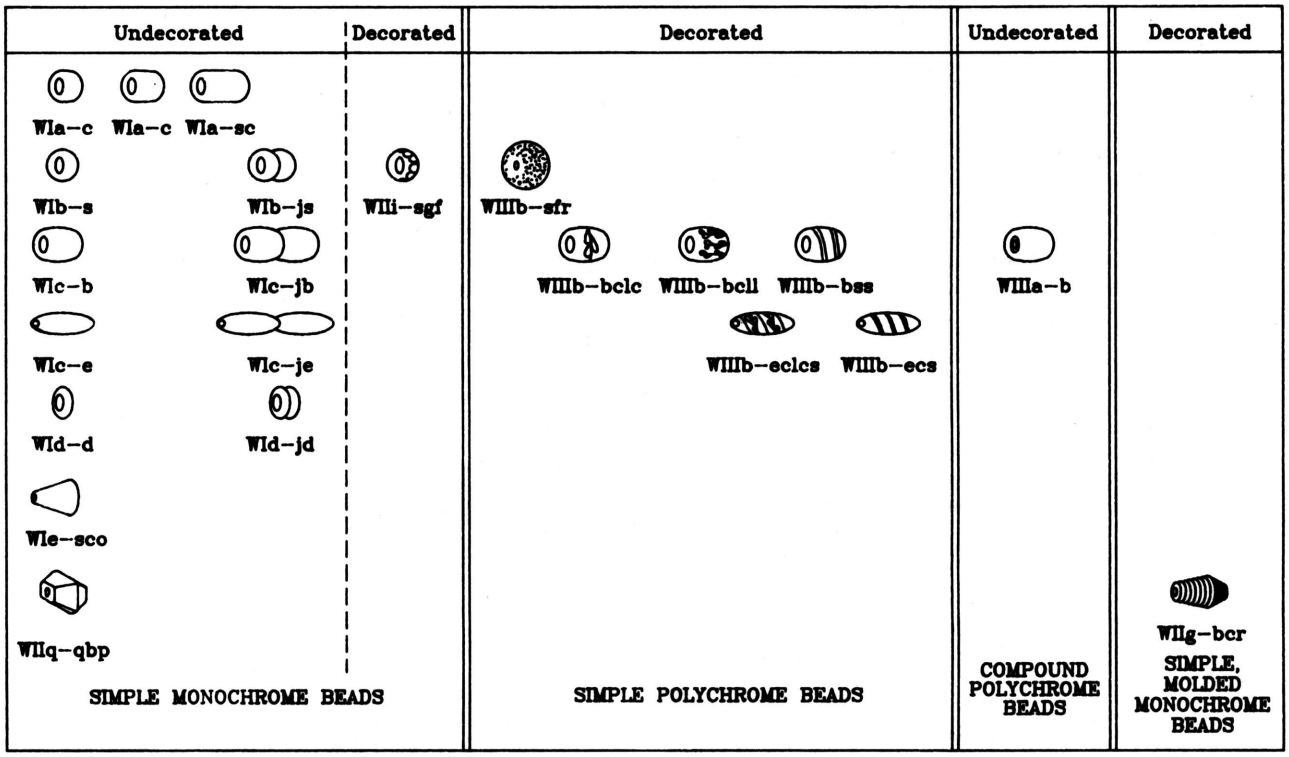


Figure 9. Wound bead types.

Wound beads comprise the second most common group at Fort Vancouver (2.3% of the fort bead assemblage), and are grouped into three major classes on the basis of manufacturing technique.

Class Wsm – Simple Monochrome Beads (n = 2359)

These exhibit a monochrome body, either undecorated, shaped or facetted.

Type WIa-c – Undecorated "Cylindrical" Beads (n = 25)

These are roughly cylindrical with no decoration. Six varieties are recorded (Pl. IIIa-f, Fig. 9, and Table 6).

The HBC Kanaka village and riverside complex sites produced six possible new varieties: 1) translucent amber (2.5YR 3/8), short variety (III.12.; n = 1), 7.0 mm (D) x 5.1 mm (L) (Carley 1982:165); 2) translucent purple (10P 2/4), short variety (III.11.; n = 1), 6.7 mm (L) x 4.6 (L) (Carley 1982:165); 3) opaque blue (7.5PB 2-3/10), short variety (III.21. and III.22.; n = 3), in two sizes measuring 5.0 mm (D) x 2.4 mm (L) and 7.1 mm (D) x 3.6-3.9 mm (L) (Carley 1982:165); 4) opaque turquoise (2.5B 3/8), short variety (III.4.; n = 2), 3.8-4.7 mm (D) x 2.3-3.2 mm (L) (Carley 1982:164); 5) opaque white (5Y 8.5/1), short variety (III.15.; n = 1), 6.6 mm (D) x 5.3 mm (L) (Carley 1982:165); and 6) opaque black (N 1.5/), short variety (III.16.; n = 1, and K81 B-1; n = 5), 6.2-7.1 mm (LD) x 4.0-5.7 mm (L) (Carley 1982:165; Thomas and Hibbs 1984:245).

Type WIa-sc – Undecorated, Shaped, Cylindrical Beads (n = 1)

The single specimen was shaped purposefully into a well-formed, rounded cylinder, possibly by turning the glass against a mold prior to its removal from the mandrel. If it was turn molded, then it may represent a type WIIg bead with a simple, rather than "elaborate," shape. One variety is recorded (Pl. IIIg, Fig. 9, and Table 6).

Type WIb-s – Undecorated "Spherical" Beads (n = 2244)

These are roughly spherical with no decoration, and the most common type of wound bead at the fort with 14 varieties being recorded (Pl. IIIh-u, Fig. 9, and Table 6).

Table 6. Wound Beads, Class Wsm – Simple Monochrome Beads.

Type WIa-c – Undecorated "Cylindrical" Beads (n = 25)

Variety	Decoration	Diaphaneity	Color	Shape	Size (mm) Least Diameter x Length	FOVA Variety Number	Kidds' No.	Quantity	Figure No. Plate No.
WIa-ctls/l-1	Undecorated	Translucent	Blue 2.5B4/6	Short to Long	8.2–8.5 x 6.1–7.1 8.2–9.5 x 9.5–10.9	2013	----	12	Fig. 9 Pl. IIIa
WIa-cop.-1	Undecorated	Opaque	White N 8.5/	----	10.4 x ----	2045	WIa3	1	Fig. 9 Pl. IIIb
WIa-cops-1	Undecorated	Opaque	Green 10G5/4	Short	8.1 x 7.2	2060	----	1	Fig. 9 Pl. IIIc
WIa-copl-1	Undecorated	Opaque	Greenish Blue 10BG4/6	Long	8.5–8.9 x 11.5–11.8	2043	----	6	Fig. 9 Pl. IIId
WIa-copl-2	Undecorated	Opaque	Dark Blue 7.5B4/4	Long	6.6–6.9 x 10.9–11.6	2014	----	3	Fig. 9 Pl. IIIe
WIa-copl-3	Undecorated	Opaque	Light Blue 7.5B5/6	Long	4.4–4.9 x 6.4–7.2	2065	----	2	Fig. 9 Pl. IIIf

Type WIa-sc – Undecorated, Shaped, Cylindrical Beads (n = 1)

Variety	Decoration	Diaphaneity	Color	Shape	Size (mm) Least Diameter x Length	FOVA Variety Number	Kidds' No.	Quantity	Figure No. Plate No.
WIa-scopl-1	Shaped by turning against a mold	Opaque	Blue 10B4/6	Long	7.1 x 14.8	2001	----	1	Fig. 9 Pl. IIIg

Type WIb-s – Undecorated "Spherical" Beads (n = 2244)

Variety	Decoration	Diaphaneity	Color	Shape	Size (mm) Least Diameter x Length	FOVA Variety Number	Kidds' No.	Quantity	Figure No. Plate No.
WIb-stps-1	Undecorated	Transparent	Red 3.75R4/4	Short	12.0 x 9.0	2036	----	1	Fig. 9 Pl. IIIh
WIb-stps/l-2	Undecorated	Transparent	Dark Red 5R2/6	Short to Long	4.4–6.8 x 4.8–8.4	2046	----	7	Fig. 9 Pl. IIIi
WIb-stps/l-3	Undecorated	Transparent	Blue 10BG–2.5–5B3–4/4–6	Short to Long	4.9–8.4 x 3.7–8.4	2004 & 2005	----	743	Fig. 9 Pl. IIIj
WIb-stps-4	Undecorated	Transparent	Purplish Blue 2.5PB4/10	Short	17.5 x 14.5	2066	----	1	Fig. 9 Pl. IIIk
WIb-stps-5	Undecorated	Transparent	Dark Purplish Blue 2.5PB3/10	Short	6.2–7.1 x 5.1–6.3	2033	----	8	Fig. 9 Pl. IIIl
WIb-stps-6	Undecorated	Transparent	Purple 7.5PB3/10	Short	5.5 x 4.2	2062	WIb15?	1	Fig. 9 Pl. IIIm
WIb-stps-7	Undecorated	Transparent	Dark Purple 10PB2/8	Short	11.3 x 9.4	2022	WIb16?	1	Fig. 9 Pl. IIIn
WIb-stls-1	Undecorated	Translucent	White N 8.5/	Short	6.3–12.0 x 4.0–10.6	2016	WIb5?	5	Fig. 9 Pl. IIIo
WIb-stls-2	Undecorated	Translucent	Purplish Blue 2.5PB4/8	Short	7.5–9.0 x 7.4–8.5	2023	----	2	Fig. 9 Pl. IIIp
WIb-stls-3	Undecorated	Translucent	Pink 10RP4/6	Short	8.4–9.7 x 6.5–8.5	2006	----	3	Fig. 9 Pl. IIIq
WIb-sops-1	Undecorated	Opaque	Dark Green 10G2/1	Short	6.4 x 5.1	2063	----	1	Fig. 9 Pl. IIIr
WIb-stp/tl/ops/l-2	Undecorated	Transparent Translucent Opaque	Blue 2.5–10B4–6/4–8	Short to Long	3.1–6.3 x 2.6–6.4 8.5–10.4 x 7.3–9.5	2002, 2018, 2037, 2042 & 2056	WIb10 WIb11 WIb12	1465	Fig. 9 Pl. IIIs
WIb-sops-3	Undecorated	Opaque	Purple 5–7.5PB2–3/8–10	Short	12.3–13.4 x 11.1–12.4	2006	WIb14?	5	Fig. 9 Pl. IIIt
WIb-sops-4	Undecorated	Opaque	Dark Purple 7.5PB3/6	Short	11.6 x 10.6	2015	----	1	Fig. 9 Pl. IIIu

Type WIb-js – Conjoined, Undecorated "Spherical" Beads (n = 1)

Variety	Decoration	Diaphaneity	Color	Shape	Size (mm) Least Diameter x Length	FOVA Variety Number	Kidds' No.	Quantity	Figure No. Plate No.
WIb-jstpl-1 (conjoined variety WIb-stps/l-3)	Undecorated	Transparent	Blue 10BG–2.5B3–4/4–6	Long	6.7 x 12.3	2050	----	1	Fig. 9 Pl. IIIv

The HBC riverside complex site produced two possible new varieties: 1) opaque white (N 9.5/-5Y 9/1), short variety (III.14.; n = 1), 5.0 mm (D) x 4.2 mm (L) (Carley 1982:165); and 2) opaque yellow (5Y 7/10), short variety (III.10. and III.17.; n = 2), in two sizes: 6.2 mm (D) x 5.1 mm (L) and 15.9 mm (D) and 14.3 mm (L) (Carley 1982:165).

Variety WIb-stp/tl/ops/l-2 beads are the most common of the wound beads at Fort Vancouver, and represent one of the most significant historical beads found in the Pacific Northwest. It is speculated that this variety represents one style of the "large blue China or Canton beads" imported by Lewis and Clark, the Pacific Fur Company, the Northwest Fur Company and the HBC. Historically, Chinese beads were identified commonly as "Canton Beads, No. 1, 2, 3, 4 or 1st, 2nd, 3rd, or 4th size" or "large blue China or Canton beads" (Coues 1897[2]:753, 822, 905, 909; Jackson 1962:74, Meriwether Lewis's 1803 list of requirements). For a one-year period, 1836-37, Chinese imports and exports to and from Great Britain and America show that 10 chests of beads were imported from Great Britain and 1345 chests exported to Great Britain, while no beads were either imported from or exported to America (McCullogh 1840 [supplement]:31).

Archaeologically, this wound variety is the most common at the early 19th-century sites in the Pacific Northwest (e.g., Combes 1964; Rodeffer and Rodeffer 1972: Nisqually John Talus site). Three sizes were identified at one archaeological site on the Oregon coast (35CS1, Bullard Beach): 1) 3.9-5.4 mm (D) x 2.4-4.6 mm (L), with a mean size of 4.54 mm (D) x 3.65 mm (L); 2) 6.3-10.0 mm (D) x 5.2-9.0 mm (L), with a mean size of 8.57 mm (D) x 7.43 mm (L), and 3) 12.7 mm (D) by 8.8 mm (L). The average metric interval between the means is 4.0 mm, and it is hypothesized that these sizes correspond to historical sizes #1, #2 and #3, and that a fourth size, measuring approximately 16.5 mm (D) x 14.0 mm (L), should be found to correspond to size #4.

Type WIb-js – Conjoined, Undecorated "Spherical" Beads (n = 1)

This is a pair of type WIb-s beads which touched on the mandrel during manufacture and became fused. One variety is recorded (Pl. IIIv, Fig. 9, and Table 6). A similar variety was recovered from 1809-68 Mission San Jose (CA-ALA-1) (Dietz 1983:196, Fig. 19).

Type WIc-b – Undecorated Barrel-shaped Beads (n = 29)

These are roughly barrel-shaped with no decoration. Eight varieties are recorded (Pl. IIIw-dd, Fig. 9, and Table 7), and all are of the short and short to long forms with no purely long varieties.

The HBC Kanaka village site produced two possible new varieties: 1) transparent dark bluish green, long variety (K81 B-3; n = 1), 5.4 mm (LD) x 7.7 mm (L) (Thomas and Hibbs 1984:245); and 2) translucent white, long variety (K81 B-2; n = 1), 5.5 mm (LD) x 11.5 mm (L) (Thomas and Hibbs 1984:245).

Type WIc-jb – Conjoined, Undecorated Barrel-shaped Beads (n = 2)

These represent a paired version of type WIc-b beads which touched one another during manufacture and became fused. One variety is recorded (Pl. IIIee, Fig. 9, and Table 7).

Type WIc-e – Undecorated "Ellipsoidal" Beads (n = 39)

These are roughly ellipsoidal with no decoration. There are seven varieties (Pl. IIIff-ll, Fig. 9, and Table 7).

Type WIc-je – Conjoined, Undecorated "Ellipsoidal" Beads (n = 1)

This is a pair of type WIc-e beads which fused during manufacture. One variety is recorded (Pl. IIImm, Fig. 9, and Table 7).

Type WId-d – Undecorated "Doughnut-shaped" Beads (n = 11)

These are roughly doughnut-shaped with no decoration. Three varieties are recorded (Pl. IVa-c, Fig. 9, and Table 8).

Type WId-jd – Conjoined, Undecorated "Doughnut-shaped" Beads (n = 2)

These are paired type WId-d beads which fused during manufacture. One variety is recorded (Pl. IVd, Fig. 9, and Table 8).

Table 7. Wound Beads, Class Wsm – Simple Monochrome Beads.

Type WIc-b – Undecorated Barrel-shaped Beads (n = 29)

Variety	Decoration	Diaphaneity	Color	Shape	Size (mm) Least Diameter x Length	FOVA Variety Number	Kidds' No.	Quantity	Figure No. Plate No.
WIc-btps-1	Undecorated	Transparent	Colorless	Short	6.2–9.8 x 5.6–7.7	2044	---	4	Fig. 9 Pl. IIIw
WIc-btps/1-2	Undecorated	Transparent	Reddish Amber 10R2/6	Short to Long	7.4–9.8 x 8.2–9.8	2010	---	2	Fig. 9 Pl. IIIx
WIc-btps/1-3	Undecorated	Transparent	Amber 2.5YR4/10	Short to Long	9.5–10.4 x 8.3–10.7	2057	---	8	Fig. 9 Pl. IIIy
WIc-btps/1-4	Undecorated	Transparent	Light Amber 7.5YR5/10	Short to Long	6.5–9.7 x 6.0–11.4	2011	---	10	Fig. 9 Pl. IIIz
WIc-btps-5	Undecorated	Transparent	Green 2.5G4/6	Short	5.9–6.4 x 5.0–5.7	2051	---	2	Fig. 9 Pl. IIIaa
WIc-btps-6	Undecorated	Transparent	Purplish Blue 5PB3/10	Short	6.0 x 6.0	2052	WIc11	1	Fig. 9 Pl. IIIbb
WIc-bops-1	Undecorated	Opaque	White N 8/	Short	6.5 x 6.5	2041	---	1	Fig. 9 Pl. IIIcc
WIc-bops-2	Undecorated	Opaque	Black N 0.5/	Short	7.5 x 6.2	2030	---	1	Fig. 9 Pl. IIIdd

Type WIc-jb – Conjoined, Undecorated Barrel-shaped Beads (n = 2)

WIc-jbtpl-1 (conjoined variety WIc-btps/1-4)	Undecorated	Transparent	Light Amber 7.5YR5/10	Long	8.5–9.6 x 19.1–19.4	2059	---	2	Fig. 9 Pl. IIIee

Type WIc-e – Undecorated "Ellipsoidal" Beads (n = 39)

WIc-etpl-1	Undecorated	Transparent	Red 5R4/10	Long	6.8 x 12.7	2019	---	1	Fig. 9 Pl. IIIff
WIc-etpl-2	Undecorated	Transparent	Dark Red 5R2/8	Long	4.7–5.5 x 7.9–9.2	2032	---	8	Fig. 9 Pl. IIIgg
WIc-etll-1	Undecorated	Translucent	Yellow 7.5Y7/6	Long	5.3 x 9.5	2021	---	1	Fig. 9 Pl. IIIhh
WIc-etll-2	Undecorated	Translucent	Blue 2.5–5B5/6	Long	4.3–5.1 x 6.9–9.1	2039	---	3	Fig. 9 Pl. IIIii
WIc-eopl-1	Undecorated	Opaque	White N 9.5/	Long	4.6–5.4 x 7.8–9.2	2009	WIc1	22	Fig. 9 Pl. IIIjj
WIc-eopl-2	Undecorated	Opaque	Bluish Green 2.5BG5/4	Long	4.5–5.0 x 7.4–9.1	2067	---	2	Fig. 9 Pl. IIIkk
WIc-eopl-3	Undecorated	Opaque	Blue 10B4/6	Long	7.1–7.6 x 10.4–11.4	2003	---	2	Fig. 9 Pl. IIIl

Type WIc-je – Conjoined, Undecorated "Ellipsoidal" Beads (n = 1)

WIc-jetpl-1 (conjoined variety WIc-etpl-2)	Undecorated	Transparent	Dark Red 5R2/8	Long	4.5 x 15.9	2064	---	1	Fig. 9 Pl. IIImm

Table 8. Wound Beads, Class Wsm – Simple Monochrome Beads.

Type WId-d – Undecorated "Doughnut-shaped" Beads (n = 11)

Variety	Decoration	Diaphaneity	Color	Shape	Size (mm) Least Diameter x Length (Number of Sides)	FOVA Variety Number	Kidds' No.	Quantity	Figure No. Plate No.
WId-dtps-1	Undecorated	Transparent	Amber 2.5YR4/10	Short	7.0–11.0 x 4.2–9.0	2035	WId1?	2	Fig. 9 Pl. IVa
WId-dtps-2	Undecorated	Transparent	Purple 5–7.5PB2/8–max	Short	4.6–7.5 x 3.2–7.0	2007	WId4?	8	Fig. 9 Pl. IVb
WId-dtls-1	Undecorated	Translucent	Blue 2.5B5/4	Short	5.1 x 2.7	2027	---	1	Fig. 9 Pl. IVc

Type WId-jd – Conjoined, Undecorated "Doughnut-shaped" Beads (n = 2)

WId-jdtll-1 (conjoined variety WId-dtls-1)	Undecorated	Translucent	Blue 2.5B5/4	Long	5.0 x 6.6–7.5	2047	---	2	Fig. 9 Pl. IVd

Type WIe-sco – Undecorated, Shaped, Conical Beads (n = 1)

WIe-scoopl-1	Shaped by turning against a mold?	Opaque	White N 9.5/	Long	5.3 x 6.7	2048	---	1	Fig. 9 Pl. IVe

Type WIIq-qbp – Quadrilateral "Bi-pyramidal" Beads (n = 1)

WIIq-qbptpl-1	8 facets on 4 sides made by pressing	Transparent	Red ---	Long	5.0 x 8.7 (4)	2061	---	1	Fig. 9 Pl. IVf

Type WIIi-sgf – "Spherical" Beads with Ground Facets (n = 1)

WIIi-sgftls-1	12 randomly ground facets	Translucent	Blue 10B4/8	Short	8.3 x 6.8	2020	---	1	Fig. 9 Pl. IVg
WIIi-sgfops-1	12 randomly ground facets	Opaque	Dark Bluish Green 5BG2/2	Short	8.3 x 6.6	2012	---	1	Fig. 9 Pl. IVh

Type WIe-sco – Undecorated, Shaped, Conical Beads (n = 1)

The specimen was purposefully shaped into a well-formed cone, probably by turning the glass against a mold prior to removal from the mandrel. If it was turn molded, then it may represent a type WIIg bead with a simple, rather than "elaborate," shape. One variety is recorded (Pl. IVe, Fig. 9, and Table 8).

The HBC Kanaka village site produced one possible new variety: opaque red (2.5R 4/12), long variety (III.c.; n = 1), 6.0 mm (MD) x 8.5 mm (L) (Storm 1976:109).

Type WIIq-qbp – Quadrilateral "Bi-pyramidal" Beads (n = 1)

A flat-sided tool was employed to shape this bead into a roughly bi-pyramidal shape with four sides (or eight shaped facets). One variety is recorded (Pl. IVf, Fig. 9, and Table 8). Beads of a similar form, but turquoise green in color, were recovered from 1834-75 Fort Laramie, Wyoming (Murray 1964:Pl. III, Var. 8079).

Type WIIi-sgf – "Spherical" Beads with Ground Facets (n = 2)

These are roughly spherical, with 12 facets randomly ground around their circumference. Two varieties are recorded (Pl. IVg-h, Fig. 9, and Table 8).

Class Wsp – Simple Polychrome Beads (n = 8)

These consist of a monochrome body with inlaid monochrome or polychrome decoration.

Type WIIIb-sfr – Fritted "Spherical" Beads (n = 1)

After a roughly spherical bead was wound (perhaps on a ferrous mandrel, as the interior of the perforation is blackened), numerous small chips of glass were pressed into its surface. It appears that upon cooling, the surface was polished or tumbled, not fire-polished, as the surfaces of the colored chips are relatively flat rather than rounded. One variety is recorded (Pl. IVi, Fig. 9, and Table 9).

Type WIIIb-bcl – Barrel-shaped Beads with Combed Loops (n = 3)

These are roughly barrel-shaped, and were decora- ted by trailing molten glass onto the viscous surface, and then dragging a wire through the appliqué to form either a single string of combed loops around the circumfer- ence, or four longitudinal strings of combed loops. Three varieties are recorded (Pl. IVj-l, Fig. 9, and Table 9).

Type WIIIb-eclcs – "Ellipsoidal" Beads with Combed Loops and Complex Stripes (n = 2)

Roughly ellipsoidal in shape, these beads were decorated with a single, spiral string of combed loops and a single, spiral, complex stripe. The combed loops were made by trailing molten glass onto the viscous surface, and then dragging a wire through the appliqué. The complex stripe is of two colors. One variety is recorded (Pl. IVm, Fig. 9, and Table 9).

Type WIIIb-bss – Barrel-shaped Beads with a Simple Stripe (n = 1)

A roughly barrel-shaped bead with a relatively broad, flat stripe (the same color as the body) spiralled around the body. One variety is recorded (Pl. IVn, Fig. 9, and Table 9).

Type WIIIb-ecs – "Ellipsoidal" Beads with a Complex Stripe (n = 1)

This bead is roughly ellipsoidal in shape with a complex, twisted, polychrome stripe spiralled around and pressed into the body. One variety is recorded (Pl. IVo, Fig. 9, and Table 9). What may be an identical variety was recovered from 1834-75 Fort Laramie, Wyoming (Murray 1964:Pl. III, Var. 8081).

Class Wcp – Compound Polychrome Beads (n = 2)

These were manufactured by winding or wrapping one color of glass onto a wound core of another color.

Type WIIIa-b – Undecorated Barrel-shaped Beads (n = 2)

These are roughly barrel-shaped without decoration. One variety is recorded (Pl. IVp, Fig. 9, and Table 10).

Class Wsmm – Simple, Molded Monochrome Beads (n = 2)

These were manufactured by winding glass on a mandrel and then, by using an open mold, the decoration was pressed into the surface while the glass turned, or a pinching tool with molded faces similar to a bullet mold was used to impart the decoration while the glass was stationary.

Type WIIg-bcr – Ringed, Truncated, Bi-conical Beads (n = 2)

These have 12 molded rings circumscribing the surface which appear to have been created by turning the glass against an open mold. Two varieties are recorded (Pl. IVq, Fig. 9, and Table 10).

Possible Type WIIg-smf – "Spherical" Beads with Molded Facets

This bead type is described as a "wire-wound pressed bead" with facets. It may be a mold-pressed bead with molded facets. No examples of this type were recorded within the fort. However, the HBC riverside complex site produced one variety: translucent red (5R 3/10), short variety (VII.1.; n = 1), 3.6 mm (D) x 3.1 mm (L) (Carley 1982:166).

Mold-pressed Beads (n = 166)

These were manufactured by pinching or pressing molten glass in a two-part mold. The hole was produced by pushing a pin into the mold and through the glass.

Class MPsm – Simple Monochrome Beads (n = 166)

Table 9. Wound Beads, Class Wsp – Simple Polychrome Beads.

Type WIIIb-sfr – Fritted "Spherical" Beads (n = 1)

Variety	Decoration	Diaphaneity	Color	Shape	Size (mm) Least Diameter x Length	FOVA Variety Number	Kidds' No.	Quantity	Figure No. Plate No.
WIIIb-sfrop.-1	Multi-colored glass chips marvered into the entire surface and polished or tumbled smooth	Opaque & Opaque on Opaque	Purple 10PB2/8 and Pink 2.5RP6/8 Chips on White N 9.5/	---	---	2054	---	1	Fig. 9 Pl. IVi

Type WIIIb-bcl – Barrel-shaped Beads with Combed Loops (n = 3)

WIIIb-bclcop/tpl-1	1 circumferential string of combed loops	Opaque String on Transparent	White N 9/ String on Green 5G2/6	Long	10.3 x 10.5	2040	---	1	Fig. 9 Pl. IVj
WIIIb-bclcop/tps-2	1 circumferential string of combed loops	Opaque String on Transparent	White N 9/ String on Dark Purple 7.5PB2/4	Short	8.2 x 7.1	2034	---	1	Fig. 9 Pl. IVk
WIIIb-bcllt1/opl-1	4 longitudinal strings of combed loops including 2 alternating single-color strings	Translucent Strings on Opaque	2 Red 5R3/8 Strings and 2 Purple 5PB2/6 Strings on White N 9/	Long	8.8 x 10.0	2068	---	1	Fig. 9 Pl. IVl

Type WIIIb-eclcs – "Ellipsoidal" Beads with Combed Loops and Complex Stripes (n = 2)

WIIIb-eclcstl/opl-1	Complex, spiral stripe with 1 spiral string of combed loops	Translucent on Opaque Stripe with Translucent String on Opaque	Red 5R4/10 on White N 9/ Stripe with Green 5G3/8 String on White N 8.5/	Long	9.7–10.3 x 22.0	2024	---	2	Fig. 9 Pl. IVm

Type WIIIb-bss – Barrel-shaped Beads with a Simple Stripe (n = 1)

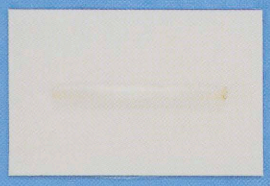
WIIIb-bssop/tll-1	Simple spiral stripe	Opaque Stripe on Translucent	Red 7.5R4/12 Stripe on Red 7.5R4/12	Long	8.8 x 11.1	2058	---	1	Fig. 9 Pl. IVn

Type WIIIb-ecs – "Ellipsoidal" Beads with a Complex Stripe (n = 1)

WIIIb-ecsop/tpl-1	Complex, twisted spiral stripe	Opaque on Opaque on Opaque Stripe on Transparent	Red 5R4/6, White N 9/ and Blue 5PB4/4 Stripe on Red 7.5R2/6	Long	8.2 x 15.5	2031	WIIId1?	1	Fig. 9 Pl. IVo

Type MPIIa-sppgf – "Spherical" Beads with a Bi-conical Punched Perforation and Ground Facets (n = 166)

These were probably manufactured in Bohemia (part of present-day Czechoslovakia) and, during the first half of the 19th century, were molded individually or in pairs by pressing glass in iron tongs equipped with opposing hemispherical cavities. Perforations were partially formed by either a tapered pin that appears to have been an integral part of one cavity (Ross 1974:17 and Fig. 3, 1976:759-62), or by a pin inserted through one cavity (Anonymous 1913; Pešatová 1965; Ross and Pflanz 1989). The former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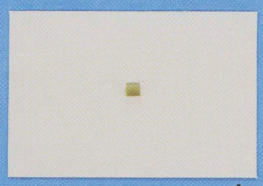
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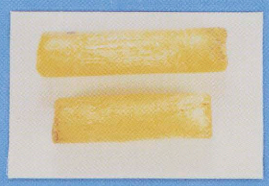
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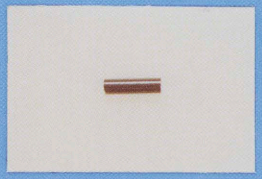
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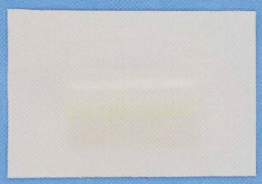
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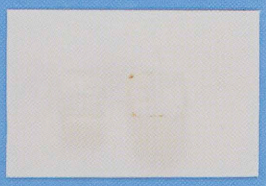
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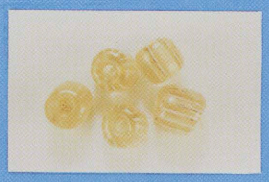
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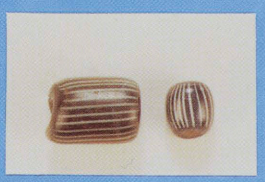
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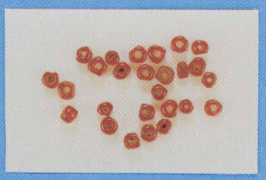
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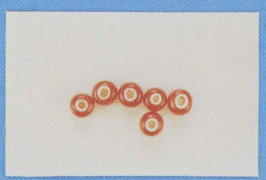
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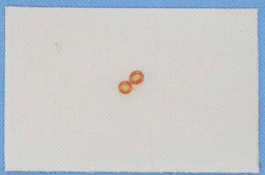
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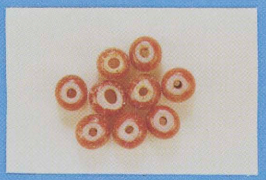
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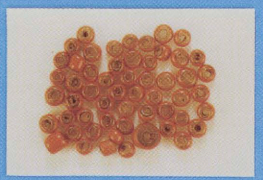
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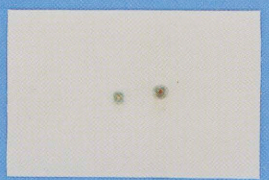
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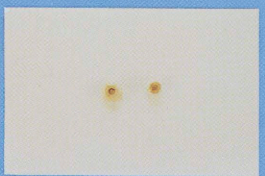
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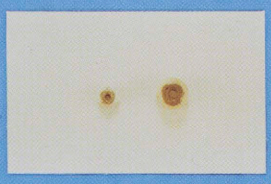
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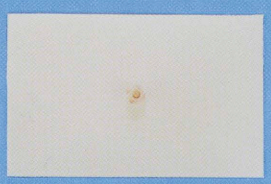
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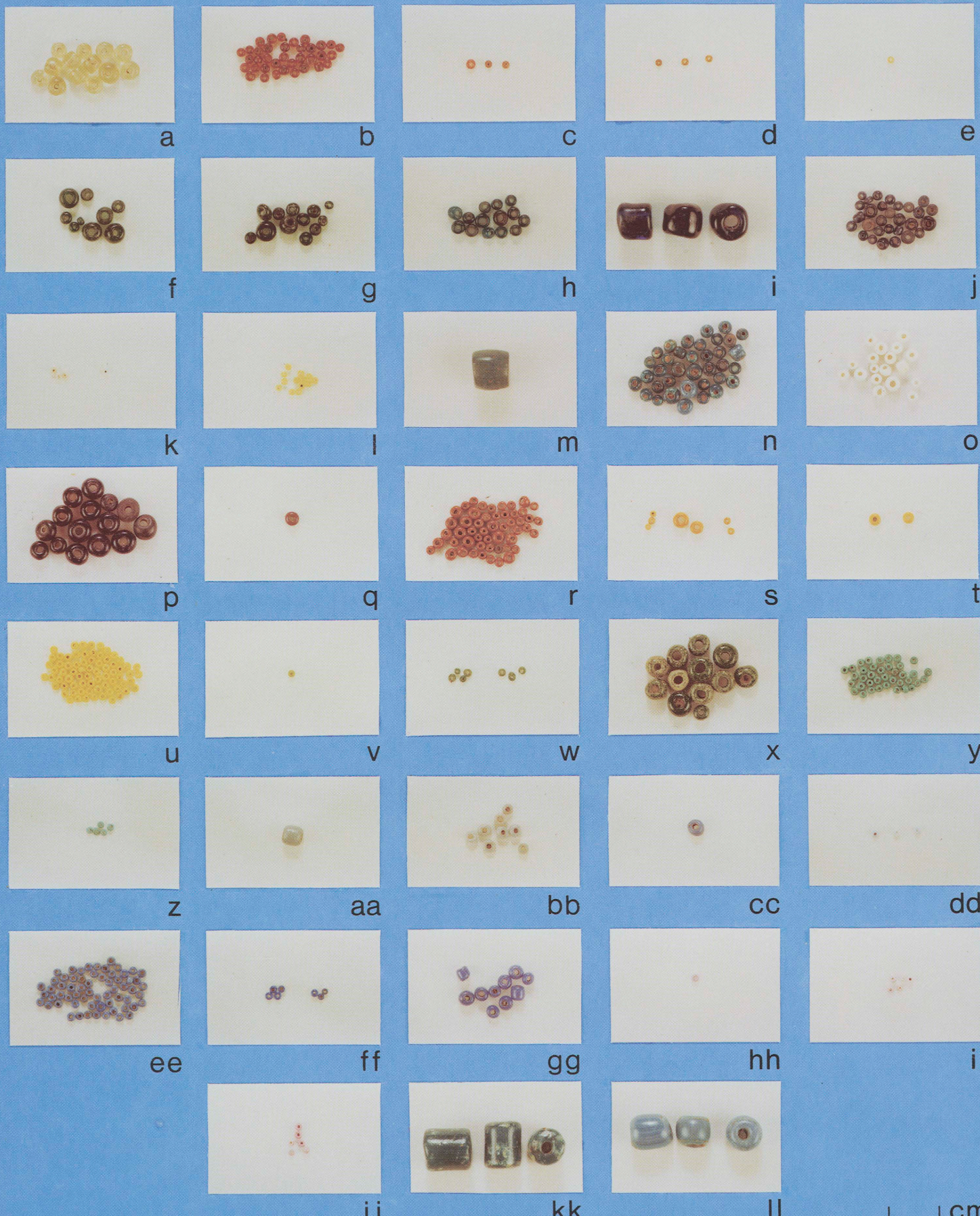
See page 2 for plate captions

cm

FORT VANCOUVER

PLATE II



FORT VANCOUVER

PLATE III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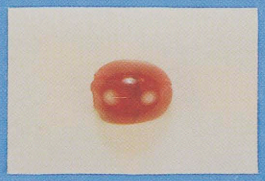
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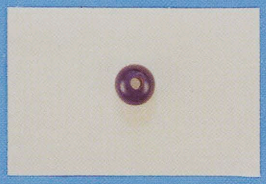
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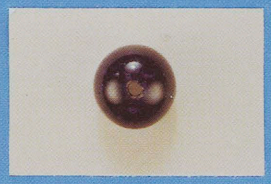
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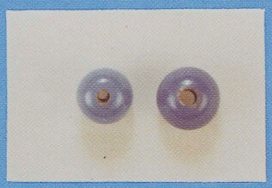
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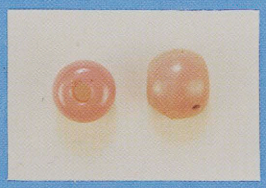
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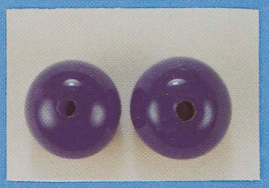
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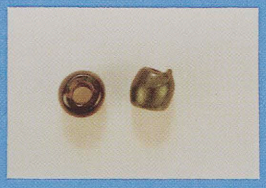
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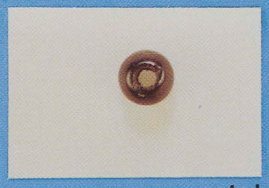
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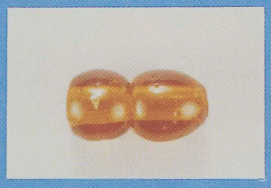
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FORT VANCOUVER

PLATE IV


a


b


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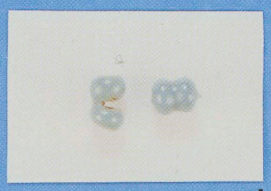
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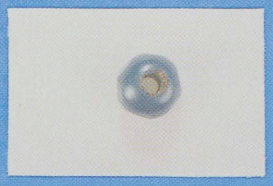
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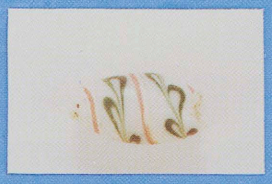
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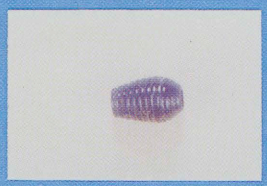
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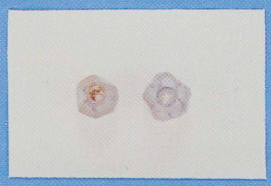
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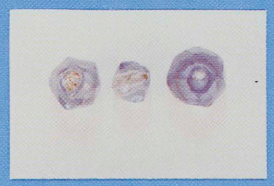
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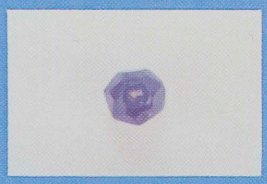
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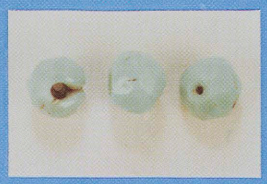
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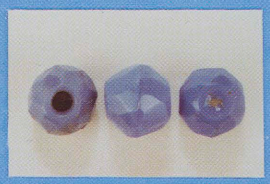
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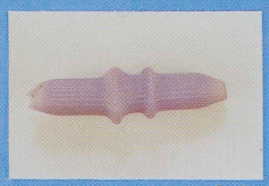
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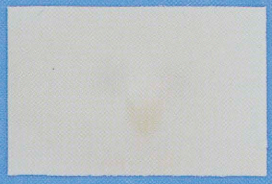
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cm

Table 10. Wound Beads, Class Wcp – Compound Polychrome Beads.

Type WIIIa-b – Undecorated Barrel-shaped Beads (n = 2)

Variety	Decoration	Diaphaneity	Color	Shape	Size (mm) Least Diameter x Length	FOVA Variety Number	Kidds' No.	Quantity	Figure No. Plate No.
WIIIa-btp/opl-1	Undecorated	Transparent on Opaque	Red 5R3/10 on White 5R8/1	Long	10.1 x 10.6	2049	---	2	Fig. 9 Pl. IVp

Class Wsmm – Simple, Molded Monochrome Beads.

Type WIIg-bcr – Ringed, Truncated, Bi-conical Beads (n = 2)

WIIg-bcrop.-1	12 rings circumscribing bead	Opaque	White N 8.5/	---	---	2053	---	1	---
WIIg-bcropl-2	12 rings circumscribing bead	Opaque	Purple 7.5PB3/8	Long	6.3 x 9.5	2038	---	1	Fig. 9 Pl. IVq

appears to have been the method employed for the recovered beads. Upon removal from the mold, the preform had a partially formed perforation and a mold seam around its circumference with fine glass fins protruding from it. Facets were subsequently ground on the bead, thus removing the fins (the fins could also be removed prior to facetting by sieving or abrasion), and the incomplete perforation was punched through, forming a roughly spherical facetted bead with a bi-conical perforation.

A few specimens from the fort exhibit a vertical cleft (e.g., Pl. IVy), possibly caused by an insufficient amount of glass that did not completely fill the lower hemisphere of the mold as glass flowed around the tapered stationary pin or as a pin was inserted to form the perforation. It may also be that this cleft was produced by a three-part mold, although no historical evidence for such a mold has been found.

These beads emulate the appearance of cut crystal or cut jewelry beads, and the products from the Bohemian industry were collectively referred to as artificial jewelry. In addition, "unfinished" beads (those with an incomplete perforation) could be used as heads for hat pins. Just such an "unfinished" bead was excavated at 1849-1900 Old Sacramento, California (Motz and Schulz 1980:57, Type 49, Fig. 4e).

Among collectors, beads similar to these, but of later manufacture, are called "cut," "Czech," or "vaseline" beads (e.g., Johnson 1975), presumably for their technique of manufacture emulating cut stone beads, country of manufacture and glossy appearance, respectively. The early varieties from the fort were probably manufactured in Bohemia, but lack the high polish exhibited by later varieties. This glossy finish may have been created by placing the beads in an acid bath, similar to the 20th-century technique used to polish cut lead-crystal glassware (Jones and others 1985:55, 56). Assumedly, if such a bath was employed for later beads, it was not used in the mid-19th century.

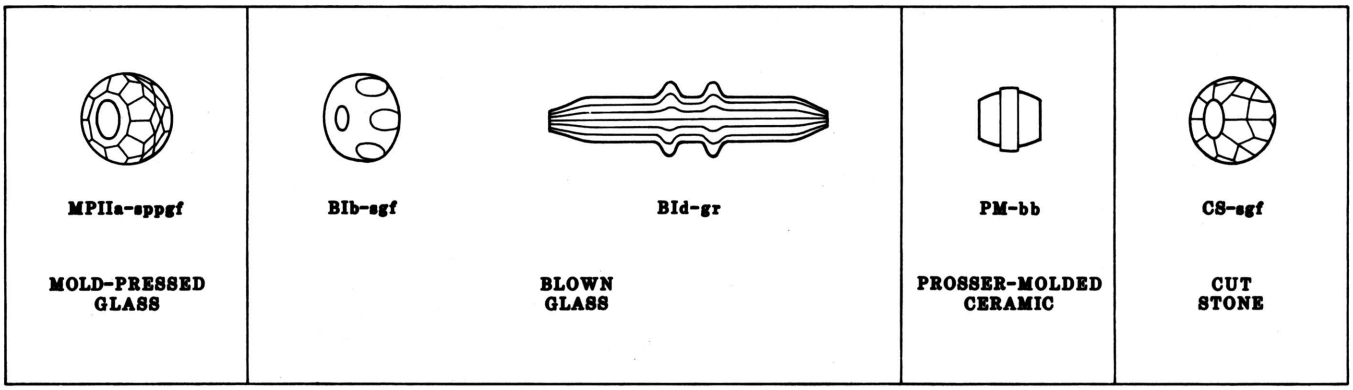

Figure 10. Other Fort Vancouver bead types.

Ten varieties are recorded (Pl. IVr-z, Fig. 10, and Table 11), with perhaps six sizes being identified. Because these beads are molded, it is likely that discrete sizes were intentionally manufactured. However, sizes identified for the fort do not support definition of uniform intervals between sizes, nor do they support definition of definitive sizes. Speculatively, if discrete sizes do exist, they are based upon 1-mm intervals with apparent sizes of 5, 6, 7, 8, 9, 10 and 16 mm represented at the fort. These beads may have been identified by the HBC as "cut glass" beads, but there is only a moderate correlation between historical and archaeological color groupings. The historical color groupings are more indicative of subtypes If-d and IIIf-d (discussed above). While historical records denote five sizes of "cut beads" (#4-7 and #9), there may be seven sizes for the type MPIIa-sppgf beads. Finally, there is no correlation between the sizes of these facetted, mold-pressed beads and the facetted, multi-sided drawn beads (subtypes If-d and IIIf-d).

The HBC Kanaka village site produced two possible new varieties: 1) transparent amber (7.5YR 3/4), short to long variety (IV.d.; n = 1), 7.8 mm (D) x 7.9 mm (L) (Chance and others 1982:46); and 2) transparent purple, short variety (K81 C-1; n = 1), 9.8 mm (LD) x 8.2 mm (L) (Thomas and Hibbs 1984:246).

Type MPIIa-sppgf beads have been reported from several other archaeological sites in North America. The earliest-known specimen came from a post-1804 to pre-1835 context at Santa Ines Mission (CA-SBR-518), California (Ross 1989a:156, Type MPIIa-2). The ca. 1829-67 American Fur Company Fort Union site (32WI17), North Dakota, produced seven varieties (Ross 1989b). In addition, one variety was found at the 19th-century Rosary site, Quebec, Canada (Lee 1966), and another may have been uncovered at 1803-78 Fort William, Ontario, Canada (Karklins 1973).

Possible Type MPIIa-smf – "Spherical" Beads with Molded Facets

These may have been manufactured in a two-piece mold equipped with opposing, facetted, hemispherical cavities. Perforations were probably formed by inserting a tapered or straight pin through both cavities (Ross and Pflanz 1989). Although no examples of this type were recorded at the fort, the HBC Kanaka village site reportedly produced three varieties: 1) opaque black, short variety (V.c; n = 1), 8.0 mm (D) x 7.5 mm (L) (Chance and others 1982:46); 2) opaque bright Chinese red (5R 4/14), short variety (V.b.; n = 1), 7.8 mm (D) x 6.5 mm (L) (Chance and others 1982:46); and 3) opaque medium blue (6.25PB 4/12), short variety (V.a.; n = 3), 8.3-9.5 mm (D) x 7.4-7.8 mm (L) (Chance and others 1982:46).

If these are mold-pressed beads with molded facets then comparative data from other North American sites suggest that they may represent a late period of occupation (ca. 1850s or later) (Ross 1988).

Blown Beads (n = 5)

Blown beads were created by various techniques (Karklins 1982:98). Those from the fort were freeblown, and blown in a mold.

Table 11. Mold-pressed Beads, Class MPsm – Simple Monochrome Beads.

Type MPIIa-sppgf – "Spherical" Beads with a Bi-conical, Punched Perforation and Ground Facets (n = 166)

Variety	Decoration	Diaphaneity	Color	Shape	Size (mm) Least Diameter x Length	FOVA Variety Number	Kidds' No.	Quantity	Figure No. Plate No.
MPIIa-sppgftps-1	35–54 randomly ground facets	Transparent	Colorless	Short	6.0 x 5.4 7.6 x 7.3 8.9–9.8 x 7.5–8.9	3009	---	4	Fig. 10 Pl. IVr
MPIIa-sppgftps/l-2	35–54 randomly ground facets	Transparent	White N 7/	Short to Long	5.6 x 5.9 9.0 x 8.8 10.7 x 10.1	3006	---	3	Fig. 10 Pl. IVs
MPIIa-sppgftps-3	35–54 randomly ground facets	Transparent	Red 5R2/8	Short	6.5–7.1 x 6.4 7.9 x 7.4	3007	---	3	Fig. 10 Pl. IVt
MPIIa-sppgftp.-4	35–54 randomly ground facets	Transparent	Green 7.5G4/8	---	---	3008	---	2	Fig. 10
MPIIa-sppgftps-5	35–54 randomly ground facets	Transparent	Light Purplish Blue 7.5PB5/6	Short	5.7–6.4 x 5.3–5.9	3013	---	2	Fig. 10 Pl. IVu
MPIIa-sppgftps/l-6	35–54 randomly ground facets	Transparent	Purplish Blue 7.5PB4/10	Short to Long	5.0 x 5.3 7.2–7.5 x 6.3–6.8 9.5 x 8.1 16.4 x 15.3	3011	---	6	Fig. 10 Pl. IVv
MPIIa-sppgftps-7	35–54 randomly ground facets	Transparent	Dark Purplish Blue 7.5PB3/12	Short	7.6 x 7.2	3010	---	1	Fig. 10 Pl. IVw
MPIIa-sppgfops-1	35–54 randomly ground facets	Opaque	Black N 0.5/	Short	5.3–5.8 x 5.3–5.4 6.9–7.0 x 6.3–6.4 8.2–8.9 x 7.1–7.4 9.1 x 8.8 10.5 x 9.3	3001	---	9	Fig. 10 Pl. IVx
MPIIa-sppgfops-2	35–54 randomly ground facets	Opaque	Light Greenish Blue 2.5B8/4	Short	7.7–8.9 x 6.5–8.1	3002	---	71	Fig. 10 Pl. IVy
MPIIa-sppgfops-3	35–54 randomly ground facets	Opaque	Purplish Blue 5PB4–6/6–8	Short	8.0–10.0 x 7.0–9.3	3003, 3004 & 3005	---	65	Fig. 10 Pl. IVz

Class Bsm – Simple Monochrome Beads (n = 1)

Type BIb-sgf – Spherical Beads with Ground Facets (n = 1)

This type was manufactured by freeblowing glass beads either individually or in a series. Facets were subsequently randomly ground on the surface. One variety is recorded (Fig. 10 and Table 12). Similar varieties have been reported from 1834-75 Fort Laramie, Wyoming (Murray 1964:Pl. IV, Var. 8126), and 1849-1900 Old Sacramento, California (Motz and Schulz 1980:58, Type 55, and Fig. 4h).

Class BMsm – Simple, Blown-molded, Monochrome Beads (n = 4)

Type BId-gr – Grooved Segmented Beads (n = 4)

These were manufactured by inserting a thin-walled drawn or blown tube, sealed at one end and in a plastic state, into a two-part mold with 12 longitudinal ridges and then blowing into the tube to impart the design. Such a mold may have had multiple cavities, requiring the tube to be snapped into bead segments. Once removed from the mold, two upsets were created in each tube by reheating a portion at a time, and blowing and pushing the two ends towards the center. Two varieties are recorded (Pl. IVaa-bb, Fig. 10, and Table 12).

Table 12. Blown Beads, Class Bsm – Monochrome Beads.

Type BIb-sgf – Spherical Beads with Ground Facets (n = 1)

Variety	Decoration	Diaphaneity	Color	Shape	Size (mm) Least Diameter x Length	FOVA Variety Number	Kidds' No.	Quantity	Figure No. Plate No.
BIb-sgftl.-1	Unknown number of randomly ground facets	Translucent	Purplish Red 10RP5/12	---	---	4001	---	1	Fig. 10

Class BMsm – Simple, Blown-molded, Monochrome Beads.

Type BId-gr – Grooved, Segmented Beads (n = 4)

BId-grtll-1	25 molded, longitudinal grooves with 2 upsets	Translucent	White N 8/	Long	6.5 x 20.5	4003	---	1	Fig. 10 Pl. IVaa
BId-grtll-2	25 molded, longitudinal grooves with 2 upsets	Translucent	Purple 5P4/4	Long	6.2-8.6 x 15.7-27.5	4002	---	3	Fig. 10 Pl. IVbb

Ceramic Beads (n = 1)

Ceramic beads are distinguished from glass beads on the basis of their composition and manufacturing techniques. Glass beads are generally manufactured from a molten gather that is shaped into a finished form, but may be manufactured by pressing and melting or fusing broken, crushed or powdered glass in a mold. Ceramic beads are manufactured from a dry or moist powder that is packed into a mold, subsequently removed from the mold and fired, with or without a glaze or slip.

"Prosser-molded" Beads (n = 1)

Beads of this group, also referred to as tile beads, may have been manufactured variously by pressing a dry or moist mixture of powdered clay, flint, feldspar, metallic oxides and "other earthy materials" in a mold. Upon removal from the mold, the bead would have been bisque fired. Whether this firing produced the glossy surface of the single bead at the fort, or whether the bead was subsequently glazed and glost fired is not known. Historical accounts of the "Prosser" techniques indicate that after bisque firing, the molded objects could be decorated, fired again, glazed and fired for the final time (Sprague 1983). The process was originally patented in 1840 by Richard Prosser, but may have been invented in 1832 by his brother Thomas, who claimed to have made the first button by this process in 1837. The process was used in Great Britain, America, France and Bohemia from the 19th century onwards, and was employed primarily for the manufacture of "china" or "calico" buttons (Sprague 1983).

Class PMsm – Simple Monochrome Beads (n = 1)

Type PM-bb – Banded, Barrel-shaped Beads (n = 1)

The single recorded bead (Pl. IVcc, Fig. 10, and Table 13) is barrel-shaped with a relatively broad band circumscribing the middle. It may be an intrusive find related to the U.S. Army's occupation of the fort after 1860.

The HBC Kanaka village site produced two new varieties: 1) opaque light blue (7.5B 8/4), variety

(VI.b.; n = 2), 6.3-6.4 mm (D) (Chance and others 1982:46); and 2) opaque black, variety (VI.c.; n = 1), 7.1 mm (D) (Chance and others 1982:47). These beads all came from a post-HBC context associated with the U.S. Army occupation (post-1849) (Chance and others 1982: 39), suggesting that all "Prosser-molded" beads from sites in the vicinity may date to the post-HBC period.

Stone Beads (n = 2)

Stone beads found in the Pacific Northwest are generally of Native-American manufacture. However, the two beads recovered from the fort were probably imported from Europe.

Cut-stone Beads (n = 2)

Class CSp - Polychrome Beads (n = 2)

Type CSp-sgf – "Spherical" Beads with Ground Facets (n = 2)

These were cut from a cryptocrystalline silicate, probably agate. One variety is recorded (Fig. 10 and Table 14).

Ground-stone Beads

Unclassified Steatite Beads

Untyped, Flat Disc Beads

The Kanaka village site produced a flat disc bead of steatite that was of prehistoric Native-American origin. It measured 8.1 mm (D) x 1.3 mm (L) (Chance and others 1982:47).

Beads of Other Materials

Although none were recovered from Fort Vancouver, beads of materials other than glass, ceramic and stone were recovered from the HBC Kanaka village and riverside complex sites.

Bone Beads

The HBC riverside complex site produced an ellipsoidal specimen, presumably of Native-American manufacture (Carley 1982:166).

Wood Beads

A string-wound, wooden, yellowish brown, barrel-shaped bead of presumed Euro-American manufacture was found at the HBC riverside complex site. (Carley 1982:166).

Metal Beads

The HBC Kanaka village site yielded two undescribed metal beads, presumably of Euro-American origin (Thomas and Hibbs 1984: 169).

Shell Beads

The village site also produced an undescribed shell bead of probable Native-American manufacture (Thomas and Hibbs 1984:479).

SPATIAL AND TEMPORAL INTRASITE COMPARISONS

The bead assemblage from Fort Vancouver is indicative of the diversity of beads imported by the HBC to the Pacific Northwest from 1829 to 1860, and can serve to construct an initial archaeological horizon marker for other sites of the same period. For an initial definition of the HBC 1829-60 bead horizon marker, bead varieties from the fort with more than 20 specimens have been selected, resulting in a construct of 36 varieties, 10 types, 6 classes and 3 manufacturing groups which comprise 99.6% of the fort assemblage:

Drawn Beads

Monochrome Beads with Chopped Ends

Undecorated Cylindrical Beads

Table 13. "Prosser-molded" Ceramic Beads, Class PMsm – Simple Monochrome Beads.

Type PM-bb – Banded, Barrel-shaped Beads (n = 1)

Variety	Decoration	Diaphaneity	Color	Shape	Size (mm) Least Diameter x Length	FOVA Variety Number	Kidds' No.	Quantity	Figure No. Plate No.
PM-bbops-1	Molded band circumscribing bead	Opaque	White N 8.5/	Short	4.9 x 4.8	5001	---	1	Fig. 10 Pl. IVcc

Table 14. Cut-stone Beads, Class CSp – Polychrome Beads

Type CSp-sgf – "Spherical" Beads with Ground Facets (n = 2)

Variety	Decoration	Diaphaneity	Color	Shape	Size (mm) Least Diameter x Length	FOVA Variety Number	Kidds' No.	Quantity	Figure No.
CSp-sgftls-1	Agate bead with 28–48 randomly ground facets	Translucent	Colorless with Orange Tip 2.5YR5/14	Short	6.6–8.0 x 6.5–7.6	6001	---	2	Fig. 10

Yellow (Ia-tll-3)
Complex, Multi-sided Cylindrical Beads with Ground Facets
Beads with Two Rows of Facets
Dark Purple (If-d6/7tps/l-6)
Black (If-d6/7ops/l-1)
Polychrome Beads with Chopped Ends
Complex, Multi-sided Cylindrical Beads with Ground Facets
Beads with Two Rows of Facets
Colorless (IIIf-d6/7tp/tls/l-1)
Light blue (IIIf-d7op/ops/l-1
Purple (IIIf-d7op/ops/l-2)
Dark purple (IIIf-d6/7tp/tls/l-3)
Monochrome Beads with a Hot-Tumbled Finish
Undecorated "Cylindrical" Beads
Colorless (IIa-tps-1)
White (IIa-ops-1)
Black (IIa-ops-2)
Dark red (IIa-tps-2)
Brownish red (IIa-ops-4)
Yellow (IIa-ops-7)
Yellowish green (IIa-tps-6)
Green (IIa-tps-7 and IIa-ops-10)
Bluish green (IIa-ops-11)
Blue (IIa-tps-8 and IIa-tls-4)
Light purplish blue (IIa-ops-14)
Bluish purple (IIa-ops-17)
Purple (IIa-tps-10)
Dark purple IIa-ops-19)
Pink (IIa-ops-23)
"Cylindrical" Beads with Simple Straight Stripes
White with four purple stripes (IIb-op/ops-1)
"Cylindrical" Beads with Ground Facets
Red (IIf-tps-1)
Dark purplish red (IIf-tps-2)
Polychrome Beads with a Hot-tumbled Finish
Undecorated "Cylindrical" Beads
Red-on-white (IVa-tp/ops-1)
Red-on-light pink (IVa-tl/ops-1)

Brownish red-on-green (IVa-op/tps-1)
White-on-white (IVa-op/ops-1)
Wound Beads
Simple Monochrome Beads
Undecorated "Spherical" Beads
Blue (WIb-stps/l-3 and WIb-stp/tl/ops/l-2)
Undecorated "Ellipsoidal" Beads
White (WIc-eopl-1)
Mold-Pressed Beads
Simple Monochrome Beads
"Spherical" Beads with a Bi-conical Punched Perforation and Ground Facets
Light greenish blue (MPIIa-sppgfops-2)
Purplish blue (MPIIa-sppgfops-3)

This horizon marker is dominated by undecorated, monochrome drawn and wound beads, followed in frequency by undecorated polychrome drawn beads and facetted, monochrome drawn and mold-pressed beads. Decorated beads are notably infrequent in the fort assemblage, possibly reflecting a relatively high value. The remaining 0.4% of the fort assemblage consists of 116 varieties, 40 types, 13 classes and 6 manufacturing groups, representing unique specimens possibly associated with the horizon marker. Of the possible 39 new varieties reported for the HBC Kanaka village and riverside complex sites, none were represented by more than seven specimens. Adding these to the unique varieties from the fort, there may be as many as 155 unique varieties associated with the horizon marker. Spatial and temporal analysis of the 36 common varieties found at the fort indicate that not all varieties remained common throughout the 30-year occupation.

The fort assemblage is dominated by two bead types (IIa and IVa; Fig. 11), including undecorated, monochrome and polychrome, hot-tumbled drawn beads in white and blue (85% of the fort assemblage). The prevalence of white and blue beads reflects the preference of Native Americans for beads that simulate white and purple shell beads which were the most common items of Native-American exchange. The four most common colors at the fort are white/colorless, blue, green and purple (Fig. 12), matching the relative frequencies reported for various historic inventories of the mid-1840s (Hussey 1972a, b, 1976). From surviving inventories it is also apparent that white and blue beads retained their popularity throughout the entire 30-year period of the fort, whereas green and red beads declined in popularity during the last 15 years. A wide variety of purple beads appears in later assemblages, possibly replacing red ones in popularity. Stylistically, there are two major varieties of white beads (IIa-ops-1 and IVa-op/ops-1), with the polychrome seven times as common as the monochrome in early assemblages, and the monochrome four times as common as the polychrome in the later period. These differences in color frequencies may reflect changing color and stylistic preferences, or changes in procurement from various bead suppliers. Similar changes should be reflected at other sites in the Pacific Northwest.

Prior to 1844, bead types other than drawn were uncommon at the fort; wound and mold-pressed beads became more popular between 1844 and 1852. A comparison of relative percentages of beads from the five major bead-producing areas to the entire fort bead assemblage reveals:

1) The sales shop and Indian trade store exhibit similar attributes, especially relatively high percentages of monochrome (83.3% and 83.5%, respectively, to 72.4%), opaque (73.0% and 82.9%, respectively, to 64.8%), white and purple beads (Fig. 12), and low to moderate percentages of red, yellow, green (Fig. 12) and decorated beads (0.5% and 1.3%, respectively, to 1.2%).
2) The fur store had a high percentage of polychrome beads (43.9% to 27.6%), and a low percentage of spherical (1.1% to 2.3%) and yellow beads (Fig. 12).
3) The chief factor's house had a high percentage of monochrome (90.3% to 72.4%), decorated (9.2% to 1.2%), spherical (7.7% to 2.3%), opaque (87.7% to 64.8%), white and purple beads (Fig. 12) , and a low percentage of yellow, green and blue beads (Fig. 12).
4) The bachelors' quarters privies had a high to very high percentage of monochrome (98.3% to 72.4%), opaque (95.1% to 64.8%), and yellow beads (Fig. 12), with a low percentage of wound (Fig. 11), spherical (trace to 2.3%), transparent (3.8% to 13.5%), translucent (1.1% to 21.7%), white and blue beads (Fig. 12).

Reasons for these relative differences are not readily apparent, especially because particularistic

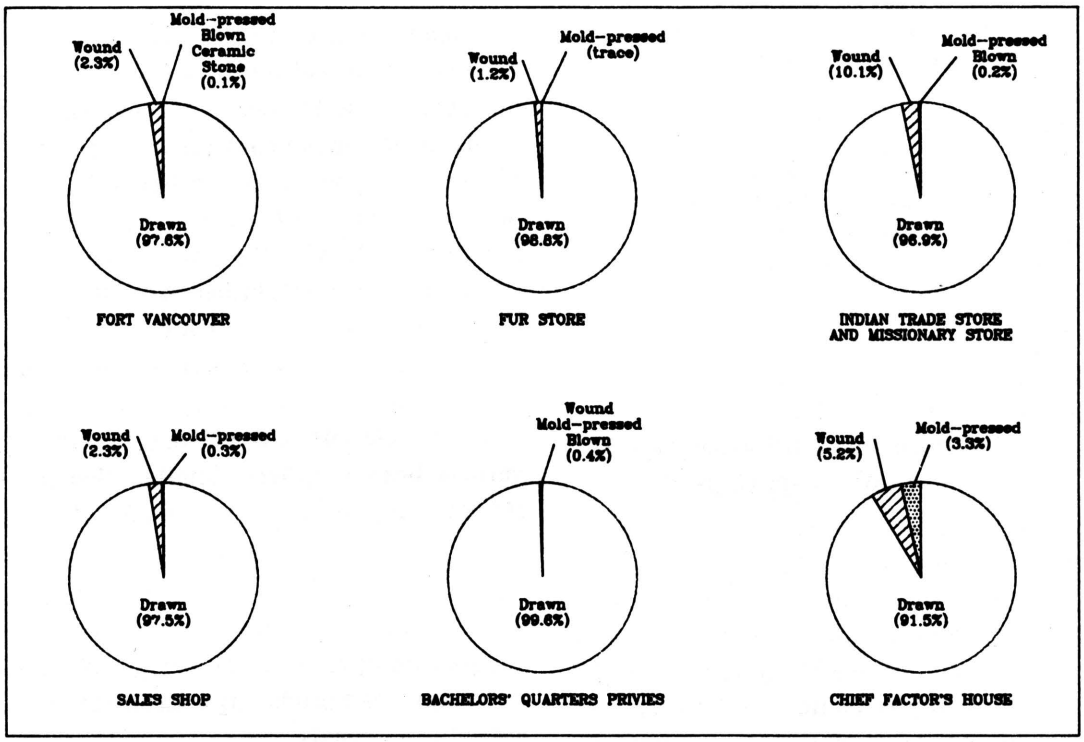

Figure 11. Percentage comparisons of bead types at Fort Vancouver.

events, such as the loss of an entire strand of one variety and color, could account for fluctuations of attributes at any of the structural areas. Contrasting the similarities of the sales-shop and trade-store assemblages to the fur-store assemblage suggests that beads sold within the fort, as opposed to beads repacked for shipment to outlying posts, included the more desirable bead varieties. Thus, more opaque monochrome beads were kept at the fort, while less desirable beads were shipped elsewhere.

The perceived differences require further analysis of tightly dated contexts at the fort, compared to sites around the fort and to other sites in the Pacific Northwest. Initial comparisons signify that there are useful interpretations to be gleaned from comparative attribute analyses. However, until bead attributes are consistently identified for the archaeological assemblages outside the fort, substantive conclusions cannot be reached. The lack of published comparative information for the HBC Kanaka village and riverside complex sites also mirrors difficulties for comparative studies among sites across North America, indicating the need for a standardized nomenclature.

EVALUATION OF THE KIDDS' BEAD CLASSIFICATION SYSTEM

With "some temerity," Kenneth and Martha Kidd, in 1970, proposed a classification system for glass beads for the use of archaeologists that they hoped would allow glass beads to be more easily recognized, properly identified and classified. It was "designed to be infinitely extensible," being based on the processes of manufacture as well as shape, size, color and diaphaneity (Kidd and Kidd 1970:47-8). A few shortcomings of the system were subsequently noted (Hoffman and Ross 1974b:70-4; Karklins 1971; Sprague 1971), and formal revisions were suggested (e.g., Allen 1983; Karklins 1982, 1985; Spector 1974, 1976; Sprague 1983, 1985).

Applying the Kidds' system to the beads from Fort Vancouver, five major problems became apparent (Hoffman and Ross 1974b:70-4): 1) Under what conditions were color descriptions obtained, and how could color variability within "natural" bead groupings be incorporated into the system?; 2) What were the working definitions for bead shapes, and how

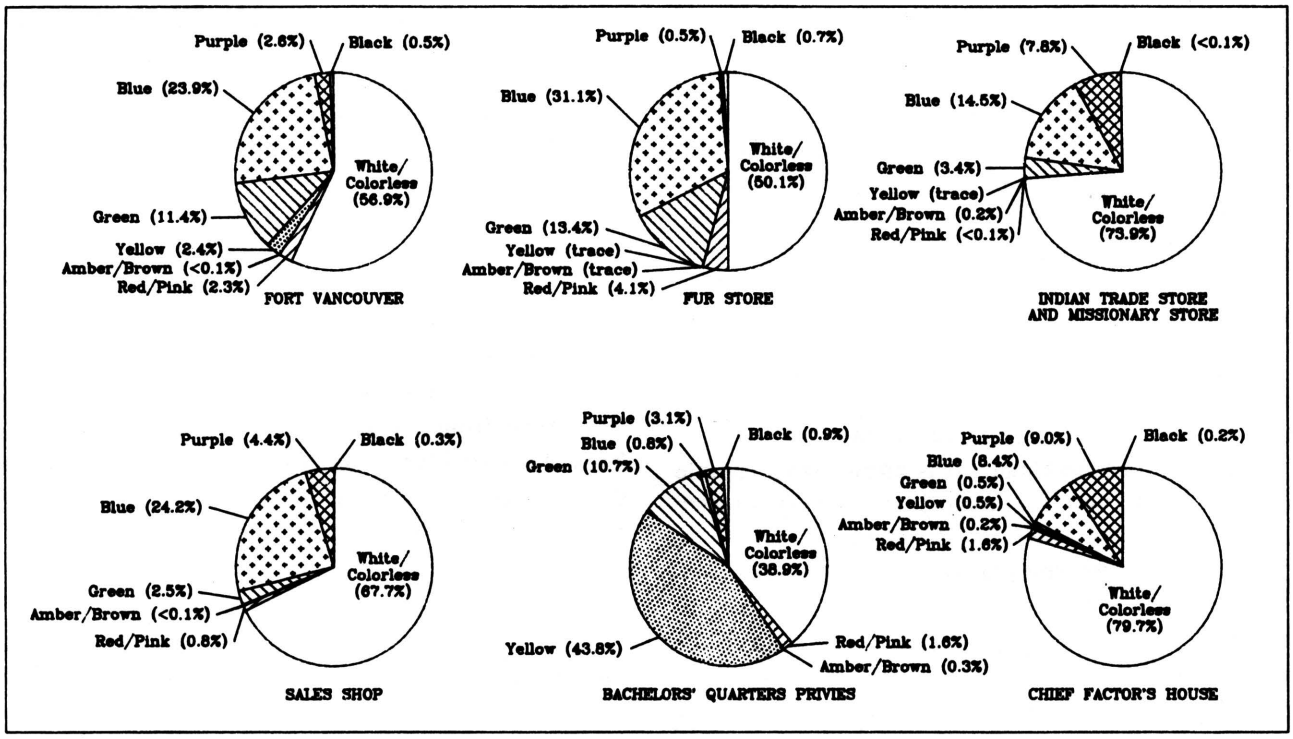

Figure 12. Percentage comparisons of bead colors at Fort Vancouver.

could "natural" population variables be handled without crosscutting arbitrary system groupings?; 3) How could "natural" size populations be effectively recorded within the system?; 4) How could new manufacturing groups be incorporated into the system?; and 5) How could new bead varieties be distinguished effectively from previously identified varieties, and subsequently incorporated into the system?

Some of these issues have been addressed by revisions suggested by Karlis Karklins (1982, 1985), such as new manufacturing groups being identified with new nomenclature. However, many of the existing classification categories combine multiple discrete attributes or assume some unique combinations of attributes. If a bead with one or two additional or different attributes is encountered, an entire class may require revamping. The classification of beads for Fort Vancouver uses a combination of the Kidds' nomenclature and attribute-specific nomenclature to preserve as much discrete data as possible. Unfortunately, the resultant typology lacks simplicity and forces beads into group hierarchies based on the selection of one or more unique attributes over others. As the correlations of attributes with specific historic structures within Fort Vancouver indicate, certain attributes, such as the presence or absence of decoration or the exact shape of a bead, must be clearly indicated for quantitative comparisons.

Many of the historical bead terms observed on manifests and inventories could not be correlated positively with archaeological types or varieties at Fort Vancouver. In their attempt to address bead sizes, Kenneth and Martha Kidd (1970:47) state that historical bead terminology is of "no assistance to the archaeologist in classifying archaeological specimens." Interpreted within its most restrictive sense, this statement is supported by the research conducted at Fort Vancouver; but historical terminology has been highly useful for interpreting the defined varieties. For example, a few varieties and sizes have been hypothesized as being beads of Chinese manufacture, and archaeological bead sizes have been hypothetically correlated with historical sizes. Thus, while archaeological bead classification may create groupings dissimilar to historical groups, there are instances where hypothetical historical sizes may be defined and used for cultural interpretations.

RECOMMENDATIONS FOR A REVISED BEAD CLASSIFICATION SYSTEM

When the Kidds' system is replaced, the revision must explicitly identify discrete attributes of a specific bead or bead variety. The Kidds occasionally used unique letters to identify specific attributes (e.g., "f" for facetting), and a revised system should expand upon this approach to cover all attributes (e.g., "gf" for ground facets, "mf" for molded facets).

The Kidds' use of the terms "very small" to "very large" to identify bead sizes masks "natural" size populations identified in relatively large archaeological assemblages. It is known from sample cards that beads were sold historically in very discrete sizes, albeit ones that vary from manufacturer to manufacturer. The sample measurements of beads from Fort Vancouver demonstrate that unique, uniform sizes can also be distinguished in archaeological assemblages. It is possible that such metric data will eventually result in the recognition of sizes that can be attributed to specific bead-manufacturing centers, thus helping to determine a bead's country of origin. If researchers record only such relative size attributes as "very small," then potentially significant data will be lost.

The same may be stated for the sizes of bead perforations. Perforation sizes were not recorded at Fort Vancouver. Historical photographs of bead-manufacturing equipment in Venice at the turn of the 20th century (Liu 1986:51, Fig. 5) reveal that drums covered with fine upstanding wires were used to pick up beads for subsequent stringing. Such a device would pick up beads with perforations large enough for stringing, while beads with smaller or occluded perforations would be left behind. Thus, only beads that had perforations large enough to be picked up would be marketed. The remaining beads would presumably be remelted, or discarded. From this observation, it would appear appropriate that beads of different sizes, and possibly intended for different applications, might be sorted by perforation size. Roderick Sprague (1985:99) argued that perforation diameters of archaeological specimens should be measured "until more is known about bead manufacture and dating," while Karlis Karklins (1985:113) stated that "the size of the perforation has not been found to be significant." If bead manufacturers only used perforation sorting to separate beads with open vs. occluded perforations, then measurements taken by researchers will be meaningless. However, if manufacturers sorted beads by perforation size, there may be a culturally-significant reason relevant to the use of beads.

CONCLUSIONS

The bead assemblage from Fort Vancouver provides an excellent type collection for identifying cultural and temporal affiliations for the Pacific Northwest from 1829 to 1860. The assemblage has been used to infer a complex horizon marker for dating other sites in the Northwest. This horizon marker includes undecorated, monochrome drawn and wound beads, undecorated polychrome drawn beads, and facetted, monochrome drawn and mold-pressed beads. Decorated beads are notably infrequent in the fort assemblage, probably due to their relatively high value.

Subtle changes in preferred bead colors and styles during the 30-year period suggest that white-on-white drawn beads may have been common prior to the mid-1840s, with purple beads and monochrome white beads becoming common after the mid-1840s. There may be other subtle variations, such as the appearance of mold-pressed beads with ground facets and punched perforations after the mid-1830s, and the introduction of mold-pressed beads with molded facets possibly after the 1850s. Definitely, the appearance of "Prosser-molded" beads coincides with their 1840 patent date, but their presence may also signify a post-1850s American origin, rather than an HBC or British source. Similarly, the presence of multi-sided drawn beads with four rows of ground facets may also signify an American rather than British source.

Correlations of historical bead terms from HBC documents with archaeological groupings have been limited. "Cut glass" beads appear to compare favorably on the basis of color with facetted, multi-sided drawn beads (subtypes If-d and IIIf-d), and may include facetted, mold-pressed beads (type MPIIa-sppgf). "Canton" beads appear to represent blue "spherical" wound beads. The only countries positively identified as bead distribution points for Fort Vancouver are Great Britain and China, and

perhaps the United States. Probable manufacturing sources include China and Bohemia (now part of Czechoslovakia), probably Venice, and perhaps Great Britain.

Size analysis of the hot-tumbled drawn beads indicates that "seed" beads were sized by sieving, and evidence from discrete varieties indicates that at least two intervals existed, 0.5 mm and 0.8 mm. Discrete sizes for wound beads are generally non-demonstrable, except for the three sizes of blue "spherical" wound ("Canton") beads which have 4-mm intervals between sizes. If sizes exist for the facetted mold-pressed beads, they may be based upon 1-mm intervals. As with the all-molded beads, sizes are generally determined by the size of the mold. However, mold sizes may not be based on uniform intervals and, until more specimens are measured, identification of mold sizes will be speculative. Size analysis of "Prosser-molded" beads may provide the best evidence for the existence and definition of mold sizes.

Techniques for classifying beads from archaeological contexts have advanced significantly since the introduction of the Kidds' (1970) classification system. As use of the system has demonstrated, there is a need to constantly reexamine the manufacturing groups and classes that are presently recognized. Typologies founded on less than a clear understanding of the techniques used by beadmakers are prone to create confusion in comparative studies. Likewise, typologies that lump or ignore relevant attributes are prone to obscure significant historical observations. The Kidds' system initiated the accurate classification of archaeological bead assemblages, and reasons for its improvement have been well defined over the past 30 years, with a few derived from the analysis of the Fort Vancouver assemblage. Even with the revisions and modifications adopted in the present classification, major improvements must be addressed, especially a standardized nomenclature that will allow specific attributes of manufacture and decoration to be clearly described.

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DOMINIQUE BUSSOLIN ON THE GLASS-BEAD INDUSTRY OF MURANO AND VENICE (1847)

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Initial translation by Carol F. Adams

One of the earliest detailed descriptions of the Venetian bead industry is contained in an obscure book published in French in 1847 by the Venetian glassmaker Domenico Bussolin. Intended as a "Guide for the Foreigner," this work contains much useful information concerning bead manufacturing techniques and the socioeconomic aspects of the industry. To make this text generally available, a translation prepared by Karklins and Adams is provided here.

INTRODUCTION

In 1847, Dominique (Domenico) Bussolin published his treatise on "The Celebrated Glassworks of Venice and Murano: A Historical, Technological and Statistical Description of the Industry Divided into its Various Categories, with Notes on the General Trade in Fine and Common Beads." Despite its broad scope, all but 17 of its 86 pages are devoted to the manufacture of drawn and wound beads, as well as the historical and commercial aspects of the glass-bead industry. While much is already known about these subjects, Bussolin presents a variety of details not found in other accounts. Furthermore, not only is the text based on firsthand observation, but Bussolin was an expert glassworker with several important accomplishments to his name (*see* endnotes 5 and 33). Thus, his words have a ring of truth and accuracy that is not always present in the accounts of novice observers. Because of the importance of Bussolin's treatise to our understanding of the Venetian/ Muranese bead industry, coupled with its relative obscurity, especially in North America, an English translation of the relevant chapters of the French text is presented below (chapters 8-11 have been deleted since they deal with the production of glassware, mirrors and window glass). Page numbers in the original volume are shown in brackets. To avoid confusion, it should be noted that the endnotes are Bussolin's, while the bracketted in-text notes and the Conclusion and References Cited sections were prepared by Karklins.

A few comments on some of the terminology will help the reader to better understand the text. Bussolin differentiates between beads made of enamel (*émail*) and glass (*verre*). As used herein, the former is a high-quality glass, transparent or opaque, that probably had its clarity and brilliance enhanced by the addition of lead oxide. "Glass" would be less refined and cheaper.

The term "quality" (*qualité*) as applied to the glass and enamel used to make beads equates with "kind," "type" or "grade." There were various compositions of glass, each with slightly different properties. Thus, coupled with the skill of the glassmaker, a glass could be hard, clear and lustrous, or soft, dull and full of bubbles.

THE BUSSOLIN TRANSLATION

Chapter One. General Categories of the Venetian Glassworks. [p. 5]

The Venetian glassworks can now be divided into four major categories:

1. Factories producing enamel or colored-glass beads, generally known as *jais*, *rocailles*, or *conteries*.
2. Factories producing glassware and assortments of same.

3. Factories producing mirrors.
4. Factories producing window glass.

More than any others, factories producing *conteries* are of special interest to foreigners because of the unique character of the product, and because they are unrivalled in any other country.

The term *conteries* [p. 6] includes small embroidery beads known as *marguerites* (*margheritine*) and all the various types of beads made of enamel and colored glass, generally known as "Venetian beads." We will begin with a discussion of this branch of production.

Chapter Two. The Production of Glass Beads or Conteries, and its Various Branches.

Conterie production can be divided into three branches, each represented by separate factories or trades.

1. The art of preparing and coloring the molten enamel and glass. This is the chemical aspect.
2. The art we refer to as *del margaritaio* (*du margaritaire*), which involves transforming the enamels into beads with specially built furnaces and specific procedures.
3. The art of the *patenôtrier*, enameller or producer of lamp-wound beads.[1] [p. 7]

The first of these arts is the most important, and fundamental for the other two, since it provides them with the material necessary for their work. It requires quite unusual theoretical and practical knowledge; hence, the preparation techniques, such as the proportions of the various materials used in preparing the enamels and the coloring techniques, are still regarded as trade secrets.

Under the laws of the Republic, each of these three arts was to be practiced separately: the first only in Murano and the other two in Venice. Now, however, a visit to a *conterie* factory reveals all aspects of the process from the beginning to the achievement of the perfect bead through the art of the *margaritaire*.

The *art* of making lamp-wound beads [p. 8] still remains separate. Those who practice the art live in Venice and have their workshops in their own homes.

Factories which produce *conteries* can be divided into two categories according to the quality of the items they produce:

1. Factories producing enamels [*émaux*] or fine *conteries*.
2. Factories producing *rocailles*, or ordinary *conteries*.

A visit to an enamel or fine-*conterie* factory is sufficient to understand this type of work. We will provide a description.[2] [p. 9]

Chapter Three. Description of a Factory for the Production of Enamels or Fine Conteries and the Work Carried Out.

On entering one of these factories, the first thing to be observed is the special construction of the furnaces where the pastes [frit] are melted. These furnaces normally contain three, four, and, at times, five pots or crucibles; they are separated from each other so the heat can be controlled at will according to the quality of the glass or enamel to be melted.

The most important activities carried out in these factories include [the production of]:

a) Tubes of different qualities and sizes of enamel and colored glass which are then cut and formed into beads by the *margaritaire* workers.
b) *Baguettes*, or solid canes made of the same materials and used [p. 10] to make beads by the *patenôtrier* workers or wound-bead makers.

These factories also produce enamels for mosaics or other articles of jewelry, as well as glass to imitate all kinds of precious stones.

The operation for producing enamel or colored glass tubes for the *margaritaires* is the most complicated and the most worthy of observation. It involves forming the vitrified material into long tubes of varying thickness according to the intended size of the beads, but in such a way that the tubes are perforated along their entire length.

This operation is carried out by a master-worker called a *scagner* (*de l'escabeau*) who has one or two assistants and four pullers (*tiradori*) under his command. The assistant begins the operation: with a small iron bar about 4 *pieds* [4 ft., or 1.3 m] long, a gather of well-fused enamel is removed from the

crucible and formed into a roughly cylindrical shape by rolling it on a horizontal slab of iron or cast-iron (*marbre* [marver]). [p. 11] At the same time he uses pincers to open the end of the cylinder.

Following this preparation, the master-worker takes the iron bar and reheats the enamel to the necessary temperature, taking care that the hole which has been formed remains perfectly centered. Then, with all possible speed, he attaches another iron bar, called a *consaura*, to the upper end of the small enamel cylinder. Finally, two other workers (pullers) grasp the bars and, running in opposite directions, draw the enamel, which is still hot, soft, and ductile into a long cane or tube of a given thickness, perfectly round and perforated throughout it's length.[3]

It is to be noted that the fineness of the tubes depends not only on the amount [p. 12] of enamel used, but on the speed at which the pullers run.

For the manufacture of small embroidery beads (*marguerites*), the enamels must first be formed into long tubes. The Venetian industry is eminently distinguished in this type of work, which is unrivalled abroad. The color of the tubes varies according to the quality of the materials and the metal oxides used in preparing the glass.

Some types of beads are made of two differently colored layers of enamel applied one on top of the other. To achieve this, the enamel or colored-glass tubes are specially prepared in the following manner. The worker first scoops a mass of opaque enamel called *sottana* from the crucible with his iron bar. He then shapes it into a cylinder, and after opening the end as just described, he covers it with a second layer of transparent enamel of a different color, which is ready [p. 13] in another crucible in a molten form. The operation continues, and, when pulled, the two enamels spread uniformly along the entire length of the tube.

If an opaque white enamel is covered by a ruby-colored enamel, the result is a very bright carnelian [*cornaline*] color. Covering an opaque yellow enamel with that same ruby-colored enamel results in a very pleasant coral shade. In this way, a variety of colors can be produced according to the various qualities of the enamels used.

While watching the pulling of the tubes, it is worth noting that in any ruby, rose or yellowish-amber-colored glasses (i.e., those compounds colored with gold oxide or silver oxide), the true color is not immediately revealed at the tube stage; instead it is developed during a subsequent operation when the tubes are heated to form them into beads.

Pulling enamel or colored glass into long rods [*baguettes*] [p. 14] which are used in the production of wound beads is easier and faster than the tube process for *margaritaires*. The rods are solid and generally have a diameter of 3 *lignes* [¼ in., or 6.7 mm].

Enamels intended for mosaics and articles of jewelry are formed into small cakes according to an even simpler and easier operation. The worker uses the top of his iron rod to remove a small amount of molten, well-fired enamel from the crucible and drops it on the castiron slab mentioned above. It spreads out naturally into a round, flat shape about 3 *pouces* [3 in., or 8.1 cm] in diameter. The cakes are immediately placed into a cooling (annealing) furnace where they are left for a few hours to cool bit by bit; if this precaution were not taken, the cakes would break easily.

We shall now discuss the conversion of the enamel tubes into beads: the art of the *margaritaire*. [p. 15]

Chapter Four.

Article 1. The Art of the Margaritaire, and the Division of Labor. Most of the large *conterie* factories in Venice and Murano also have *margaritaire* workshops for converting the enamel tubes into beads. However, there are still *margaritaire* workshops in Venice which, as we said at the beginning, limit their production to beadmaking, and have nothing to do with the preparation of enamel and colored glass.

The art of the *margaritaire* can be divided into six major operations:

1. Sorting the enamel and colored-glass tubes.
2. Cutting the tubes. [p. 16]
3. Rounding, or the manner in which the beads are formed.
4. Sorting the different sizes of beads with screens.

5. Polishing the beads.
6. The way of stringing them, or forming hanks (*masses*).

Article II. The First Operation -- Sorting the Enamel and Colored-Glass Tubes. Since it is almost impossible for the tubes resulting from the work discussed above to be of an equal diameter throughout their length, it is necessary to sort them according to size before cutting them. This work is usually carried out by women called *cernitrici* (sorters), who sort the tubes very skillfully with their fingers. [p. 17]

Article III. The Second Operation -- Cutting, or the Manner of Cutting the Enamel Tubes. The cylindrical enamel tubes, sorted or divided by size, go to the cutters [*tailleurs*], who convert them into small, perfectly uniform pieces. The worker sits on a small chair: between his legs he holds a small bench into which is set a perpendicular steel chisel. The chisel is about 3 *pouces* [3 in., or 8.1 cm] wide, set parallel to a half-cylinder called the *scontro*, or regulator, which serves as a guide for cutting the tubes to the required length. The worker takes a handful of the tubes, spreads them out in his left hand, and places one end horizontal to the fixed chisel. With another chisel of the same size held firmly in his right hand, he taps rapidly and repeatedly [p. 18] on the tubes which advance in a measured fashion, thereby reducing them into small, regular pieces.

About 25 years ago [1822], Captain Longo invented an enamel-tube cutting machine to replace manual labor. The machine has four or six fixed chisels lined up horizontally and other, corresponding striking chisels are mounted on a curved handle shaped like a hammer. These chisels are set in motion by a cylinder and strike the fixed chisels. The enamel tubes are placed perpendicular to these chisels, and drop down by their own weight to be cut at their bases by successive blows of the falling chisels. This machine requires two workers: one to turn the cylinder, and the other to continually replace the cut tubes with new ones. This second worker is also responsible for sharpening the striking chisels when necessary. However, as this machine lacks the required precision, and [p. 19] is not equally suited for all sizes and qualities of tubing, it has not been generally adopted.

The resulting tube segments, whether produced by hand or machine, are angular and sharp, and must undergo an operation to make them round. First, however, they go to the worker called the *schizzadore*, or screener, since he uses a screen to separate the pieces or small tubes from the cutting debris (*coupage*).

Article IV. The Third Operation -- The Manner of Rounding the Beads in the Margaritaire Furnace. The small, regularly cut cylinders of enamel are rounded and converted into beads in specially designed furnaces. There are two types: the *ferraccia* furnace, and the "tube" furnace. [p. 20]

In the past, only *ferraccia* furnaces were used, but in 1817, Mr. Louis [Luigi] Pusinich introduced machines, or "tubes," which allowed the beads, mainly *margaritines*, to be more perfectly rounded.

The machines for rounding the beads are made of various materials: castiron, rolled iron, and copper sheeting. The machine is about 16 *pouces* [17 in., or 43.3 cm] long and shaped like the breech of a cannon; a metal bar which acts as an axle passes lengthwise through the center of the drum.

The beads are rounded off as follows. The small pieces of enamel, cut as described, are poured into a mixture of lime and ground charcoal which has been reduced to an extremely fine powder and moistened slightly with water. The tube segments are stirred into this mixture, called *siribiti*. The *siribiti* is then rubbed between the hands, which forces the mixture into the holes of the small cylinders, thus blocking them temporarily. [p. 21] This is purposely done to preserve the hole during the next operation.

An appropriate quantity of these prepared enamel pieces are taken and placed in the tumbling machine, or "tube," along with some sand, and occasionally some powdered charcoal as well, depending on the quality of the enamels. This second mixture is used to prevent the heat from causing the aforementioned pieces of cut enamel from sticking to one another. Finally, the "tube" is placed in the furnace. It is turned constantly in a very hot fire which is increased or decreased according to need. When the edges have been blunted and the fragments have become rounded -- in other words, when they have been converted into beads -- they are poured into a copper or iron receptacle where they are left to cool. Then, using a

screen, the beads are separated from the sand. To remove the mixture from the holes in the beads, they are placed in a bag and thoroughly shaken. [p. 22]

The operation carried out in the *ferraccia* furnaces is quite different. *Ferraccia* are certain copper pans [*poêle*] about 10-12 *pouces* [10-13 in., or 27.0-32.5 cm] in diameter which are used to round off some types of beads, primarily the largest ones and the ordinary *conterie*.

The *ferraccia* containing the pieces of glass or enamel to be rounded off is put in a reverberatory furnace where a very hot fire is maintained: the pieces of enamel or colored glass, mixed with sand or powdered charcoal, are stirred continually with an iron rod, and once the beads are rounded, they are set aside to cool, and the holes unblocked in the manner described earlier when discussing the tube machines. The preferred fuel for this type of work is bundles of well-dried willow sticks. [p. 23]

Article V. The Fourth Operation -- The Separation of Beads by Size Using a Screen. Once the beads have been rounded using the technique just described, they are turned over to another worker called a *governadore*, who uses increasingly fine screens to separate the beads according to their various sizes. He then takes a very flat wooden tray on which he pours a handful of beads: he holds the tray at a slight angle and shakes it gently so that the perfectly round beads separate from those that are not. Those that are not round remain on the tray, whereas the others, on the contrary, roll quickly downwards. [p. 24]

Article VI. The Fifth Operation -- Polishing the Beads. The beads are turned over to a further worker called a *lustratore* (polisher) to remove all the dust they have accumulated both inside and out, and to give them the necessary shine. To this end, they are thrown into a bag with a little sand and shaken; the sand is then removed with a screen. Finally, they are put into another bag with a certain amount of bran. They are shaken again, the bran is removed, and the beads come out with a perfect shine.

Article VII. The Sixth Operation -- Stringing the Beads. This is the final operation. The beads are turned over to women who use long, very fine needles [p. 25] to string them and form them into hanks (commercially referred to as *masses*) of varying sizes according to the quality and the size of the beads; for instance, *margaritines* for embroidery are strung in *masses* of one hundred twenty strings, 5 *pouces* [5 in., or 3.5 cm] long. The beads are arranged in this way for commercial delivery.

Chapter Five. Faceted Beads and Matte Beads.

Before we leave the subject of *conterie* production, faceted beads and matte beads should be mentioned. Just as precious gems take on more shine and a more pleasant appearance when they are cut and polished, it was thought that *margaritines* or embroidery beads, as well as other qualities of beads, could be cut; in fact, *margaritines* cut in this way do produce a most beautiful effect when used on fabrics and in embroidery. [p. 26]

Our beads are cut quite easily in Bohemia, and at very reasonable prices. So that is where they have been shipped for a long time now to undergo this further process. It should be noted that cut colored-crystal beads are also produced in Bohemia. The type of process, however, is very different and the product should not be confused with the beads produced in the Venetian factories.

Other beads, on the contrary, are matted in our factories; in other words, the shine is removed from the [transparent] glass which, through this operation, becomes semi-transparent.

Chapter Six.

Article I. The Art of the Patenôtrier or Wound-Bead Maker (Perlaire). The art of the *perlaire*, formerly known as a *patenôtrier* or a wound-bead maker, is one of the main branches of the Venetian *conterie* industry, and merits special attention. [p. 27] In this work, the *perlaire* uses rods composed of enamel or colored glass as the raw material. Using the flame of a lamp, the beads are shaped as desired, and decorated with various colors and designs. Those of our readers wishing to observe this process must go to Venice; as stated previously, the *perlaires* have their workshops in their own homes.[4]

Article II. Description of the Work of the Perlaire or Wound-Bead Maker. On a workbench there is a

lamp fuelled with melted tallow; a bellows is used to direct the flame [p. 28] horizontally and diametrically away from where the worker is seated.[5] The worker holds a piece of a rod of enamel or colored glass in the right hand and brings it into contact with the flame; the left hand holds a piece of iron wire covered with a mixture of glue, lime [*chaux*] and white clay from Vicenza [*terre blanche de Vicence*] which keeps the beads from sticking to the wire. [p. 29]

The enamel or colored-glass rod heats up and melts in an instant, and winds itself around the iron wire, taking on a rounded shape. The worker then shapes the beads as desired, either by a simple movement of the fingers, or using small molds. To create flowers or other decorations on the beads, the worker takes differently colored enamel threads which are melted at the lamp; in this way all kinds of designs are executed, as if with a paintbrush.

Another remarkable practice of the *perlaire* is reducing glass to very fine silk-like threads. This process, which has recently caused much astonishment in France and in Belgium, has been known here for a very long time. The glass thread is formed by a very easy process. It is a simple matter of stretching it out by pulling while using a lamp flame to keep it soft and almost molten. To do this, one end of the glass thread is attached to a revolving wheel, about 2.5 *pieds* [2.5 ft., or 80 cm] in diameter, which is turned rapidly [p. 30]: the glass lengthens, winds onto the circumference of the wheel, and is reduced into hanks. The threads are of different colors, depending on the quality of the glass used.

Since glass thread is very flexible it can be used to manufacture various fabrics. Mr. Olivo of Venice was the first to distinguish himself in this type of work, also making baskets, small vases, and other articles. Then Mr. Tommasi perfected the process, leaving little or nothing to be desired.

Stuff for tapestries is also produced using glass threads interwoven with silk threads, but no matter how beautiful these fabrics may look, they must only be used with great care. Although glass threads are made to hold together, from time to time one of the threads may give or break, and the tiny pieces of glass thread, almost invisible and very sharp, could cause very small [p. 31] but, nonetheless, very annoying injuries if one is pricked with one.

Please note that this process is not to be confused with the ancient manufacture of lace and filigree glass in the Murano factories, which will be discussed in one of the following chapters.

Chapter Seven. The Various Qualities of Beads, and Other Articles, Known in the Trade as Conteries.

From all that has been said, we can recapitulate that the beads known commercially as *conteries* fall into three main categories:

1. Beads known as *margaritines* for embroidery, or *charlottes* in the trade.
2. Beads or real *conteries*, of varying sizes and qualities, also known commonly as *jais* and *rocailles*. [p. 32]
3. Beads made at the lamp, or wound beads, used in making chaplets, ladies' necklaces, bracelets, earrings, pin heads, etc.

The factories of Venice and Murano, as we have stated elsewhere, are still known for enamels in cakes of different colors, which are in great demand throughout Europe. They are used in mosaics, in watch and clock faces, and in thousands of pieces of jewelry. The imitation of all types of precious gems should also be mentioned, especially the famous aventurine or astroit, a unique composition in which a cluster of flakes sparkle and shine, resembling gold.

[Chapters 8-11 (pp. 33-50) have been omitted as they deal with the manufacture of glassware, mirrors, window glass and glass globes.]

Chapter Twelve. On the Origin of Venetian Beads (Conteries), and Ancient and Modern Trade in Them. [p. 51]

We know that the ancient Egyptians became famous not only for their glass factories, but also for their clay pottery which they were able to coat with various colors of glass. This method was used to make vases, household utensils, and many articles of adornment such as beads, amulets, etc., which we still find with many mummies.[6] Nothing could have been easier for the Venetians. As of the 6th and 7th centuries, they had frequented [p. 52] Egyptian ports;

as they expanded their trade, they sought new types of industry to introduce in their country, and from Egyptian beads they drew some idea of the making of glass and enamel beads for which they distinguished themselves -- and still do today.

According to some experts who have written on the subject, the making of these beads started to flourish in Venice during the 13th century.[7] It is reported that around the same time Marco Polo, returning from his travels in Asia and along the coast of the Indian Ocean, had spoken of the customs of the peoples he had visited and of their taste for agates, garnets, and all types of precious stones, which he encouraged our glassmakers to imitate.

Christophe Briani was the first [p. 53] person whose name we still know to act on this; he continued his experiments with his colleague Dominique Miotto, and together they were able to color glass so that it imitated the aforementioned precious stones. The first shipment of these beads to Basra [Iraq] was highly successful, which encouraged Miotto to take on students and to create a new glassmaking art, the art of the *margaritaire*, from the word for garnets and other precious stones then known in Venice by the generic name of *marguerites*.

It is said that before glass beads were produced in Venice, bone and wood beads for chaplets and rosaries were made there and shipped to the Holy Land. Later, one André Vidaore introduced the process of making beads at the lamp. In this way he made some multicolored ones and others decorated with gilt. In 1528, he obtained a matricula from the Committee for the Supervision of Arts and Trades, and founded the art of the [p. 54] *perlaires*, known in the past as *suppialume* ["lamp blowers"].[8]

Since these articles were adapted to the taste of the Eastern nations to which they were shipped, and since they were adapted to their uses, the Venetians expanded their production, reaching an incredible, constantly increasing rate, which expanded beyond measure. Venetian beads were sold to merchants at ports on the Black Sea, in Suristan and in Egypt, where they were traded for spices and herbs from the interior of Asia.[9] From there, caravans transported them to China, and spread them throughout the islands of the Indian Ocean.[10] [p. 55]

A great many were also destined for the Asian and African coasts of the Red Sea, and Ethiopia and Abyssinia. These peoples used the beads not only as ornaments at the neck, in the ears and on their clothing,[11] but also to decorate their dwellings and, [p. 56] following ancient customs, to cover the remains of the dead in their tombs.

In some countries these beads were so highly valued that they were used as money in transactions. This is the origin of the name *conteries*, (or, actually, *compteries*), as they are still called today.[12]

Wherever Venetians had establishments and enjoyed privileges, on the northern coast of Africa, in Tripoli, in Soussa, in Tangiers, in Fez, in Marrakech, etc., they did extensive trade in *conteries*. Merchants from the interior tribes flocked there to buy them, and mainly traded native products for them. [p. 57] It is worth noting that one of their uses was in large part the purchase of Negro slaves.

When Vasco de Gama rounded the Cape of Good Hope, and, through the marvel of navigation, charted the new route to the Indies, the Portuguese, the Spanish, and then the Dutch and the English replaced the Italian Republics in the great trade with Asia. All the merchandise from the East was then transported to Europe, and European merchandise traveled to the East via the new Ocean route. As a result, *conteries* were already then starting to be transported to the ports of these different nations, where direct trade with Asia was concentrated. The same was later true of trade with the new continent of America and with Oceania. This state of affairs, with occasional changes caused by the political vagaries of the countries, still exists today. It should, however, be noted that the current rate of production of our factories, compared [p. 58] to earlier production, has been increased and considerably improved thanks to the progress of the arts, speedier communication with distant countries, and the new, broader relations we maintain with them.

Present-day trade in *conteries* with England and Holland is not inconsiderable. London and Liverpool on one shore, and Hamburg and Amsterdam on the other, are the major centers for shipping exports to the Americas and the English and Dutch colonies. As a result, immense quantities of *conteries* are consumed, particularly in Africa. Starting with the Moroccan Empire and moving on to Guinea, the Congo, Kaffraria [eastern Cape Province, South Africa], Zanzibar and Abyssinia, everywhere *conteries* are in

great demand, and are used by the Europeans to barter for the natural products of these countries.

France also deals in these beads, mainly with its Senegalese colonies, [p. 59] in exchange for gold dust, amber [this is not a local product; perhaps copal is meant], inlaid wood, furs, and the famous gum arabic. As well, in Paris, Strasbourg and other French cities, Venetian *margaritines* are used to produce quite beautiful purses, ribbons, belts, scarves, sashes, and all kinds of embroidery which are consumed partly within the kingdom and partly used for export.

Spain and Portugal also trade in Venetian *conteries*. However, trade by these two kingdoms -- which was once so extensive because of major exports to South America -- has been very limited for the past few years. Germany and Prussia still consume some of these objects. Lemberg [Lvov] and Brody, in Poland [now the Ukraine], trade in *conteries* throughout Russia. Constantinople is the center for orders coming from Persia, Armenia, and other parts of Asia. Through its location, Alexandria remains an important port for shipping *conteries* along [p. 60] the eastern coast of Africa, and along the Asian shores of the Red Sea. Finally, the Barbary ports supply the markets of all the neighboring African tribes, and from there, *conteries* are introduced into the central regions of Africa itself.

Europe's relations with China, which should be expanded because of recent events, will provide the Venetian-*conterie* trade with new, extremely interesting openings, especially for trade with that country, since the Chinese have always demonstrated a special affection for beaded ornaments which they use as symbols of their dignity, as reported by Macartney in his travels to China, as already quoted. Once the new route via Egypt is regularly established, it could prove very advantageous to this traffic, which would, in fact, be reverting to one of the routes used long ago.

Some types of beads can even be adapted for use by European nations [p. 61] for chaplets, necklaces, hair ornaments, or a few other luxury items. This trade, which is spreading without competition throughout the entire world, is supplied solely by the Venetian factories. On many occasions in the past, foreigners have tried to discover the methods of manufacturing *conteries* so as to import them into their own countries. Their efforts have always been in vain. The complexity of the operations, the jealousy with which the expert craftsmen have guarded the secrets of their compositions, and the strictness of Venetian laws have always frustrated their attempts. [Although Venice did dominate the glass-bead industry, it certainly did not have a monopoly on bead production, Bohemia being a major competitor. Furthermore, it is a fact that, despite severe penalties, many Venetian glassworkers were lured to other countries where they divulged their beadmaking secrets.]

When, in 1797, the French took possession of Venice for the first time, the goal of exporting this branch of industry to France did not escape the attention of the republican envoys, and in 1798 the Executive Directory gave a specific order to General Berthier. Here is his reply:

> It is with regret that I must inform you that I have not succeeded [p. 62] in the task you set me in your letter of 5 Nivôse [Dec.-Jan.]: to take the secret of the manufacture of *marguerites* from Venice. I hope to send the report of those I had handling this matter by the next courier."[13]

One should not be surprised that, at the time, arts and trades guilds still existed in Venice;[14] those approached by General Berthier did not make it easy for him to achieve his intended goal. One must also remember that the general, busy on Napoleon's orders with the famous Italian wars did not have time to expand his research and to approach those actually practicing the art, as the subject required, since it was an art familiar to very few, and divided by the laws of the day into several branches totally different from one another. [p. 63]

Chapter Thirteen. A Few Regulations Regarding the Murano Glassworks at the Time of the Republic of Venice, and the Privileges it Granted to the Residents of Murano.

Since the power of the Republic of Venice was due entirely to trade, it was certainly in its interest to encourage the national industry of the Murano glassworks, which, as we have said in previous

chapters, represented one of the most significant export branches, and brought immense wealth to the state. In his civil and political history of Venetian trade, Marin states:

> The glassworks have always been the government's most prized possession: countless measures have been taken to increase and perfect the work, and to maintain, [p. 64] in so far as possible, an exclusive flow into neighboring countries, as into the most distant lands."[15]

As of 1318, the Murano glassworks were separated into various categories according to the quality of their products. Each category was subject to special laws which, with time, have undergone various changes according to circumstances.

According to the last register (*Capitolare o Matricola*), these factories were divided into the following four categories:

1. Blown-glass and crystal factories.
2. Window-glass and mirror-glass factories.
3. Factories making "ordinary" canes [tubes] for *conteries*.
4. Factories making canes [tubes] intended for *margaritaires* and *perlaires*, and enamel cakes.

The register (*Matricola*), commonly called the *Mariegola*, was a handwritten register in which all the [p. 65] regulations relating to the professions in question were written down as soon as they were promulgated. It is worth noting that the three professions of *miroitier* [mirror maker], *margaritaire*, and *perlaire à la lampe* [wound-bead maker], whose workshops were in Venice, were regulated by registers separate from the Murano register; the art of manufacturing glass and enamels was considered a primary art, and was separated from the secondary branches of glassmaking in order to make emigration more difficult.

To guarantee strict supervision of the glassworks, an office called *del Comparto* (of division)[16] was established on Murano. It was made up of nine individuals: five were elected by the factory owners, and four by the working class. Membership was renewed every year. They made sure order was maintained within the factories, and resolved within the art any questions which [p. 66] arose. Towards the end of the Republic, this office was subordinated to the Council of Censors in Venice.

Amongst the regulations included in the register was one which required each factory owner, at the beginning of the year, to declare to the *del Comparto* office the quality and quantity of crucibles he intended to maintain. The work year began October 1 and ended the following July 31; in other words, there could be no increase or variation in production over that forty-four week period. To allow these orders to be carried out, two representatives of the art (called *soprastanti*), responsible to the *del Comparto* office, were selected; they had the right to enter the factories, day or night, at will, to inspect the work.

Another important regulation was the one regarding apprenticeship, including the tests to be passed by those wishing to register with the workers' guild. [p. 67] There were two excellent results: first, the products were of proper and perfect quality; second, the production levels of the factories were maintained at the level of commissions or consumption.

The Republic of Venice took such care to maintain, even among foreign nations, the reputation of this branch of the industry, and to prevent the circulation of defective products, that one decree amongst many others, dated March 20, 1764, from the Council of Censors, stated:

> Be it known and understood that any attempts at forging objects produced at the glassworks in Murano shall be irrevocably halted, following removal of the counterfeit products. Criminal proceedings shall be instituted against the offenders *in absentia*, and an ongoing secret investigation shall be opened with a view to subjecting the offenders to the severest of punishments, in reparation for the public and private damage caused.[17] [p. 68]

At different periods, the Murano glassworks were under various magistratures. We will mainly point out that as of February 23, 1490, their superintendency was entrusted to the heads of the Council of Ten, and that on October 27, 1547, the council decided to take on the job of ensuring that the art was not transported outside the state.[18] These proceedings were confirmed by the resolutions (*Parti*) adopted in the *Maggiore*

Consiglio on March 22, 1705, and April 13, 1762.[19] The second of these resolutions established

> That [p. 69] the heads of the Council of Ten protect the art, using the most secret and severe means that they, in their wisdom, consider necessary, ensure that no person employed in the glassworks leaves the state for foreign countries.[20]

Consequently, it was forbidden, subject to the most serious penalties, for all those belonging to the art of the glassmaker to divulge its secrets. Those who left the Venetian state without the permission or the knowledge of the Council of Ten were condemned to death.

The following decision of the *Maggior Consiglio* of April 13, 1762, also stated that "all matters relating to the art of the glassmaker were to be regulated by the Senate through administrative means."[21] [p. 70]

Again on April 13, 1662, the Council of Five Sages was required to prepare a report on the state of these professions, and to suggest the means most appropriate for their prosperity. This is what led to the council report of January 30, 1762 MV (1763), in which various changes to the old laws were proposed. It was also as a result of this council's opinion that the superintendency of the art of the glassmaker was handed over to the Council of Censors, with one of the three State Inquisitors as an assistant.

Later on, the laws of 1806 established freedom in these provinces for the arts and the trades, and abolished all guilds. Because of these laws, anyone -- foreigner or national -- regardless of status, can set up a [p. 71] glassworks or work in one. Anyone can move his factory wherever or whenever he wishes, since the manufacturing of *conteries* has the same status as all the other arts.

While these general provisions may seem profitable and encouraging for national industry in the case of professions also known and practiced in other countries, they do not seem to be applicable to a kingdom or a town which wishes, as in this case [Venice/Murano], to preserve an exclusive native industry. But as the maxims of the new legislation of these provinces relating to arts in general did not correspond to those of the government of the Republic of Venice, it was normal that the specific regulations relating to the art of the glassmaker, the *margaritaire*, and the wound-bead maker could not be preserved in any way either.

If, on the one hand, the strictness of the Venetian laws against glassworkers who betrayed their country was severe, the Republic did, on the other hand, grant special distinctions and [p. 72] privileges to the Muranese, particularly those who belonged to the glassmakers' art, to bind them to the government. The following are some of the main concessions:

1. In 1445, Murano received from the Senate of Venice the rare privilege of electing in perpetuity, from amongst its citizens, a chancellor called the *chancelier prétorien* [praetorian chancellor], specifically *sicut factum fuit*, as in the statute, *comunitati Clugiae, et Modoni, et Coroni, et civitatum insulae Cretae*.[22]
2. Murano maintained its nuncio in Venice for matters which had to be handled there.[23]
3. The island of Murano had its own civil, criminal, and administrative justice, whose laws and ordinances made up the code entitled *Statut de Murano*. In 1502, with the approval of the Senate of Venice, the statute was entirely laid down and arranged according to the circumstances of the day, with no [p. 73] further reform until the fall of the Republic.[24]
4. On February 16, 1601 MV (1602), the Council of Murano passed a resolution, confirmed by the Senate of Venice on August 20, 1602, establishing the privileges of the bourgeoisie (*citadinance*) of Murano. This led to the institution of the "Golden Book" in which were inscribed the original families of Murano and, later on, their descendants.[25]
5. As of the 12th century, the period when Murano was enclosed in Venice, the Republic granted the Muranese the distinguished title of "original citizens of Venice." As a result, they did not require a decree of favor, as was required of subjects born outside [p. 74] Venice or who were not resident there, to always be admitted to the first jobs in the republican ministry of the *Avogaria*, the *Cancelleria Ducale* or foreign courts.[26]
6. The Muranese had the long-established privilege of having gold or silver coins struck at Venice's *Zecca* each year. These coins were called *Oselle* and bore the epigraph: *Munus Comunitatis Mu-*

riani. The size and the design of the *Oselle* varied over the years. In laters days they were stamped on one side with the names and the coats of arms of the doge, the podesta, and the treasurer, as well as the arms of the township of Murano, and on the other side with the names and the arms of the four deputies of the island. The last *Osella* was struck in 1796, under Doge Louis Manin; Sébastien Pisamano was the podesta of Murano, and Zanetti was the treasurer. The four deputies in that year were Georges Barbaria, Antoine Ongaro, François Dal Moro, and François Motta. [p. 75]

7. The Magistrature of the "proveditor of the commune" (*Provveditori di Comun*), as residents of Venice, could not get involved in repairs required to the bridges, streets, and canals of the island of Murano. That was the responsibility of the supervisors (*soprastanti*) of the glassworks, who administered the revenues of a special fund, the *Bezzo*, to cover such expenses.[27]
8. Those who belonged to the glassmaker's art [guild?] had the right to carry two knives in a single scabbard.
9. Neither the police officers of Venice, nor their leader, the *Missier grande*, could land on Murano. If by chance a Muranese were to commit a crime, the magistrates of the island handled the imprisonment of the culprit, handing him over later to the superior courts.
10. Foreigners were not allowed to practice the glassmaker's art. Only the sons of glasswork's owners or [p. 76] of master-workers could set up a glassworks.[28,29]
11. But the most remarkable and most honorable of all the privileges was that the daughters of the heads of the Murano glassworks could marry patrician noblemen from Venice, and their descendants kept all their degrees of nobility. This privilege is truly extraordinary, considering the quality of the [p. 77] eminently-aristocratic government and the very high degree of Venetian nobility.

Chapter Fourteen. A Comparison of the Factories in Murano at the End of the Venetian Republic and those in Existence Today.

Towards the end of the last century, Murano had about forty-six glassworks, divided as follows:

1. Eight factories, most using three crucibles, making enamel and fine canes [rods and tubes] for *margaritaires* and *perlaires*.
2. Six factories, each with six crucibles, making canes [tubes] suited for ordinary *conterie*.
3. Three crystal factories, not including the Briati factory in Venice which closed about 1790. The three Murano factories each used three crucibles.
4. Four ordinary-glass factories, each with five crucibles. [p. 78]
5. Four mirror factories: one manufactured large mirrors, using seven crucibles; the others made smaller mirrors using five crucibles each.
6. Twenty-one factories making small window panes, each using five crucibles.

Today (1846) there are twelve working factories on Murano, divided as follows:

a) Four factories producing enamel canes [tubes] for fine *conteries*, usually using five crucibles each.[30]
b) Four factories making canes [tubes] for ordinary conteries; these are annexes and actually part of the four previous factories. These factories usually operate with five crucibles, increasing to six or seven according to need.
c) Three factories making crystal and ordinary blown glass. These two types of work, formerly kept separate, are now carried out using the same furnace. Today's factories use [p. 79] three crucibles: two for ordinary glass and one for crystal.[31]
d) One factory for window glass of all sizes, watch crystals, and French-style bottles. This is the major establishment set up by the Marietti brothers of Milan.[32]

In Venice there are three operational factories:

1. Two enamel-bead factories, using a total of ten crucibles.[33]
2. One making hollow, colored-glass [tubes] for *rocailles*, with four crucibles.[34,35] [p. 80]

Although the above report reveals that the number of enamel and *rocaille* (ordinary *conterie*) factories in operation today has decreased, we know that the number of crucibles for producing enamels has increased considerably. As well, since the present crucibles are

Table 1. Annual Production of the Enamel and *Rocaille* Factories in Venice and Murano.

Quality of the Products	Weight in Kilograms		Value of the Pastes	Cost of Bead Production	Total Value of Manufactured Objects
	Gross	Net, Manufactured			
			Francs	*Francs*	*Francs*
1) Enamel pastes for fine *rocailles*	900,000	750,000	1,500,000	1,000,000	2,500,000
2) Colored-glass pastes for ordinary *rocailles*	1,400,000	1,200,000	600,000	400,000	1,000,000
3) Enamel and colored-glass pastes for makers of wound beads	350,000	320,000	350,000	650,000	1,000,000
	2,650,000	2,270,000	2,450,000	2,050,000	4,500,000
Enamel cakes and other products	50,000	50,000	200,000	—	200,000
	2,700,000	2,320,000	2,650,000	2,050,000	4,700,000

Table 2. Summary of the Previous Table. Products of the Art of the *Margaritaire* and the Wound-Bead Maker.

Quality of the Products	Net Weight of Products	Value of Products	Total	
			Weight in Kg	Value in Francs
Art of the Margaritaire				
Enamel beads	750,000	2,500,000	1,950,000	3,500,000
Rocailles	1,200,000	1,000,000		
Art of the Wound-Bead Maker				
Beads of enamel and colored glass	320,000	1,000,000	320,000	1,000,000
			2,270,000	4,500,000
Enamel cakes and others products	50,000	200,000	50,000	200,000
			2,320,000	4,700,00

larger than in the past, and the manufacturing techniques currently in use more perfected and faster, the output of products is higher than in the past.

To verify this fact, it is enough to note that the art of the *margaritaire*, which existed in Venice and which dealt solely with the production of enamel and colored-glass beads, included, towards the end of the Republic, twenty-two *ferraccia* furnaces, whereas today, [p. 81] when all the *margaritaire* factories now in existence in both Murano and Venice are in full production, they maintain about eighty furnaces, mostly of the tube type.[36] It follows from what we have stated that, comparing the old work with the new, particularly as regards enamel articles or fine *conteries*, we can infer that the latter is four times the former; at the same time, it must be noted that the prices of the products have decreased accordingly.

The factories of Murano and Venice create a yearly movement of capital which varies according to commercial transactions, and hence according to an increase or decrease of work. Those in classes a and b above (including the establishments of this type [p. 82] located in Venice) annually produce about 2,320,000 kg of enamel, *jais*, *rocailles*, lamp-wound glass beads, and other objects, for a value of 4,700,000 francs (*see* Tables 1 and 2).[37] The other Muranese glassworks mentioned in classes c and d above annually produce about 800,000 kg of crystal, window panes, watch crystals, bottles, and common glassware for a value of 700,000 francs. Most of these products come from the Marietti factory.

Thus, all the factories we have described represent a total annual production of over three million kilograms of diverse manufactured articles, at a value of [p. 83] about 5,400,000 francs.

From these facts we can calculate that the total approximate commercial activity of the city of Venice, within this sector of industry, including the import of raw materials used in the glassworks and the export of the resulting products, exceeds an annual amount of about eight million francs.

CONCLUSION

As an accomplished local glassmaker, Bussolin provides insight into the Venetian beadmaking industry that is not to be found in many other works. Of some 30 known reports prepared on this topic during the 19th and early 20th centuries, only six others (Anonymous 1835; Carroll 1917; Hoppe and Hornschuch 1818; J.P.B. 1856; Zanetti 1866; Zanetti and Sanfermo 1874) are clearly based on personal observation. Even so, the observers (with the notable exception of Zanetti who was a local historian) were generally just curious travelers who were given the grand tour so some details of their accounts are occasionally suspect. The other accounts do not acknowledge their sources, but several are definitely based on earlier works (e.g., Anonymous 1825; Benjamin 1882; Lardner 1832). In fact, a practically verbatim though restructured version of Bussolin's text appears as a chapter in *Venise: l'Art de la Verrerie* by Pieter D'Hondt (1891: 35-49). The latter is an excellent example of why researchers must be careful when collecting material regarding the chronology of beadmaking technology and other aspects of the industry; the date of publication -- especially of an encyclopaedia -- does not always correspond with the date of observation.

ENDNOTES

1. Workers practicing this art are known as *perlai* (*perlaires*).
2. There are now four factories producing enamels on the island of Murano: Pierre Bigaglia q.^{m} L.; A. Dalmistro and Co.; the heirs of J.B. Santi; and the Coen Brothers. The first of these factories, owned by P. Bigaglia, is one of the largest and most worthy of observation, as well as the easiest for foreign gentlemen to visit. It is located at the entrance to the island on leaving Venice. Two factories in Venice are also involved in this production: L. Zecchin in San Leonardo and Edme Voizot in San Jerome.
3. Usually, these tubes are pulled out over a distance of about 150 *pieds* [160 ft., or 49 m]. In the past, as well as rounded tubes, triangular and quadrangular tubes were also produced, as were tubes with solid and differently colored stripes.
4. Of the principal *perlaire* workshops in Venice, we will mention two: Ange Giacomuzzi's in the San Marzialo parish, where gold mosaics are pro-

duced, and I.B. Franchini's in the San Alviso parish, which is known for its enamel work called *millefiore*.

5. Instead of melted tallow, which is usually used as fuel, the author of this book obtained a patent in 1843 for the use of carbureted hydrogen gas. Tests carried out on this type of process guarantee good results. Indeed, the gas flame causes the enamels to develop brighter, more pleasing colors, especially those colored red with gold oxide. As well, because of the intensity and uniformity of the flame, the product is larger and allows considerable cost savings. In spite of these proven advantages, industry always hesitates to adopt a new process when the usual routines or local customs are ignored. At first there are many impediments and obstacles, and thus wound-bead work continues according to the old method described. [It is interesting to note that the beadmakers were forced into using the new fuel following the siege of Venice in 1849, when the city was not only without oil, but without meat and, consequently, tallow as well (Gasparetto 1958: 195).]
6. The Armenian Mechitarist Fathers on Venice's San Lazaro Island have a mummy whose long apron (*tablier*) is woven of variously shaped beads of varying colors which appear to be made of glass, and which were, in fact, considered to be glass; upon examination, the author recognized them as being clay coated with colored glass. The designs represent Egyptian hieroglyphs. [What Bussolin discusses here is actually faience, a fused mixture of finely crushed quartz and an alkali, such as natron, that is usually covered with a blue or green glaze. Glazed pottery was unknown to the ancient Egyptians.]
7. Unpublished memoir on Murano Island by Counsellor [Carlo] Neijmann Rizzi; and a memoir on the glasshouses of Venice by Counsellor Rossi, read to the Athenaeum of Venice in 1841. [Rizzi's assertions that Marco Polo was responsible for setting the Venetian bead industry in motion and that Briani and Miotto were the first producers have no basis in historical fact (Gasparetto 1958: 182-183)].
8. Memoirs by Neijmann and Rossi.
9. Marin, *Histoire civile et politique du Commerce des vénitiens*, vol. IV, book II, page 172, Venice, 1800.
10. One of the main ancient trade routes leading to the Asian interior and the Indies was the following. From the Black Sea the merchandise went up the Fasi River (now known as the Rion). It was then transported by wagon about 15 leagues [ca. 38 mi., or 60 km] from Serapana to Sura [in central Georgia], where it was shipped downstream on the Cyrus River (today known as the Kura) to the Caspian Sea. It finally reached the Oxus (today known as Gihon or Amu) from where it was distributed throughout Asia. *Mémoire hystorique et géographique sur les pays entre la Caspie, et la mer Noire*, Magasin de Paris, October, 1797; and Marin, *Histoire civile et politique*, etc., vol. IV, book II, page 132.
11. "It would be impossible to say what quantity of glass [objects] the Venetians exported to Syria, Egypt, Barbary, and the Black Sea, or of the *Margaritines* which were in demand throughout the East to adorn women, dwellings and clothing." *Ricerche Storico-Critiche sulla Laguna Veneta, e sul Commercio dei Veneziani*, Venice, 1803, p. 189.

    [George] Macartney tells us that the Mandarin Chinese and the Tartars wore Venetian glass buttons on their clothing, as well as ornaments made of *Margaritines*, as symbols of their dignity and their profession. He adds that this is a remnant of the nearly exclusive ancient trade practiced by the Venetians with China. *Voyages à la Chine*, and *Ricerche Storico-Critiche*, etc., p. 140. [Peter Francis, Jr., (1990: pers. comm.) believes that the beads mentioned by Macartney may well have been of Chinese manufacture.]
12. In the work quoted -- *Ricerche Storico-Critiche sulla Laguna Veneta, e sul Commercio dei Veneziani* -- 1803, p. 140: "That in Duhalac near Massuah on the Red Sea even now the currency in use is Venetian beads, or *margharites*, or those enamel tubes or small balls of various colors that are made in Venice, and that are very popular in the Orient as ornaments, decoration, etc. Whether new or old, broken or whole, whatever the color or size, all are in use as currency."

13. D'Artaud, *Vie du Pape Pie VII.*
14. These guilds lasted until 1806.
15. Book II, chapter IV, p. 258, Venice, 1798.
16. It was given this title because, among its other duties, it monitored the dispensation of the different sorts of work carried out in each glasshouse.
17. "*Si fa pubblicamente intendere e sapere, che le contraffazioni di qualunque genere di lavori nelle fabbriche vetrarie di Murano, si sospenderanno irremissibilmente, previo trasporto delle manifatture spurie: si procederà criminalmente contro i rei contumaci, e si aprirà un processo segreto d'inquisizione sempre permanente, per indi discendere contro li medesimi inesorabilmente alli piu severi castighi, a riparo di tanti pubblici e privati pregiudizii.*"
18. Report of the College of Five Sages to the Senate on January 30, 1762 MV (1763). See the Capitulary containing documents and decrees relating to the art of glassmaking, preserved in our public archives.
19. See the resolutions adopted in the *Maggior Consiglio.*
20. On lit: "Che i capi del Consiglio de'X, dovessero avere *la cura dell'arte, valendosi anche di vie le piu segrete e severe, quali pareranno alla loro prudenza, nell'invigilare attentamente, e provvedere, che niuna persona impiegata nelle arti vetrarie partisse da questo stato, per trasportarle in alieni paesi.*"
21. *"Che il governo delle arti vetrarie, in via amministrativa, dovesse spettare all' Eccelso Senato."*
22. Ab. Fanello, *Saggio storico di Murano*, p. 29.
23. Idem, p. 30.
24. Idem, p. 30.
25. The "Golden Book," with parchment pages, is still preserved in the Murano chancellery. In his new "Voyage to Italy," Misson reports that "the glassmakers of Murano refer to themselves as gentlemen, having been ennobled by Henry III who watched their work while in Venice (1753); and they enjoy the rights of the bourgeoisie (*citadinance*); vol. I, p. 326, printed in the Hague, 1727.
26. Vettor Sandi, *Storia civile della Repubblica di Venezia*, part I, vol. II, p. 548, Venice, 1755.
27. A *Bezzo* was a coin worth half a Venetian sou, or one and one-half centimes of an Austrian pound.
28. This provision was also confirmed by Senate Decree on September 5, 1776.
29. On page 4 we reported that Mr. Barbaria had received permission to build a glasshouse in Venice in 1790 to manufacture bottles in the English style; since Mr. Barbaria was Venetian and did not belong to the glass manufacturers' guild of Murano, it was through a special favor and an order from the State Inquisitors that he was granted Muranese citizenship and the right for himself and his descendants to be registered in the "Golden Book" of Murano. Otherwise he could not have practiced the art in question. This can be confirmed in the "Golden Book" of Murano under the date of April 15, 1793: *"Per comando degli Illustriss. Inquisitori di Stato, aggregato Zorzi Barbaria coi suoi legittimi discendenti. Esente dall' Ufficio del Comparto per la sola fornace ad uso di bottiglie d' Inghilterra eretta nella dominante."*
30. See endnote no. 2.
31. See endnote no. 2.
32. This factory is an annex of one of the two previously mentioned: L. Zecchin's in San Leonardo.
33. In the glasshouses on Murano, filigree glass and ribbon glass are worked in the old style according to the method reproduced by the author. In Venice, Mr. Pierre Bigaglia built a factory to make these products which stands out from the rest because of the beauty of the products. His factory also produces jasperated and spotted glass in imitation of various types of marble.

    While the filigree work we have referred to now competes with that being produced in French factories for the past two years and in a few places in Bohemia, the Venetian product is remarkable for a specific genre of work which sets it apart from that of foreign factories. As well, as of 1838, Venice was the first to give a new radiance to this branch of the industry.
34. In Article IV, we showed the difference between *ferraccia* and "tube" furnaces. All told, there are

ten *margaritaire* factories, five of which are annexes of enamel factories in Venice and Murano. The other five are separate.

35. This output is calculated on the basis of the average number of crucibles maintained in the enamel and *rocaille* factories of Venice and Murano, taken together, for the following total: 30 crucibles for enamel and fine *rocailles*, and 24 crucibles for ordinary *rocailles*.

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PERFORATED PREHISTORIC ORNAMENTS OF CURAÇAO AND BONAIRE, NETHERLANDS ANTILLES

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This paper describes some of the more distinctive characteristics of perforated prehistoric ornaments, primarily beads and pendants, found on the Caribbean islands of Curaçao and Bonaire. The production and stylization of these ornaments is briefly compared between the islands, as well as with specimens recovered from sites on the South American mainland.

INTRODUCTION

Curaçao and Bonaire, two of the six islands comprising the Netherlands Lesser Antilles, are located about 45 km north of the state of Falcon, Venezuela (Fig. 1). These are true oceanic islands, separated from the mainland by the over-1000-m-deep Bonaire Trench. They share similar climatic conditions, having an average annual rainfall of 270-855 mm per year and an average annual temperature of 27°C (Bruinenburg 1985). Thus, they have semi-desert environments with xerophytic vegetation, similar to northwestern Venezuela, and northeastern Colombia at Goajira.

Both islands were formed by deep-sea volcanic action producing basaltic bedrock which emerged above sea level. This rock was subsequently surrounded by various developments of coral growth which eventually formed into limestone terraces. Curaçao has proportionally more basalts over its 444 km^2 area, while Bonaire has proportionally more limestone over its 288 km^2 surface. There are no permanent rivers or streams on either island; however, seasonal watersheds and shallow groundwater locations are present.

PREHISTORIC BACKGROUND

Noted on Curaçao, the earliest human occupation of the two islands has been established by radiocarbon dating at about 2500-1800 B.C. (4490±60 to 3790±50 years BP) (Haviser 1987: 81). On Bonaire, radiocarbon dates indicate that the first inhabitants appeared ca. 1400-150 B.C. (3320±55 to 2105±75 years BP) (Haviser 1990: 3). These were peoples with a level of technological development identified as the Archaic Age, which signifies that they had neither agriculture nor produced ceramics. Thus far, no perforated ornaments have been found associated with Archaic-Age sites on Curaçao or Bonaire.

Radiocarbon dates obtained from archaeological sites on the islands indicate that a major influx of Amerindian peoples from South America began about A.D. 450-500 (1480æ25 years BP). These people were of the Ceramic-Age level of technological development, and thus had manioc/maize cultivation, produced ceramic artifacts, possessed a more complex social organization, and were probably of the Arawakan linguistic family. The Ceramic Age for these islands lasted until initial contact with the Spanish in 1499, and carried over as the Historic Age into the early part of the 16th century. It is during the Ceramic Age that beads and pendants manufactured of shell, ceramic, bone, and stone appear on Curaçao and Bonaire.

For this study, various artifact collections assembled by both professionals and amateurs were examined personally or via published sources. As recent archaeological studies of this region have generally neglected beads and pendants, several of the regional references in this report are from earlier professional publications. The primary sources for

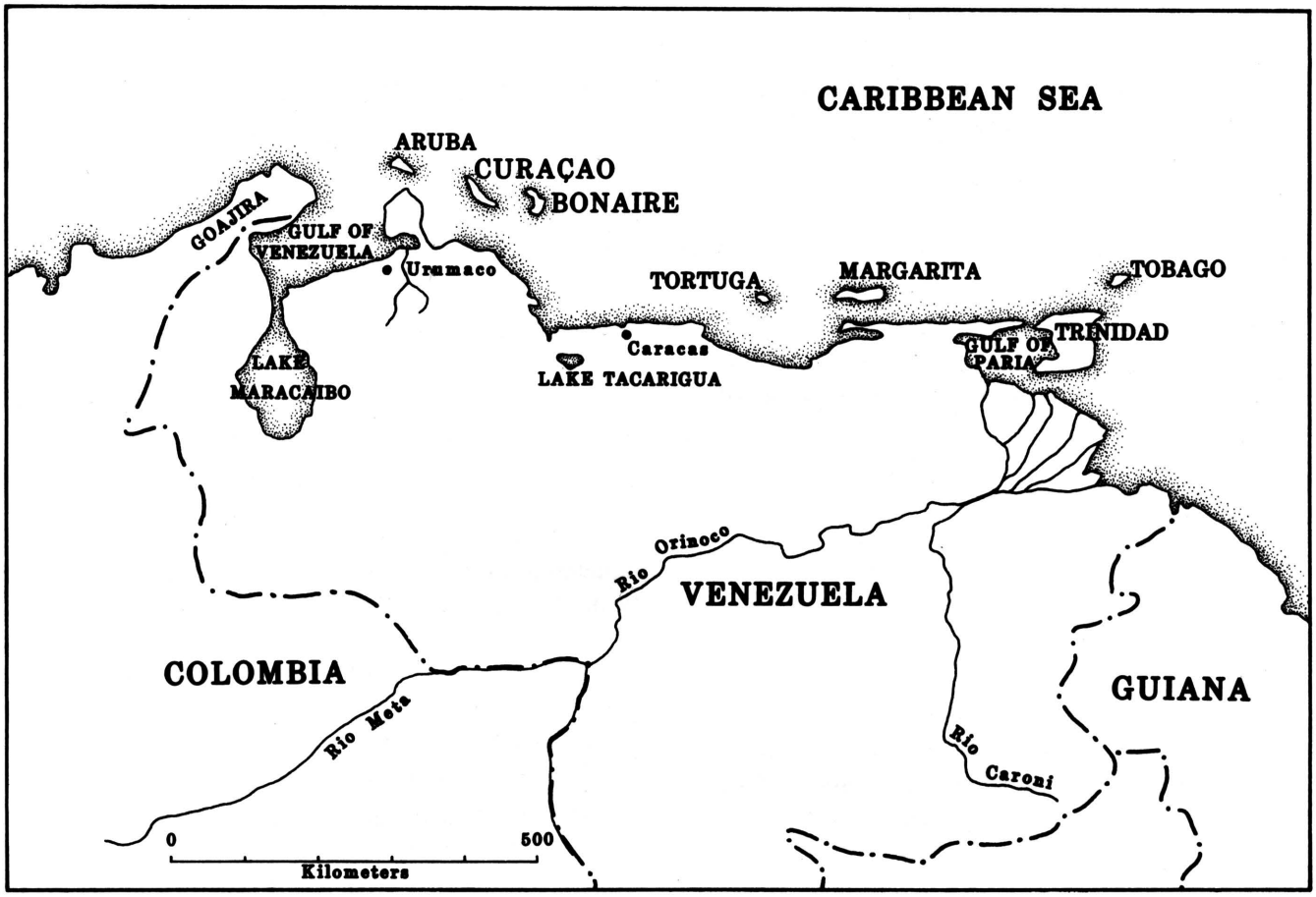

Figure 1. Location of Curaçao and Bonaire, off the northwestern coast of Venezuela (drawing by D. Kappler).

this study include professional reports by E. Boerstra (1982), J.B. Haviser (1987, 1990, n.d.), H.R. van Heekeren (1960), J.P.B. de Josselin de Jong (1918), and professional field observations made by the author from 1982-1990. A review of collections owned by amateur collectors Jose daCamara, Frans Booi, and others was also of assistance to the author, although these specimens have limited use for precise analysis.

BEAD DESCRIPTIONS

The materials used for the manufacture of prehistoric beads and pendants on Curaçao and Bonaire include marine shell, the most common, as well as ceramics, stone, and bone.

Beads and pendants of shell are primarily made from the outer lips or shoulder nodes of various species of conch (*Strombus*) shells. Other shells frequently found modified into beads and pendants are olive shells (*Oliva*), flamingo tongues (*Cyphoma gibbosum*), oysters (*Isognomon*), and file shells (*Lima scabra*). All of these are indigenous to the islands. Pearls were also perforated for suspension.

Stone beads and pendants are most commonly composed of calcite or quartz (Pl. VE,f,g), also jasper (Pl. VE,h,i) and basalt, and less commonly nephrite and serpentine. The calcite, quartz, jasper and basalt can be acquired on the islands. However, the nephrite and serpentine are imported, most probably from the Venezuelan-Colombian border area (Wagner and Schubert 1972).

Ceramic beads are most often made of an untempered red clay (Pl. VE,a-d). Several specimens of perforated, tempered-ceramic discs (sherds of broken vessels) are too small (less than 3 cm in diameter) to have been used as spindlewhorls, and probably functioned as beads (Pl. VE,e).

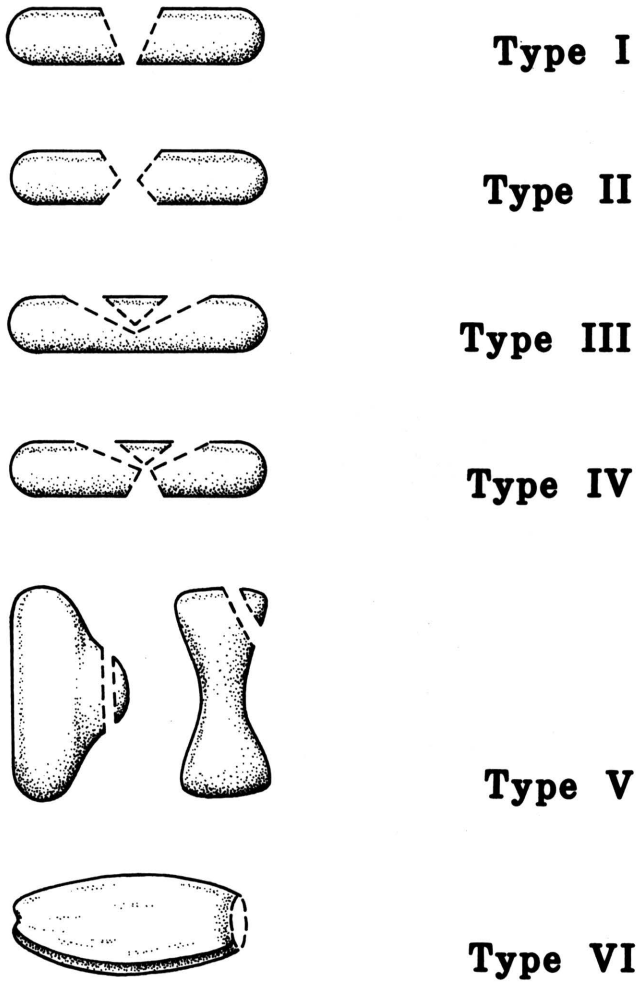

Figure 2. Prehistoric bead-hole typology (drawing by D. Kappler).

Bone beads are relatively rare. They generally consist of hollow bird bones with polished ends. The species vary and are rarely identifiable. Also present are beads made of various fish bones (primarily the vertebrae of cartilaginous fish) which exhibit both enlargement of natural perforations and incising of the outer surfaces. Turtle bone and carapace fragments are also found modified into pendants (most commonly of *Chelonia mydas*), and longbone fragments of large mammals (species unknown, but possibly the deer *Odocoileus gymnotus* on Curaçao) occur with perforations.

Regardless of the material used, six basic types of bead holes were produced on Curaçao and Bonaire during the prehistoric period (Fig. 2). These are described here and correlated to those defined by H.C. Beck (1928: Pl. IV) as an aid to future prehistoric bead studies in the region.

Type I. Conical: A single perforation drilled from one direction with an opening on either side of the artifact. Equivalent to Beck's "Type III, single cone" perforation.

Type II. Biconical: A single perforation drilled from opposite sides with an opening on either side of the artifact. Equivalent to Beck's "Type I, double cone" perforation.

Type III. V-Shaped: A V-shaped perforation whose two segments were drilled from one surface; two openings on one side of the artifact. Equivalent to Beck's "Type VIIIa, V-perforation".

Type IV. Y-Shaped: A combination of a Type I and a Type III perforation with two openings on one side and one opening on the other side of the artifact. Equivalent to Beck's "Type Xd, Y-perforation".

Type V. Offset: One or more perforations in an expanded edge or appendage of an artifact. Equivalent to Beck's "Type IXa, single perforation."

Type VI. Terminal: A perforation produced by removing the spire, apex, or an area of outer shell of gastropod shells. Most often equivalent to the "grinding" technique identified by Francis (1982: 714).

Holes of Types I-V were produced by small lithic drills worked in a rotary motion. The conical openings so produced were generally about 2-6 mm in diameter at the orifice. It is important to note that all Ceramic-Age village sites on both islands have produced small, chipped, chert drills 1-3 cm in length which exhibit distinctive rotary use-wear striae.

Bead shapes vary, but the most common one by far is a disc ranging from 2-90 mm in diameter and 2-12 mm in thickness. Disc beads of stone and shell tend to be barrel-shaped. They are equivalent to Beck's (1928: Pl. II) Type I.A.1.b. circular barrel discs with Type I, II, III and IV holes. It has been noted that as the diameter of the disc decreases, the sides tend to become straighter, approximating Beck's Type I.A.2.b. circular cylinder disc.

The majority of the untempered-ceramic beads are quite distinctive with Type IV holes and a rounded

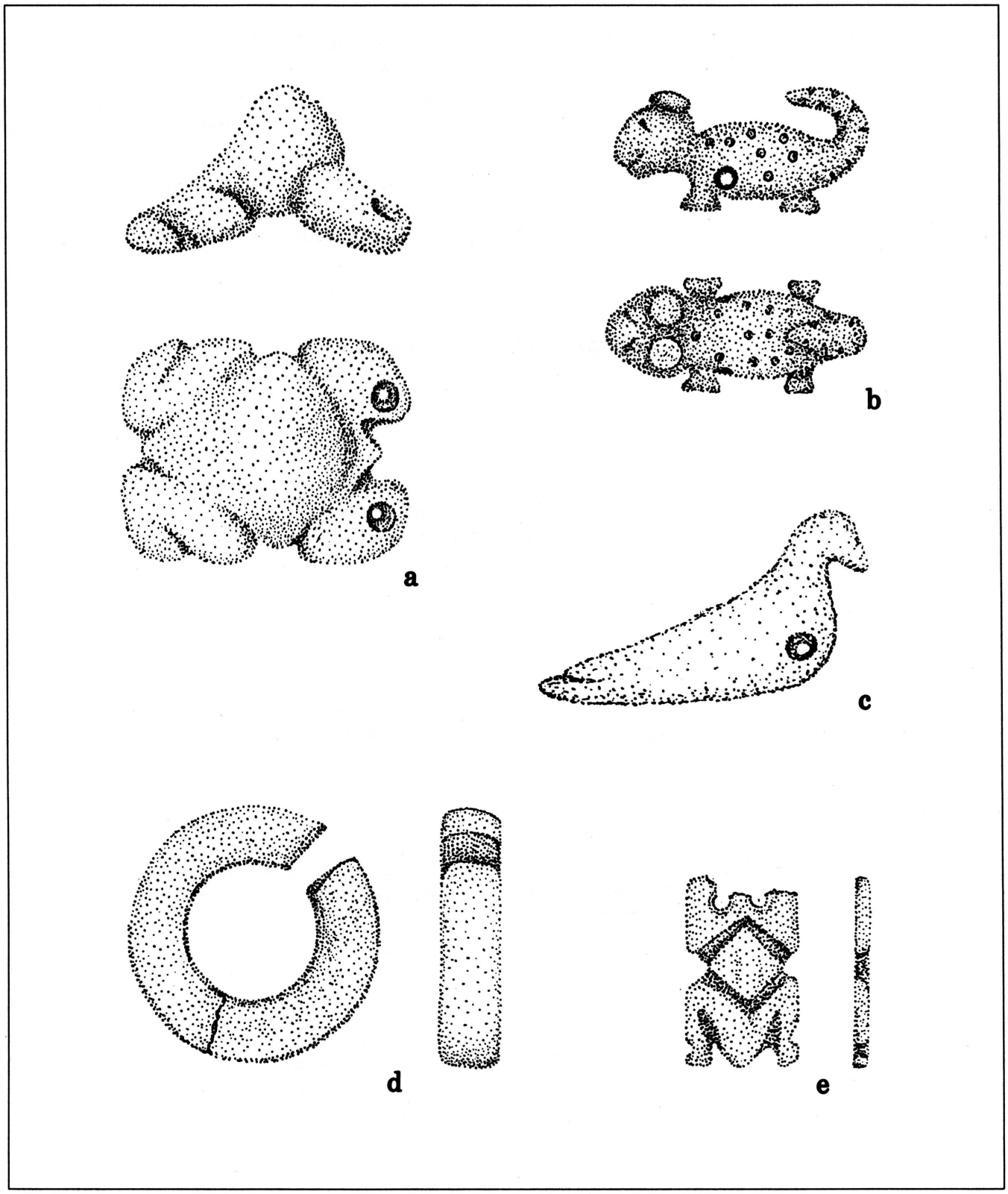

Figure 3. Prehistoric shell ornaments: a, b, e, zoomorphic ornaments excavated by Haviser (1987) at Wanápa, Bonaire; c, bird ornament from F. Booi collection (Amboina, Bonaire?); d, nose-ring from Wanápa, Bonaire. Scale is 2:1 (drawing by E. Juliana).

conical shape; the single hole is always on the conical end of the bead. There are also some long cylindrical beads made of untempered clay which range from 2-4 cm in length and 60-90 mm in width and have elongated Type II holes. Some cylindrical untempered-ceramic beads are encircled by incised parallel lines. The tempered-ceramic-sherd discs have only Type I and II holes (Pl. VE,e). Perforated pearls always have Type II holes.

There are numerous specimens of square or rectangular shell beads which range from 8-30 mm in length and 2-6 mm in thickness. The rectangular beads almost always have Type III holes.

Irregularly shaped beads and pendants can be separated into several different categories: zoomorphic representations; cones, rings, and hourglass shapes; amorphous forms; and natural-shell forms.

The zoomorphic representations include frogs (Fig. 3,a,e; Pl. VF,a-c), birds (Fig. 3,c), turtles, and one example of a jaguar (Fig. 3,b). Shell is the most common material for animal representations, although calcite, quartz, and bone specimens are also known. Hole Types I, II, III and V predominate on zoomorphic beads.

Conical objects (Pl. VG,c,f), rings (Pl. VG,e), and hourglass-shaped beads (Pl. VG,d) are also made of shell, and have Type I, II and V holes. Ethnohistorical accounts (Nooyen 1979) suggest that the cone-shaped artifacts may have been used as earplugs rather than beads, and the notched ring in Fig. 3,d and Pl. VF,d possibly served as a nose ring. The hourglass beads always exhibit encircling incised rings and have Type V holes.

The amorphous beads are primarily made of polished shell or stone with Type I and II holes. Some of these forms are probably stylized representations of animals that are not readily identifiable (Pl. VG,b).

Various beads are made of perforated, complete or nearly complete shells. Common examples include *Oliva, Conus,* and *Nerita* shells with Type VII openings, often with a Type I hole on the side; *Isognomon* shells with paired Type I holes; and *Cyphoma gibbosum* shells with two pairs of evenly spaced Type I holes (Pl. VG,a).

LOCAL COMPARISONS

For the purpose of inter-island comparisons, the relevant artifacts excavated from two prehistoric archaeological sites by the author will be examined. On Curaçao, the De Savaan site (C-021) was excavated in 1984. This is a Ceramic-Age village site radiocarbon dated to about A.D. 900-1200 (1040±100 - 660±20 years BP). The excavated area consists of four 2x2 m units (104/98-100, 106/98-100) dug to bedrock at about 35 cm below the surface (Haviser 1987). On Bonaire, the Wanápa site (B-016) was excavated in 1987. This is a Ceramic-Age village site radiocarbon dated to about A.D. 450-1450 (1480±25 - 505±35 years BP). Four 2x2 m units (88-90/122, 88-90/124) were dug to bedrock at about 30 cm below the surface (Haviser n.d.).

Table 1 lists the relevant artifacts recovered from the excavated units. In both samples, unperforated shell discs are the most common artifacts, and probably represent preforms for the manufacture of perforated discs. The shell objects have a greater frequency of Type I and II holes, with considerably more Type II holes represented on Bonaire. A pearl bead with a Type II hole was found at either site. There are substantially more Type III holes in shell artifacts from Bonaire, with the previously mentioned focus on rectangular bead shapes (five from Bonaire and two from Curaçao) for this hole type. Type IV and V holes are less common, with only two specimens of shell discs with Type IV holes from either site. There is also a zoomorphic pendant from Bonaire and two hourglass-shaped objects from Curaçao with Type V holes. Type VI holes occur on Oliva shells from Curaçao and Bonaire, and on Conus and Nerita shells from Bonaire. All of the zoomorphic pendants are made of shell, with one frog from Bonaire, and four frogs and one jaguar from Curaçao. The frog pendants all have Type I holes, whereas the jaguar pendant has a Type II hole.

Perforated ceramic objects are primarily the untempered-clay beads with Type IV holes, with three examples from Curaçao and five from Bonaire. A single ceramic disc with a Type II hole and two unperforated ceramic discs are from Curaçao.

Lithic beads have Type II holes, and are of calcite (1) and nephrite (2) on Bonaire, and calcite (1), nephrite (1), red jasper (1) and basalt (1) on Curaçao.

Table 1. Perforated Artifacts from Curaçao and Bonaire.

Shell/Ceramic*/Lithic+ Perforation Types	Curaçao (C–021) n	%	Bonaire (B–016) n	%
Type I	14	15.7	18	16.7
Type II	8*+	8.9	26+	24.1
Type III	2	2.3	8	7.5
Type IV	5*	5.6	7*	6.4
Type V	2	2.3	1	.9
Type VI	2	2.3	5	4.6
Unperforated discs	56*	62.9	43	39.8
Total	89	100.0	108	100.0

Bone artifacts which can be identified as beads or pendants primarily consist of polished bird longbones with two specimens from Curaçao and five from Bonaire. Two pendants from Curaçao, one of turtle bone and the other possibly of deer bone, have Type II holes. Also from Curaçao is a shark's tooth with a Type I perforation and a perforated shark vertebrae with a Type II hole. A possible example of the latter is also in the Bonaire collection.

As can be seen, the assemblages from the two islands are relatively similar, each having about 50-60% of all perforated objects with Type I or II holes. Other similarities include the close correlations between rectangular-bead shape and Type III holes, and Type IV holes and untempered-clay beads. Zoomorphic representation of frogs are present at both sites.

REGIONAL COMPARISONS

The disc beads of shell with Type I and II holes are ubiquitous to the entire Caribbean region, and thus are of little help for comparative purposes.

Frogs, the most common zoomorphic representation noted on Curaçao and Bonaire, are reminiscent of frog motifs (often called *Muirakitãs*) found over South America (Wassén 1934) including Venezuela (Kidder 1944: 137; Nomland 1935: 93). The bird representation shown in Fig. 3,c is similar to specimens from the Greater Antilles (personal observation: Museo del Hombre, Santo Domingo, Dominican Republic). However, the artifact is from a personal collection on Bonaire, and its origin on Bonaire cannot be verified. It is curious that no other similar specimens have been excavated on Curaçao or Bonaire. The jaguar pendant from Bonaire is identical to one found near the Urumaco River, Falcon, Venezuela (José Oliver 1990: pers. comm.).

The manufacture of untempered-ceramic disc beads with Type IV holes seems to be restricted to northwestern Venezuela and the coastal islands, including Curaçao and Bonaire (Boerstra 1982: 44; Cruxent and Rouse 1958: Pl. 13; Haviser 1987: 52; van Heekeren 1960: Pl. 24; Kidder 1944: 75; Nomland 1935: 97). The extensive use of Type III and IV holes on beads of a variety of materials is also distinctive of these islands.

Rectangular beads with Type III holes, earplugs, and *Cyphoma*-shell beads have regional correlations with Aruba (Boerstra 1982: 44; van Heekeren 1960: Pl. 24) and northwestern Venezuela (Cruxent and Rouse 1958: Pl. 13; José Oliver 1990: pers. comm.). The shell "nosering" from Bonaire is unique in the islands.

INTERPRETATION

There are direct and indirect correlations related to perforated objects found on Curaçao and Bonaire. Clearly, trade with the mainland is evidenced by the presence of nephrite, serpentine, and pearls. Yet, it is also evident that a particular animal species does not have to be present on the islands for its representation in the iconography of pendant design; e.g., the jaguar image carved in marine shell in this semi-desert region where jaguars do not live. The composition of the jaguar ornament is indicative of local manufacture (marine shell), with a conceptual importation (the jaguar), which correlates with Levi-Strauss' totemism theory that an animal representation focuses on the mythical association of the animal, and only indirectly relates to the actual animal itself (Levi-Strauss 1962: 29). Another example is the use of frog representations, a very wide-spread concept over the Antilles and South America (Wassén 1934), which are made of various materials depending on the local resources. It is interesting to note that frogs are reported to have been introduced to Bonaire only in 1928 (Brongersma 1948: 94), and yet they are very common in prehistoric zoomorphic representations. Maybe there was a prehistoric frog species on Bonaire that became extinct, or perhaps it is an example, like the jaguar, of a concept being imported and expressed on local materials.

Some specific zoomorphic motifs are directly associated with specific areas, such as the "bat pendants" common in the Valencia area of Venezuela, and the "condor pendants" of the Guianas and Antilles. These two specific motifs are not found on Curaçao and Bonaire. Interestingly, the jaguar pendants from Bonaire and Falcon have a closer correlation with the greater Amazonia region (Roosevelt 1987) than with the Antilles. The frog pendants, common to Curaçao and Bonaire, are very wide-spread and thus are generally associated with the entire South American and Caribbean area.

Some localized patterns can be identified based on bead-manufacturing techniques. For instance, the red untempered-clay beads and Type III and IV perforation techniques are distinctive of Curaçao, Bonaire and northwestern Venezuela.

The foregoing data suggest that the physical manufacturing techniques of the ornaments discussed herein are more indicative of local associations with northwestern Venezuela, while the conceptual inspiration for the images represented may perhaps relate to more ancestral connections with Amazonia.

ACKNOWLEDGEMENTS

I would like to thank Edwin Ayubi of the Archaeological-Anthropological Institute of the Netherlands Antilles, Curaçao, and Frans Booi of the Department of Culture, Bonaire, for their cooperation in the investigation of the prehistory of these islands. My gratitude is expressed to Elis Juliana for the drawings in Fig. 3, and to José daCamara for allowing me to observe and photograph his collection. I would like to thank Erica Wagner for bringing the Wassén article to my attention, and to Karlis Karklins for his interest in this paper.

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BOOK REVIEWS

Northern Athapaskan Art: A Beadwork Tradition.

Kate C. Duncan. University of Washington Press, Seattle, 1989. 224 pp., 44 color plates, 186 B&W illus., appendix, notes, bibliography, index. $45.00 (cloth).

Once upon a now-departed time, it was possible for serious scholars to finally attain complete knowledge of all Mankind's history and accomplishments and thus to put each in its proper perspective. But, alas, in these days when new information spews forth from every printing press like an off-shore oil spill, such serene goals are no longer attainable. Thus, most scholars have retreated into a limited, but more manageable, specialization. Sad to say, this has its side affects of myopia and lessened objectivity.

Reading Dr. Duncan's work on northern Athapaskan art forced this reviewer to realize how much he had fallen into this trap. The thought kept recurring, "why, I had no idea there was that much to it!" Previously, all Subarctic beadwork had looked the same. It never will again.

Basically, the book addresses what is known about the history of artistic expression among the Athapaskan peoples of the western Subarctic and how it has developed over time. The author begins by describing the materials and art forms which predate European arrival in the region. These include carving on bone, leather and rawhide objects, porcupine-quill weaving, and embroidery. She is careful to show which of these survive today and how modern examples differ from earlier ones.

Duncan then continues to introduce trade goods and the consequences they held for native art forms. Here we come to beads. Although the book is more concerned with beadwork than with beads themselves, the author does go into some detail about probable dates of introduction and, so far as is possible, what kinds and colors were available when. With one exception to be noted below, her data appear to be current and correct.

Next, she moves to the introduction of floral design in the region, its diffusion, and finally the resulting regional styles. Here is the real meat of the book, and the author's superb contribution to dispelling the ignorance of those like myself who "had no idea." Duncan's explanations of the hallmarks of each regional style are very clear and, illustrated by the many fine photos provided, become plainly evident.

The most familiar of these for most will be the vigorous, flamboyant Great Slave Lake-Mackenzie River style which predominated all the way from Hudson Bay west into the upper Yukon River drainage. Here are the lavish floral compositions which almost fully cover their spaces leaving very little background showing. Another is the Liard-Fraser style found from Lake Athabasca south and west across the Rockies into interior British Columbia. It is identified by combinations of floral and rectilinear shapes and by a tendency to superimpose one figure upon another. A third is the Yukon-Tanana style found from Whitehorse in the Yukon west into Alaska almost as far as the Yukon delta. In contrast to the preceding, this style is more sparing and formal. Symmetrical compositions leave plenty of background area exposed and we see the familiar little "spurs" on stems which many consider diagnostic of the entire Subarctic. Finally, Duncan describes some minor styles such as the geometric figures preferred for Tahltan and Inland Tlingit beadwork which could be called more florid than floral.

Dealing with the Subarctic region, Duncan had to confront three bead-related questions which are presently not totally resolved. First, there is the matter of distinguishing beads made in Russia from those

made elsewhere. She refers to examples of Athapaskan beadwork from Russian collections, and seems to assume that the beads must therefore have come from Russian traders. Prominent among these pieces one sees the large faceted blue necklace beads which have often been so described. It is known that the Russians did make beads, but there also seems to be evidence that some of their trading stock came from Bohemia and perhaps even Venice as well. It is probably outside the perimeters of Duncan's study to answer this question, but it is to be hoped someone will try to find the answers.

Another matter that is central to her subject, though, is the introduction of floral design. She rejects the idea that everything was due to French influence and says "Sources are far more diverse, with significant roots in the British Isles, Scandinavia, and even Middle Europe...." In a footnote, she mentions more specifically English, Swiss, Norwegian, Icelandic and Galician (Ukrainian) women in the Red River area as possible sources of influence. There certainly were English and Swiss women in Lord Selkirk's colony, but my own impression is that the other national groups didn't arrive in any numbers until the late 1870s, and then tended to live in homogeneous enclaves interacting only minimally with persons of other ethnicity. Today, there is renewed interest in native North-American floral design and a more extended discussion of possible origins and influences would have been welcome.

Finally, there is the much-debated matter of "Metis" beadwork style. Duncan cites historical references to persons so identified in the western Subarctic, but points out that native people there do not so categorize themselves today. These same people say there is, at least today, no difference between their works and those made by others claiming mixed European and Native ancestry. The point made here is that this is a topic calling for further study.

In summary, here is an excellently researched and published book which is strongly recommended to all. Given the paucity of literature on Subarctic arts, Duncan has gone a long way to clarify identification and dating of objects as well as providing insight into the lives and motivations of the beadworkers themselves. Don't miss this one!

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Proceedings of the 1986 Shell Bead Conference: Selected Papers.

Charles F. Hayes III and Lynn Ceci, editors. *Rochester Museum and Science Center, Research Records* 20, 1989. xi + 206 pp., 90 figs., 20 tables. $15.00 (paper).

Most of our readership is familiar with the high-quality "Proceedings of the 1982 Glass Trade Bead Conference" previously published by the Rochester Museum and Science Center. This volume continues the tradition of research excellence by presenting selected papers on shell beads from the 1986 conference. The topics are quite varied, ranging from a survey of bead manufacturing techniques by our past president, Peter Francis, Jr., to numerous regional studies on Iroquoian shell ornaments, wampum, Mississippian shell-bead production and exchange, Mayan and Andean beads, Paleolithic beads, and bead conservation. Abstracts of eight papers presented at the conference but not published are included in the volume. The volume is dedicated to the late Lynn Ceci, a pioneer in the study of shell beads, especially wampum, among the Iroquois.

The papers can be divided into several groups: the identification and conservation of beads and bead manufacturing techniques (5 papers); shell ornaments, including wampum, among the Iroquois (6 papers); shell beads in Central and South America (2 papers); ancient Old World shell beads (2 papers); and miscellaneous (3 papers).

Jane Topping presents an introduction to the identification of the molluscs used in the manufacture of shell beads and other ornaments. This paper reveals the wide variety of shells used to make ornaments, and provides an excellent discussion of the classification of molluscs which serves as a good background to the papers on particular beads.

Nancy Davis discusses the deterioration of shell artifacts in museum collections, and provides information for the proper preservation of shell artifacts. Her paper is important to any institution or individual with a collection of shell beads.

Cheryl Claassen discusses chemical characterization of shell in an attempt to determine places of origin for shell artifacts. This paper is essentially an update on research in progress, but is important in showing how shell ornaments will eventually be useful in tracing exchange patterns.

Peter Francis, Jr., describes the numerous techniques for shell-bead manufacture in his thorough and well-illustrated paper. His classification scheme is based on both observable characteristics of shell bead specimens, and on his own replication experiments.

Charles Hayes provides an introduction to the shell-artifact collection of the Rochester Museum and Science Center. The museum has excellent holdings of prehistoric and historic-period Seneca-Iroquois shell artifacts, many of which are illustrated by excellent photographs, and outstanding drawings by Gene Mackay.

Lynn Ceci traces the origins of wampum, pointing out that beads very similar to wampum in shape and the type of shell utilized can be found in Middle Woodland (A.D. 1-1000) archaeological sites in New York. She gives an excellent period by period categorization of shell usage in prehistoric New York. In a somewhat related paper, Martha Sempowski traces the use of shell ornaments among the historic Seneca Iroquois by studying the excellent collections of the Rochester Museum and Science Center. Different styles of shell ornaments, as well as differences in shell artifact frequency, are shown to characterize different periods within the 16th and 17th centuries.

James Pendergast provides a detailed look at the types of shells utilized by Iroquoian Indians, and discusses mechanisms by which the Iroquois obtained shell in trade with coastal peoples. He sees shell trade as coming from the Chesapeake Bay area, a trade stimulated by the early trade in European goods in the 16th century. The Susquehanna and Potomac rivers acted as major arteries for the spread of shell into the interior.

Richard Yerkes discusses the production and exchange of shell beads among the Mississippian (late prehistoric) peoples of Illinois. He evaluates the evidence for the manufacture of shell beads as a craft specialization, and concludes that while beads may have been used as tribute with production controlled primarily by the elite, there is no evidence of full-time craft specialists.

Julie Hammett and Beverly Sizemore discuss shell ornaments as socioeconomic indicators using a sample of specimens from the Carolina Piedmont. They document change in shell-ornament form from the prehistoric to historic period, and make interesting comparisons with beads used in prehistoric California.

Hattula Moholy-Nagy analyzes shell beads from the important Maya center of Tikal, Guatemala. The changing uses of shell beads through time at Tikal are examined. *Spondylus*-shell beads consistently functioned as high-status markers, although the forms changed through time, finally disappearing in the Post-Classic occupation. White and nacreous shell appears in a wide range of contexts during the Intermediate and Late Classic periods, indicating that their use was not restricted to the elite.

Ann Mester discusses marine shell symbolism in Andean culture. While others have analyzed the *Spondylus* shell that is so frequently found in Peru, Mester focuses on the little-known pearl oyster. She sees a symbolic connection between pearly shell, which breaks up light into its constituent colors, and precious metals and quartz crystals. All three of these items are related to the sun, and symbolize a celestial complex which symbolizes "moral excellence, societal replication, and the role of the Incaic royal dynasty as generator of social well-being." This complex is viewed in opposition to a terrestrial complex symbolized by the red *Spondylus* shell.

The use of marine shells as cultural markers in the late Paleolithic and Neolithic of the Southern Levant is the subject of the paper by Daniella E. Bar-Yosef. The changing utilization of shell species through time and the increase in long-distance trade is carefully documented in this paper.

Nigel Goring-Morris investigates sociocultural aspects of shell use during the terminal Pleistocene in the southern Levant. Early hunters and gatherers utilized distinct assemblages of shells which correlate nicely with stone-tool assemblages. During the later portion of the period under study, with the advent of more complex sedentary peoples, shell use dramatically increases.

Stuart Fiedel provides a most-interesting discussion of the use of ornaments in hunter-gatherer burials in his cross-cultural study. He points out that many archaeologists would view the use of shell ornaments as evidence of ranked societies, particularly when they accompanied subadult burials, but through careful analysis, Fiedel demonstrates that many egalitarian societies provide rich burial accompaniments for children. Richly furnished child burials need not imply ascribed status, and this is an important lesson.

Finally, Paul Williams discusses the history of Grand-River-Iroquois wampum belts. Many of these belts were sold by individual Iroquois at the beginning of the 20th century to large museums in the eastern United States. Since that time, other Iroquois have attempted to have the belts, viewed as tribal property, returned. This paper ends with an appended note that the Museum of the American Indian, Heye Foundation, has returned eleven belts to the Iroquois people, and that the Royal Ontario Museum is considering returning wampum in its possession. The story of the return of these belts is told in an article by William Fenton in the journal, *Ethnohistory* (1989, No. 4).

I found this to be an excellent volume, certainly a must for anyone interested in the use of shell beads in archaeological analysis. The papers are well-edited and the illustrations are first quality. The subject matter is quite broad, and there is clearly something for everyone. This volume is a fitting tribute to the late Lynn Ceci, the prime mover for this conference. It comes highly recommended.

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The Ubiquitous Trade Bead.

Anita Engle. *Readings in Glass History* No. 22, Phoenix Publications, Jerusalem, Israel, 1990. 100 pp., 26 figs., 5 color plates. $20.00 (paper).

Anita Engle is the doyenne of glass historians in the Middle East. For nearly 20 years her series of *Readings in Glass History* has provided information on the history of this material often not available elsewhere. Her work is always interesting, frequently stimulating, and sometimes ground-breaking. Although often difficult to locate and rarely cited by other writers, much of her work is worth seeking out.

In this volume, however, she has perhaps bitten off more than she could chew. It appears to belong to some sort of time warp in which bead studies have not advanced much beyond what they were in the late 1960s. Most of the bead sources on which she relies are either of that period or secondary references which rely heavily on older published findings. As a result, this volume fails to advance bead studies.

In the introduction, Engle outlines what she perceives as the problems with bead research. On p. 5 she says: "As archaeologists have long known, bead finds are inadequately recorded, if at all, they are undateable, even when found in stratified circumstances, and, with one notable exception, they are hopelessly unprovenanceable."

Perhaps such a statement could have been written with confidence a few decades ago, but with the increased interest in bead studies around the world and a dozen or more years of intensive work by many people, it is no longer tenable. Many beads found in a

number of stratified sites have now been fairly closely dated, dates which are increasingly being cross checked and made more accurate. Nor are beads "hopelessly unprovenanceable," as the origins for a great many of them are being verified.

Given this critique of bead research, one might expect some breakthrough from Engle, but all we are offered are "beads picked up from the sand dunes covering the ruins of ancient and medieval Caesarea... collected by two different families settled in the area, during the course of several years in which their main search was for ancient coins." To this unscientifically based assemblage are applied parallels derived almost entirely from long-outdated sources and more recent secondary sources. The parallels are not drawn from personal examination of beads but from texts and photographs, even in one case a fuzzy photocopy (p. 58).

Engle's lack of research into current bead studies seriously weakens her work. On pages 12-15, she echoes the old argument that glass beads made in Asia were made of glass imported as scrap from the West, while comparisons of their major ingredients show that this was not the case (Francis 1988-9:3-9). She remains confused about the origin and significance of chevron beads (pp. 18, 87), which have received much attention (for a summary, *see* Francis 1988: 25). Her discussion of drawn opaque red Indo-Pacific beads (pp. 20-22) relies on sources a quarter of a century old, and takes in nothing of the work that has been done on them for the last decade. She persists in calling them *mutisalah*, an inappropriate term, and even refers to "mutisalah glass" to mean opaque "Indian" red glass.

Not having acquainted herself with recent work in bead research, Engle relies heavily on old or secondary works. One of the latter is Deagan's (1987) excellent book which, however, discusses beads that have little or no relationship to those that Engle has. The other is Dubin's (1987) work, entirely secondary and marred by flaws that Engle repeats or compounds. For example, Engle (p. 85) mentions a turquoise-colored bead which Dubin (1987: chart no. 633) says is a ceramic "Donkey bead" made in India, whereas it is neither -- it is faience made in Qom, Iran. Engle then (p. 86) compares a "St. Eustace" bead with green beads that she has seen. The name of the island, in the Netherlands Antilles, is St. Eustatius (both Dubin and Engle misspell it). These beads are blue, not green. Moreover, if Engle's green beads are pentagonal they would not be mimicking emerald crystals, as she suggested, as the latter are hexagonal.

A lack of understanding of how glass is made into beads also leads Engle astray on several occasions. The top caption for Pl. 25 (p. 88) begins by describing two beads as "wound," and then suggests that they were made by the *Margariteri* of Venice, quoting Nesbitt (1879!) on how drawn beads are finished by being packed in a mixture of lime and charcoal and being fired. She concludes that the "lime-like substance" in one of the beads is a result of this operation. However, if the beads are wound, it is more likely a separator put on the mandrel by the beadmaker. If the beads are drawn, the material might well be dirt.

The same confusion is found in the caption of the lower plate on p. 98. The red beads being discussed are of a different finish in part because they are different beads: the strand is composed of drawn Indo-Pacific beads, while the two on the other strand are wound.

On p. 58 Engle notes that "a special type of large glass bead" found on early Spanish-colonial sites in North America (i.e., Neuva Cadiz beads; *see* pp. 54-8) is "the same type of large square-sectioned bead... produced in quantity by the Hebron glassmakers today." This astonishing statement compares multi-layered drawn beads to simple wound beads with no more similarity than the fact that they are both glass and have square sections. It fits in with her overall thesis, but bears no relationship to reality.

The same sort of undiscriminating analysis of beads is made throughout much of the work. Thus, the striped bead found by Lamb at Pengkalan Bujang is related to striped beads from Caesarea (pp. 9-12), as though striped glass beads were so excessively scarce that all had to have been made by the same process in the same place. On the same basis, black round beads from Caesarea are compared to those found in North American sites (pp. 84-5). Her discussion of mosaic beads (pp. 15-7) is hopelessly entangled in misconceptions. Those found at Pengkalan Bujang are Early Islamic, as probably are the ones from Caesarea. She cites van der Sleen (1973) discussing mosaic beads, but he was describing two types: one the so-called "Java bead," the other with heavy lead and barium contents,

which must be Chinese. Engle's discussion of cornerless cubes (pp. 17-8) is sketchy, and her parallel to specimens on "A necklace of Amsterdam beads from West Africa" (first published by Read in 1905) which appears as the frontispiece of the 1973 edition of van der Sleen is meaningless, since those on the necklace are not cornerless cubes but twisted squares.

Moreover, by being unacquainted with beads, Engle tends to believe that various types are rare. Opaque red glass is referred to this way on p. 22, while, in fact, it has been a common glass for beads for millennia. In the caption of plate 26 (p. 96), she refers to a carnelian cornerless cube as being "unusual," while they are actually quite common. In the same caption she cannot differentiate chalk from bone or whatever else certain beads were made from.

The author devotes considerable space (pp. 72-83) to the so-called "man in the moon" bead: round blue tabulars with the design of a half-moon with a face and stars on one side, and stars and what might be a comet on the other (some have what is thought to be an anchor in place of the moon face). These are known from a few North American sites. They have also been found in sites along the eastern Mediterranean, a fact which she does not mention. Apparently none were found at Caesarea, so why they are discussed is unclear. They must be what she sees as the "one notable exception" to all of those "hopelessly unprovenanceable" beads out there.

Engle's argument is that the "Half-Moon," which was a nickname for Amersterdam due to the arrangement of the canals (Henry Hudson's ship was named *The Half Moon*), was a common watermark on paper which, she argues, had a Dutch connection. Therefore, she believes that the beads were made in Holland. The point of all this is that in the preceding even-longer section (pp. 59-71) she states her case for the beadmakers of Holland having largely been new Christians, forcibly converted from Judaism in Spain and Portugal.

Much of Engle's corpus is devoted to the theme of how important Jews or converted Jews have been to the history of glass. The case she makes for this is often very interesting, but also sometimes convoluted. In the present work, many assumptions are made about the identification of people and their origins and, to accept it all, the reader must undergo a considerable suspension of skepticism.

This aside, to return to the "man in the moon" bead, Engle's idea is intriguing but not absolutely convincing. For one thing, the occurrence of this bead in North America postdates most Dutch trade in the regions in which it is found and perhaps even Dutch beadmaking, though the beads could have been in circulation for some time. The watermarks themselves do not date later than 1600, leaving a gap of a century or more between them and the beads. There are also no parallels among the beads found or excavated in Holland (K. Karklins 1990: pers. comm.)

Engle further weakens her argument by advancing ideas that are allowed to float in the air. For example: "My own theory is that [this motif represents] some significant event in the struggle for religious freedom on the part of this widespread movement of artisans, of varying crafts and differing beliefs, but all united in one goal." This non sequitur is never elaborated upon. We are told that the figure usually called an "anchor" on the beads is the man in the moon with an exaggerated nose and a cross at the tip, and that a watermark depicts this clearly but, although 27 watermarks are reproduced in her book, this one is omitted. We are also told that the "comet" is a "mini-dragon," again without substantiation; several of the watermarks appear to show a comet, while the dragons seem to belong to a different class of designs.

Despite these problems, Engle has advanced an interesting idea which could, theoretically, be tested in the future. This is a contribution, but does not live up to the billing of the book.

For the first time in her series, Engle publishes color photographs which are welcome and generally of good standard (the same cannot be said of all the black and white photos). Several of the illustrations, however, have been misplaced, printed upside down, and so on. The tip-in on p. 96 to explain how to view the color plates on p. 97 is very ambiguous as to what the reader is supposed to do. The plate of the necklaces on that page has either been cropped to remove the cornerless cube mentioned in the caption or there was no cornerless cube in the strand to begin with.

The form of citations and references are not up to international academic standards. Often entire volumes of her *Readings* series are cited, leaving the poor interested reader with no choice but to plow

through the entire volume to see what is being discussed. The bibliography cites neither publisher nor page numbers, an irritant to researchers.

In short, though the book is readable and sometimes interesting, it does not advance the field of bead research in any way, save the hypothesis about the origin of the "man in the moon" bead. This is a real shame. Engle is positioned to have made some real contributions to the field. A thorough study of the important beadmaking center of Hebron (*see* Francis, this volume) would have been welcomed. Had she done her homework in regards to the beads found at Caesarea which she asserts are from the Islamic period by comparing them to excavated examples in local museums and the literature, she could have advanced our understanding of that important beadmaking period. However, despite the announced theme of this volume, its real focus seems to be elsewhere.

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The Glass Trade Beads of Europe: Their Manufacture, Their History, and Their Identification.

Peter Francis, Jr. *The World of Beads Monograph Series* 8, 1988. Lapis Route Books, Center for Bead Research, Lake Placid, New York. 69 pp., 1 map, 9 B&W figs., 1 color plate, index. $11.00 (paper).

Based on Francis' earlier works, "The Story of Venetian Beads" and "The Czech Bead Story," this is a much-updated study reflecting many years of painstaking research involving extensive travel to see museum and private collections, archival resources and modern bead manufacturing throughout the world. Those who have followed Peter Francis' peregrinations, as wonderfully detailed in issue after issue of *The Bead Journal* and its successor, *Ornament*, will, on the whole, be very pleased with the sequel. There are then, a few bones to pick as might be expected for a work of such scope. Taken as a whole, this is a fine complement to the pioneering study in this general field by Kenneth Kidd.

Francis' latest major study is made up of five sections, each of which I shall treat in turn. In Section One, after succinctly summarizing the major European processes for making beads (viz: furnace wound, drawn, and lamp wound) and making brief reference to other processes, notably for making "china" or "porcelain" (elsewhere called "tile") beads, Francis focuses on some major problems associated with identifying beads as to their countries of origin and dates of manufacture. The reader will be certain to agree that the author's caveats on these matters are not to be taken lightly. They include: 1) historical references to beadmaking operations or the bead trade; 2) bead sample cards; and 3) archaeological evidence.

Section Two: "The Medieval Background to Modern European Trade Beads" is but two pages in length due to the paucity of available information.

Section Three: "Venice: The Mother of Modern Beads" has 1) an introduction followed by a discussion of 2) "The Growth of Beadmaking at Venice," in turn succeeded by 3) "Growth of the Industry," 4) "Beadmaking History: The Early Centuries," 5) "The Nineteenth Century," 6) "The Twentieth Century," and concludes with 7) "The Identification of Venetian

Beads" by time periods. I personally found this format somewhat awkward since there was considerable overlap among subsections 1 through 5. They all dealt with the history of beadmaking in Venice but from different perspectives.

Section Four: "The Beadmakers of Bohemia" is a wonderful update of Francis' "The Czech Bead Story." Glass beadmaking is traced from the 8th or 9th century to the present. Important to those wishing to make distinctions between Czechoslovakian and Venetian beads is the fact that in 1486, Venetians on the Czech-Bavarian border established a rosary-making factory for Dominican monks. Somewhat later, Venetians sent tubes to Bohemia for finishing, a practice forbidden by Venice in 1510. Francis notes that "after the 15th century there is little evidence of direct Venetian influence in Bohemia, but the relationship between these two beadmaking giants is a constant theme in the history of glass beads" (p. 30).

Francis draws attention to a series of what he considers diagnostically Bohemian beads, in addition to those exhibiting the half-mold technique: short hexagonal to octagonal tube sections with facets ground on the corners, commonly called "Russian" beads. The author goes on to note, however, that the large solid blue ones are not recorded in the Museum of Glass and Costume Jewelry in Jablonec nad Nisou.

Other beads which appear to be of distinctly-Bohemian manufacture appear in the late 19th century when Jablonec had the leading bead industry in the world. Francis records glass imitations, for example, of lapis lazuli, coral, amber, shell and bauxite. Even ancient beads were copied.

Francis very importantly observes in this chapter, as well as in the next, that Bohemian beadmakers left Czechoslovakia after World War II to establish themselves in Austria and Germany. Therefore, while many beads may be distinctly Bohemian in character, they may have been made elsewhere under Czech craftsmen's supervision.

In Section Five: "Other European Glassmakers," the author provides detailed summaries on beadmaking history in the Netherlands, France, Great Britain, Germany and Austria, the Soviet Union, Spain and Belgium. There is so far no evidence that other countries made beads, Francis notes, and Widel's negative findings for Sweden and Valente's for Portugal are emphasized since those countries' world-wide commerce would lead investigators to think that they must have made their own beads.

In his account on the Netherlands, Francis emphasizes the influence of Venetian beadmakers who were initially smuggled into the country since they were violating the laws of Venice by exporting Venetian glassmaking secrets to other countries. The bead industry is seen to have flourished from 1597 to 1697, and beads appear to have been manufactured there until the mid-18th century. As might be expected, the Dutch beads were largely Venetian in character with some possibly being diagnostically Dutch.

Francis mentions in this section that, for sources on glass beads, "the works of van der Sleen can also be consulted" (p. 46). This reviewer believes that it would have been desirable to enter a caveat (as might also have been done in Section Three) that van der Sleen's beliefs concerning the chemistry of Venetian vs. Dutch beads were in error as demonstrated by Karklins.

A fascinating account is given for France of the making of false pearls from their invention in the 17th century to the present day. The author stresses the importance of another French beadmaking industry which involves the making of false jet which appears to have begun in the 18th century and was later copied in Bohemia. Francis regretfully states that other than for false pearls and false jet there is little information on what most of the other beads were like over the centuries other that that many of the trade beads used in the 18th century were "rocaille," a term usually referring, the author notes, to "small drawn 'seed beads'." Francis also cites the introduction of the Prosser method ca. 1866, the Art-Nouveau-movement beads in the early 20th century, and finely-crafted beads of Pierre Rousselet whose company made beads of baroque style from 1922 to 1975.

As for Great Britain, Francis, like various researchers, finds information about glass bead-making hard to come by. The earliest beads are seen to be glass tubes called "bugles" with the first bead house, beginning ca. 1579, being owned by a Venetian. By ca. 1635, there is mention in a patent of "Beads and Beaugles," the "beads" assumedly being other than tubular forms. In 1800, Francis notes the

making of "patent pearl... and fancy beads made in Birmingham" (p. 51).

Francis reports that at least as early as 1280, Venice was exporting glass to Germany for the making of glass beads. When the Venetians forbade this export in 1510, the Germans started making their own glass, probably in the Thuringia Forest in 1597. Francis traces the beginnings of the industry in various areas emphasizing that "the real heart of German glass beadmaking is in Bavaria, where beads have been made for 500 years and are being produced today" (p. 52).

The earliest-known German beads are seen to come from the Royal Forest of the Fichtel Mountains where mostly black furnace-wound rosary beads were first made in 1486. The industry is known to have flourished from the 16th through the 18th centuries. Then, after assorted vicissitudes, beadmaking in the Royal Forest came to a halt with World War II. Very interestingly, Francis notes: "Most recently, a costume jewelry industry has been started using old beads" (p. 52).

Austria, Francis relates, had its beginning in beadmaking in Innsbruck and Graz in 1765, but the industry quickly died out. At present, however, there are seven Austrian beadmakers whose products include imitations of precious stones and pearls. Their current products of blotched glass and cut crystal beads made of relatively heavy and brilliant lead glass appear to be distinctive.

The author was unable to find much information on beads made in the U.S.S.R. The earliest beadmaking he reports is a factory opened in 1753 at 'Ust Ruditsy. The owner planned to make, among other things, "pearls, strings of beads, glass jet" (p. 54). The factory quickly failed in these pursuits and took on the making of mosaic tiles.

Another factory, Francis notes, was set up in Estonia in 1764, with German beadmakers who made clear, spool-shaped beads. Wound beads are seen to have been made for local consumption near Moscow in the 1880s. Bokhara in Uzbekistan appears to have been a center for making beads since the turn of the 20th century.

The identification of Spanish beads, particularly the older ones, is seen to be something of an enigma. Small, wound, clear, yellow and green ring beads may have been brought by Columbus. Their heavy lead content is believed by some researchers to reflect Spanish manufacture. This reviewer might add that Robert Brill's analysis of the beads from San Salvador as compared with the analysis of Spanish glass of the 15th century leaves little doubt that the beads are indeed Spanish.

The last European country where Francis knows beads to have been made is Belgium, where the presently known records suggest that beadmaking may not have begun until the mid-19th century. However, glassmaking was practiced since as early as 1622, and perhaps beadmaking was simply not recorded, as Francis suggests (p. 55).

Though only 69 pages long, this is certainly an impressive treatise, encyclopedic in scope, diligently referenced throughout, yet easy to read and accompanied by appropriate line drawings and a fine color plate. One might have wished that there had been many more of the latter to illustrate the enormously broad range of beads manufactured in Europe. However, Peter Francis is assiduously selective and nicely complemented his text with illustrations and the use of the Kidds' typology whenever it was referenced by other researchers. His citations cover some 300 entries, many in languages other than English, including French, Italian, Spanish, Portuguese and German, and are as recent as 1988, the very year of the publication of this work.

This treatise is a landmark in bead studies and will be certain to be treasured by all researchers as a valuable contribution to our knowledge of glass beads and beadmaking. The author has not only provided precious factual data in compact syntheses, but he has provided insights into the origin, manufacturing techniques, and bead dispersals that are of lasting value and a fine tribute to his exceptional scholarship.

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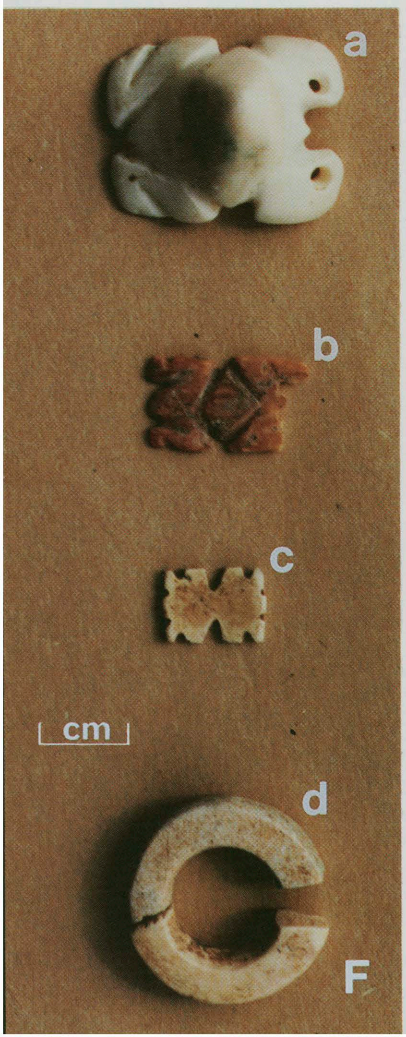
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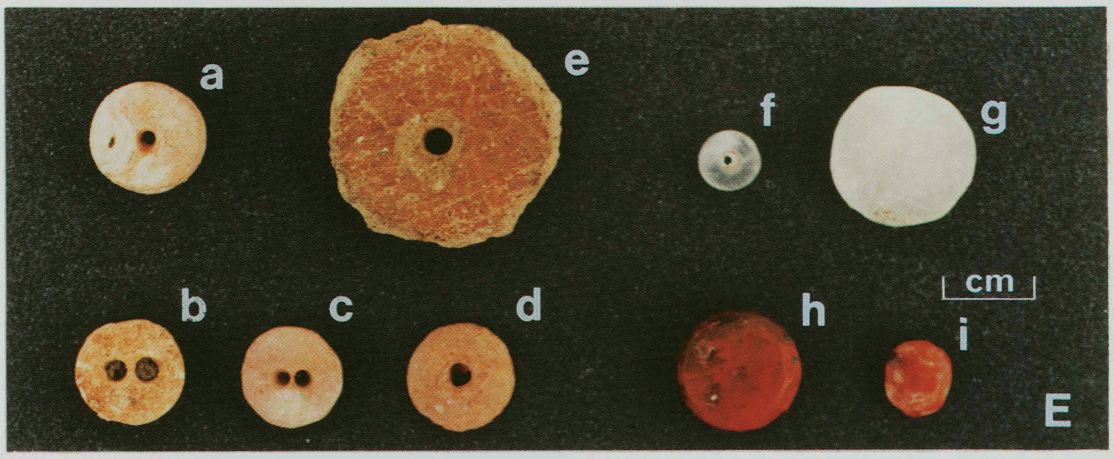
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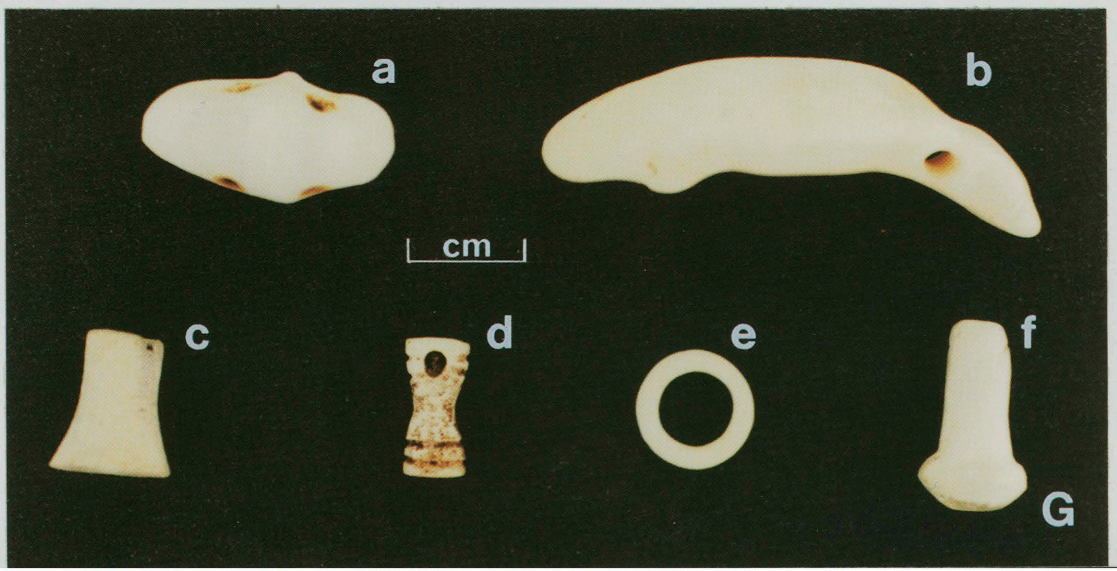
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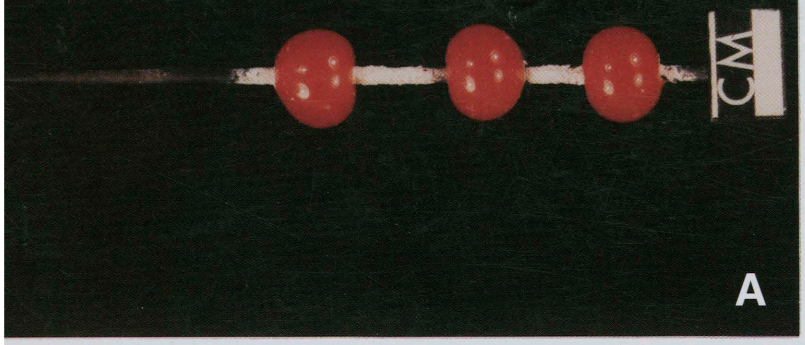

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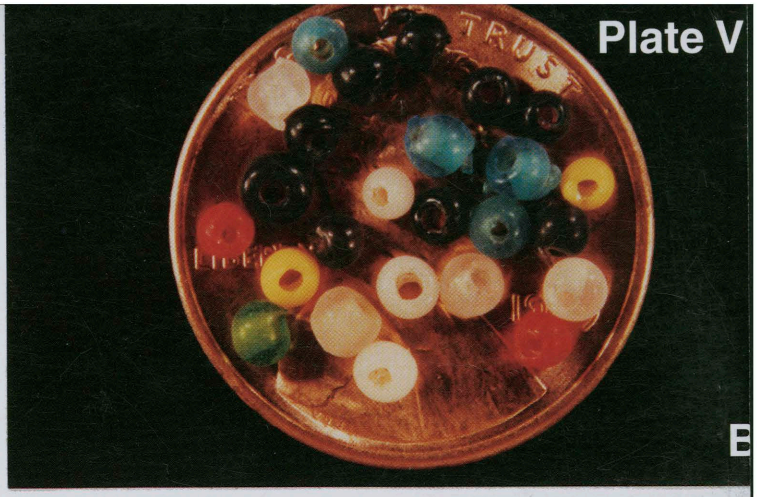

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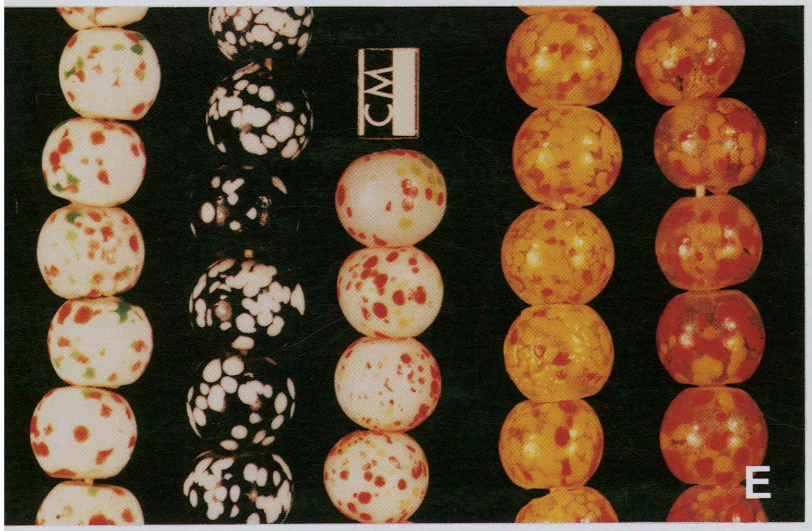

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