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Cover. *Tani*: Tani woman from the Lhopa village of Tselbar, Tibet, just north of the Arunachal border.

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KARLIS KARKLINS, *editor*

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IN MEMORIAM:
RODERICK SPRAGUE, 1933-2012

An archaeologist, educator, and a pioneer in North American trade bead research, Dr. Roderick Sprague passed away in Moscow, Idaho, on 20 August 2012. A staunch supporter of the Society of Bead Researchers, he served as its president from 2004 to 2007, and chaired the Editorial Advisory Committee for a good number of years as well. He also contributed a number of useful articles, news items, and reviews to both the Society's publications. His moral support and the useful comments and suggestions he made concerning these publications will be sorely missed.

Rick was born in Albany, Oregon, on 18 February 1933, and lived most of his life in Idaho, Washington, and Oregon. He became interested in anthropology and ethnology at an early age and received his Bachelor's and Master's degrees in anthropology from Washington State University and received his Ph.D. in anthropology from the University of Arizona after serving two years in the U. S. Army. He worked at Washington State University as a research archaeologist for three years before going to the University of Idaho in 1967 as an assistant professor of anthropology. Within a year and a half of his arrival he became chairman of the Department of Sociology/Anthropology and Director of the Laboratory of Anthropology. When the two positions became too much for one person about a dozen years later, the two units were separated. Rick chose to remain as Director of the Laboratory of Anthropology but continued to teach anthropology part time including summer archaeological field schools. Over the years, Rick conducted field work in Idaho, Washington, Oregon, Alaska, Arizona, and as far away as Prince Edward Island, Canada.

Rick received both the University of Idaho Library Faculty Award for Outstanding Service and the Sigma Xi Published Research Paper Faculty Award in 1986. In 1996, he received the Phi Kappa Phi Distinguished Faculty Award for Research. In 2000, he received the J.C. Harrington Medal, the highest international award in historical archaeology followed by the Carol Ruppé Service Award in 2004, both given by the Society for Historical Archaeology. He remains the only member to ever receive both of these awards and the only member to serve two terms as president of the society.

While Rick's research interests were many, he was particularly fond of beads. It was while working on his Master's thesis that he first encountered these little baubles. Not knowing much about them, he sent off a sample to Arthur Woodward who was well versed in trade goods and pointed out their research potential. Rick subsequently began a lifelong study of beads with emphasis on those made using the Prosser process, one also used to produce buttons which were another of Rick's specialties. Teaching at Inner Mongolia University during a sabbatical in 1986-1987, Rick was able to conduct research into modern Chinese glass bead production and was one of the first to report on this now-thriving industry. Related to that interest, he and wife Linda assembled a nice collection of early 20th-century beaded Chinese sewing baskets which is now in The Historical Museum at St. Gertrude in Cottonwood, Idaho.

Finding we had kindred interests, Rick and I met at the Society for Historical Archaeology conference in Washington in 1971. This led to the publication of *A Bibliography of Glass Trade Beads in North America* which we co-authored. With typical generosity, he let me be the senior author to give my CV a boost. That is the kind of guy Rick was; thoughtful of others and willing to help them whenever possible. I also found this to be true when I attended the University of Idaho to complete my graduate studies in anthropology several years later. I learned a lot and was happy to prepare a supplement to our initial bead bibliography as part of Rick's historical archaeology course.

During his career, Rick published over 130 scientific papers and articles plus more than 100 unpublished reports to agencies specializing in historical archaeology, culture change theory, and artifact analysis. Editorial duties were a major part of his work load; not only the usual editing of lab reports and theses but also of several journals and serials. Most significant of these were 40 years as senior co-editor for the *Journal of Northwest Anthropology* (formerly *Northwest Anthropological Research Notes*) and as editor of *Anthropological Monographs of the University of Idaho*, plus 20 years as Review Editor for *Historical Archaeology* and 40 years as editor of *Anthropological Monographs of the University of Idaho*. He also edited 96 of the 98 issues of the *University of Idaho Anthropological Reports.*

Rick conducted research and burial excavations at the request of ten different American Indian tribal governments in the Plateau, Great Basin, and Northwest Coast with repatriation a standard procedure many years prior to the enactment of the federal Native American Grave Protection and Repatriation Act. Legal work for five different Northwest tribes and two tribes outside of the area involved testimony in 5th District Federal Court on five occasions, including one case before the Supreme Court, as well as testimony before various state and federal legislative bodies.

After retirement, Rick continued to live in Moscow, Idaho, and was designated Professor Emeritus of Anthropology and Director Emeritus of the Laboratory of Anthropology at the University of Idaho. He kept busy doing the research and writing he enjoyed so much, concentrating on bells, buttons, and beads. Other areas of interest included the history of anthropological research in the Northwest, especially historical archaeology, bibliographies, and a study of Rick's ethnographic father figure, James A. Teit. Rick's personal work in recent years also turned to doing more to support the tribal view on artifact repatriation with several court appearances in the Northwest and elsewhere. So that it would be of use to others, the extensive research library that Rick and Linda accumulated over the years (now The Roderick & Linda F. Sprague Research Library) was donated to the Fort Walla Walla Museum in Walla Walla, Washington.

Roderick Sprague has done much to advance historical archaeology and material culture research both as a researcher and an educator. During his long and distinguished career he was a mentor to many who have since gone on to careers in archaeology and material culture research. I am thankful that I can count myself among these individuals. I owe much to Rick and cherish his friendship which spanned four decades. We had many a good time together and I will very much miss not being able to have a beer and a good laugh with him once again. Where once there was a warm and caring soul now exists a sad void. Yet, all of us who mourn his passing can take solace in our memories of him and the legacy he left behind. You are very much missed, my dear old friend.

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Karlis Karklins

HEIRLOOM BLUE-GLASS MELON BEADS OF THE TANI TRIBES, NORTHEAST INDIA

Barbie Campbell Cole

The Tani tribes of Arunachal Pradesh in India's remote northeast wear various heirloom necklaces including those composed of highly distinctive melon-shaped beads of wound turquoise-blue glass. These are unique to central Arunachal and were already of considerable age and very highly prized in the early 19th century. The Tanis believe their beads were made by a mythical ancestor in Tibet, but their bubbly opaque blue glass and wound method of production suggest a Chinese origin. The beads have local names which appear to link them to Tsari, one of Tibet's most important Buddhist pilgrimage sites. For centuries, the hostile animist Tanis were bought off by the Tibetan government with ornaments and other gifts in return for not robbing the Tsari pilgrims. This article seeks to determine if the Tani melon beads were part of this Tsari "barbarian tribute," as well as where and when they were made, and why they were traded into this region of Northeast India and not elsewhere.

INTRODUCTION

In the early 19th century, British colonial informants frequently remarked on the profusion of beads worn by tribes living in Arunachal Pradesh, India. Of particular note were melon-shaped beads of bubbly opaque turquoise-blue glass which are greatly valued today by tribes collectively known as the Tani group (the Apa Tanis, Nishis, Hills Miris, Adis, Tagins, and Mishmis). According to British colonial informants, the beads were already of considerable age in the early 19th century and were rarely available. They are unique to central Arunachal and are not worn as traditional heirloom beads elsewhere. While they are not the only beads or ornaments valued by the Tanis, the blue glass melons are regarded as their oldest and most valuable beads and are a symbol of wealth and Tani ethnicity.

The Tanis wear two sizes of melon beads (Figure 1). The smaller ones (Plate IA top) are irregular in size but average about 10 mm in diameter and 6.5 mm in length. They have large perforations, deep irregular indentations, and flattened ends, making them almost disc-shaped in some cases. The flattened nature of the small Tani melon beads has been increased considerably by wear. The glass generally has a smoother surface and fewer bubbles than the larger beads.

Although considerably flattened at the ends, the larger beads (Plate IA bottom) have a more spherical profile. Though also irregular in size, they generally measure 20-22 mm in diameter and 18-20 mm in length. The irregular indentations are shallower, probably due to heavy strands of beads wearing against each other. The perforations are large and the glass contains more bubbles and impurities than that

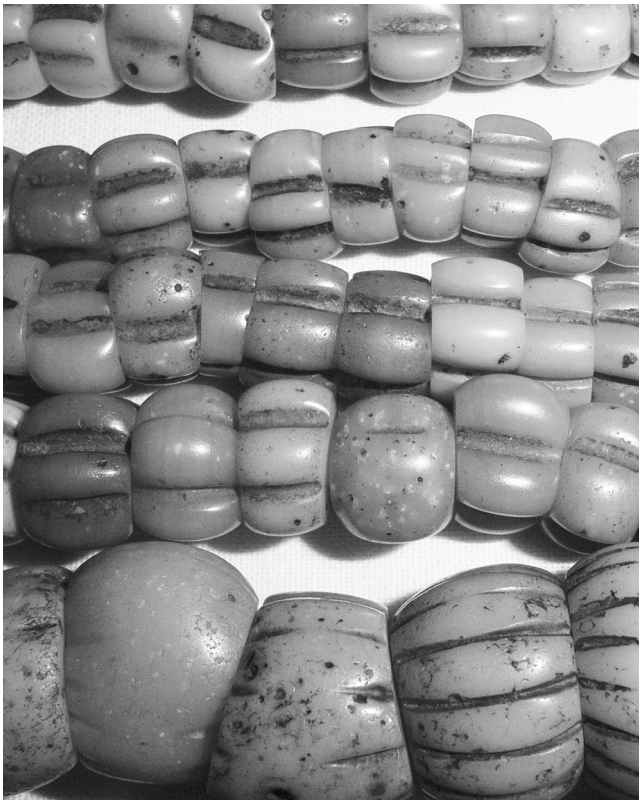

Figure 1. Small and large Tani blue melon beads (all photos by author).

of the smaller beads. Some large beads exhibit distinctive circular to horseshoe-shaped marks on the surface, probably bubbles in the glass that have been accentuated by natural abrasion. In both sizes, there is an inconsistency in the color and quality of the opaque bubbly glass. Occasionally both sizes are found in different colors.

Melon beads like the Tani specimens are made by winding molten glass around a mandrel and pressing a metal blade or tongs into the sides to form the indentations while the glass is still in a soft state. The ends may have been flattened by pressing them with a blade or paddle while the glass was still soft or by grinding when hard, although the latter method is less economical. The presence of numerous bubbles in the glass is indicative of furnace winding where liquid glass is taken directly from a pot in the furnace and worked on the end of the mandrel (K. Karklins 2012: pers. comm.).

This article seeks to determine where and when these distinctive beads were made, and why they were traded into this remote mountainous region of Northeast India and not elsewhere.

ASSAM: ITS HISTORY AND GEOGRAPHY

Assam forms a physical and cultural bridge between India, Tibet, China, and Burma (Figure 2). No other part of India has such ethnic diversity and nearly 200 separate tribes still live in the region today. Assam's earliest inhabitants, the Austro-Asiatic peoples, were followed by Indo-Aryans and successive waves of Mongoloid Tibeto-Burmans who controlled the Brahmaputra plains. In the 13th century, the Ahom, a Tai Shan group, entered Assam from northern Burma. The Assam valley remained under Ahom control until it was annexed by the British in 1830s. Assam was subsequently divided by independent India into seven separate states (Figure 3).

Through Assam's fertile plain winds the mighty Brahmaputra River which flows south from the Tibetan plateau to the Bay of Bengal. The valley is almost encircled by a range of formidable hills (Figure 4) which rise to the north to meet the snow-clad eastern Himalayas and the border of Tibet. Acting as a physical barrier to invasion, these remote hills formed a refuge for a mosaic of tribes whose language, race, and culture remained Tibeto-Burman and quite distinct from the Hindu and Muslim peasantry of the Assam plains below. Hostile and warlike, the hill tribesmen maintained their independence, attacking intruders, plundering and raiding, and causing constant irritation to the peoples living in the plains. Only very gradually during the 19th century were the British able to penetrate the hills to put a stop to

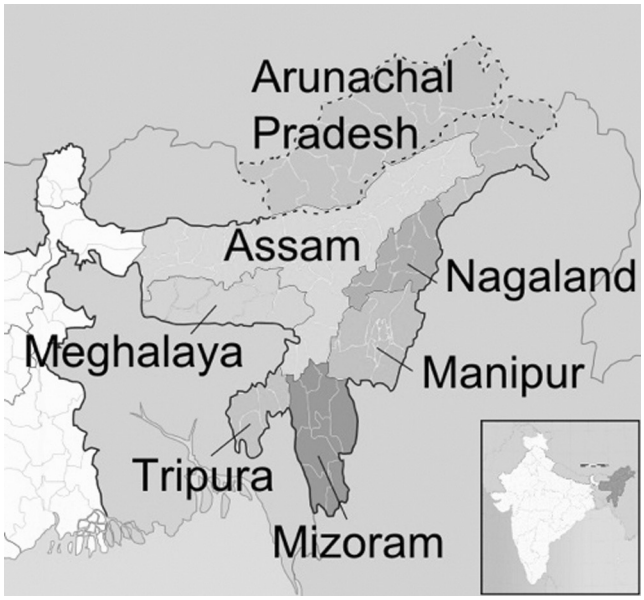

Figure 2. The location of Arunachal Pradesh in Northeast India.

the constant raiding and inter-tribal feuding. To the north, the Subansiri region of Arunachal, home to the Tani tribes, was the last to come under British control and remained one of the most remote and unexplored regions in southern Asia (Bower 1953:xii, xiii).

EARLY BLUE MELON BEADS OF THE TANIS

As the British began to penetrate the southern foothills of Arunachal, they brought back reports of tribes wearing goods said to be of Tibetan origin, including huge necklaces of blue beads of "porcelain" which were highly valued. The earliest report dates to 1825:

> All the more wealthy Abors (Adis) have... large necklaces of blue beads which they esteem very highly, and they profess that they are not procurable now; they look exactly like turquoises, and have the same hue of greenish blue; but a close examination discovers in them minute bubbles, marking the agency of fire. They are extremely hard, but the only one I could get possession of I broke with a hammer, and it had exactly the fracture of fine Chinese porcelain (Wilcox 1832:403).

Many reports followed in subsequent years. In 1845, Dalton informs us that both men and women in the Subansiri region wore around their necks "an enormous quantity of beads, mostly of blue, like turquoise, but also of agate, cornelian, and onyx and glass beads of all colours." He also mentions "fine blue beads" worn by the Meris (Miris) which

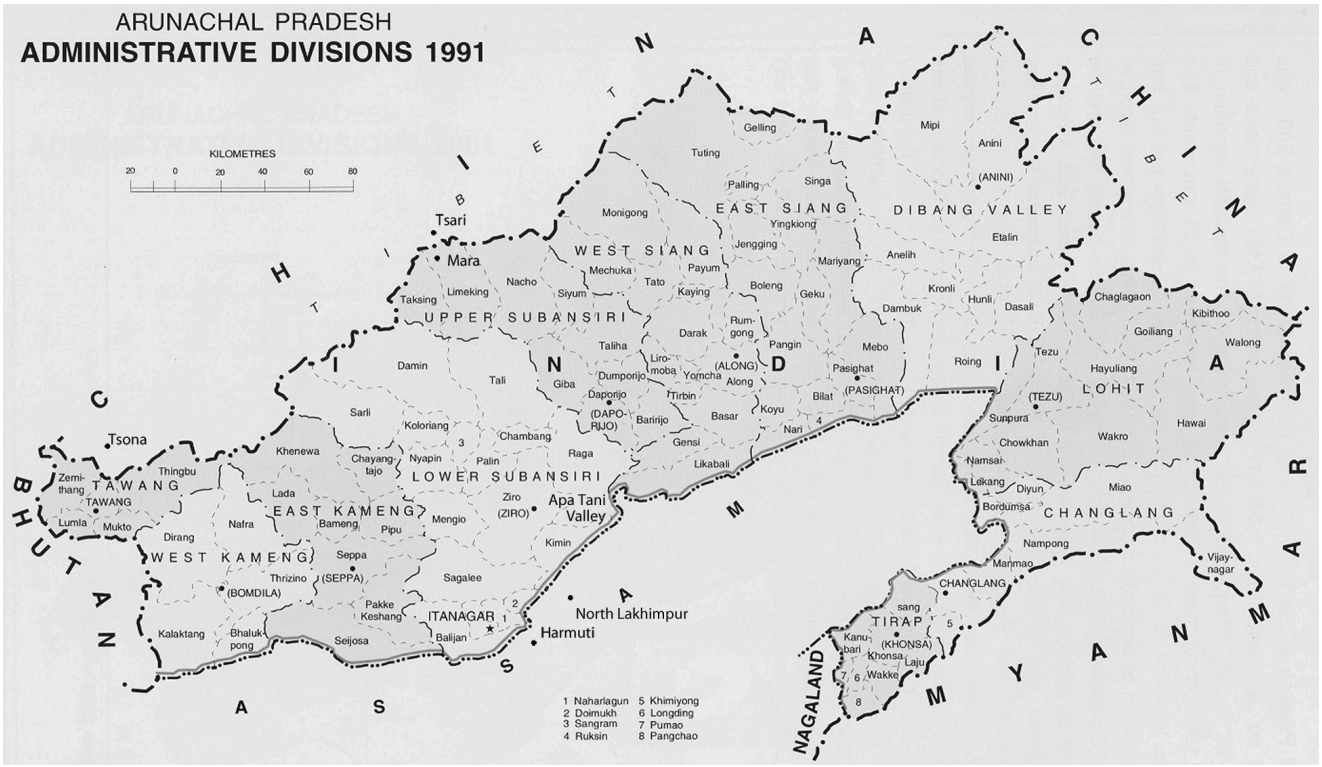

Figure 3. The political divisions of Arunachal Pradesh.

Figure 4. The Arunachal landscape; steep, heavily forested hills which rise toward the Eastern Himalayas.

they regard as heirlooms, adding that they were unaware of the origin of their beads and that they were seldom obtainable other than occasionally from the Abors (Adis) (Dalton quoted in Verrier 1959:152-153).

Krick reports in 1853 that Padam (Adi) men "wear but one kind of necklace... of blue stone... of unusually neat cut. This article is highly valued, and transmitted from father to son, as they pretend to have received it directly from God" (Krick 1913 quoted in Verrier 1959:245). Dalton later recounts a Padam (Adi) myth sung by their shaman priests:

> The human family are all descended from one common mother. She had two sons, the eldest was a bold hunter, the younger was a cunning craftsman; the latter was the mother's favourite. With him she migrated to the west, taking with her all the household utensils, arms, implements of agriculture and instruments of all sorts, so that the art of making most of them was lost in the land she deserted; but before quitting the old country she taught her first born how to forge *daos* (swords), to make musical instruments from the gourd, and she left him in possession of a great store of blue and white beads. These beads and the simple arts known to him he transmitted to his posterity (Dalton 1872:26).

In the early part of the 20th century, we have several reports from Dunbar. He refers to "blue or green porcelain beads... from the north" worn by the Abor and Gallong (Adis); large round porcelain beads worn by the Subansiri clans which differed in shape but not in substance from the Abor and Gallong beads and were highly prized as heirlooms; and strings of immense blue porcelain beads of Tibetan origin worn by the Daflas (Nishi), some of which were of considerable age. Finally, he mentions strings of "square beads of blue porcelain frequently carved into what appears to be the wheel of life in its simplest form." Dunbar probably refers here to the "wheel of law," a Tibetan Buddhist sacred symbol represented by a circle with projecting spokes, highly reminiscent of the smaller Tani blue melon beads when seen end on (Dunbar 1915:3, 5, 13, 30, 32).

These reports span nearly 100 years and confirm that by the early 19th century, the Tani blue glass beads were of considerable age, highly valued, and rarely obtainable. The author's recent fieldwork reveals that while the Tani group also value necklaces of conch and carnelian, as well as more recent spherical and oblate beads of opaque blue glass (Fürer-Haimendorf 1955:224), the beads that they value above all others, and which they consider to be of the greatest age, are the two sizes of blue glass melon beads.

THE TANI TRIBES

The Tani tribes all trace their descent to a common mythical ancestor known as Abo Tani. They claim to have migrated over many centuries from somewhere to the north in the eastern Himalayas, carrying their blue melon beads with them and arriving at their present areas of occupation by at least the 15th century or possibly much earlier (Blackburn 2003-2004:19; Dalton 1855:151; Fürer-Haimendorf 1962:59). The Tanis speak dialects of the Tibeto-Burman language, have no writing, and share the same animist beliefs, contacting the spirit world through *nyibos* or priests.

There is, however, a striking difference between the culture of the Apa Tanis and that of the rest of the Tani group. Prior to the 1950s, the Nishis, Hills Miris, Adis, Tagins, and Mishmis were warlike and independent, living in scattered isolated villages over a vast stretch of forested mountain territory (Dutta Choudhury 1981:121), dependent on slash-and-burn agriculture. They had no concept of privately owned land and no attachment to permanent village sites. Wealth and prestige were gained by acquiring wives, oxen (*mithun*), Tibetan swords, clapperless bells, and beads through raiding and kidnapping (Bower 1953:xv, 48; Fürer-Haimendorf 1955:82, 146-147; Shukla 1959:69, 70).

In contrast, the Apa Tanis lived (and still do) in seven large, permanent villages in a small, densely populated valley some 10 km in length. Their well-watered valley allowed sedentary rice cultivation (Figure 5). The Apa Tanis also valued oxen and beads, but unlike the other tribes, their main source of individual wealth lay in their land. Unlike their neighbors, Apa Tani women tattooed their faces and wore large nose plugs of bamboo (Plate IB). They also owned fewer beads and wore them only at festivals (Fürer-Haimendorf 1955:16, 143, 231; 1962:4, 57, 58).

TANI BEAD TRADITIONS AND MYTHS

The Tanis believed that their beads were made in Tibet by a mythical ancestor known as Abo Loma who "had no bones, worked only at night and never slept." Abo Loma is said to have learned the technique of metallurgy from a deity called Wiu Loma who also made the Tanis' precious swords and clapperless bells (Sarkar 1999:39; Shukla 1959:129). All these goods were referred to by the Tani tribes as *nyaloma*, meaning "from Tibet," and were considered to have a sacred origin.

Although the men of some Tani tribes wore beads, women (normally married or widowed) wore more beads

Figure 5. The Apa Tani valley, ringed by the remote forested hills inhabited by the other Tani tribes.

than the men. Heirloom beads were regarded as symbols of prestige and wealth and were rarely sold other than in times of great need (Srivastava 1988:9, 32, 91). Great value could lie in a single precious bead (Fürer-Haimendorf 1955:140, 155), its size, color, and luster dictating its worth. Blue glass melon beads of a darker turquoise blue had the most value. Some beads were regarded as "dead" and were said to cause bad luck. These were sometimes given away. Cracked beads were considered to have lost their value and it was bad luck to give them as presents (Anya Ratan and Ratan Yak, Itanagar 2010: pers. comm.; Fürer-Haimendorf 1955:154).

Tani heirloom beads were believed to have protective powers. The Hill Miris had their beads blessed by a *nyibo* or priest in order to make the beads powerful (Damnya Ligu, Hill Miri *nyibo*, Ligu village, Daporijo 2010: pers. comm.). Millet wine and rice flour were sometimes thrown onto beads by the Nishi to make them yet more "alive" and powerful; the more wine that was used, the more the beads acquired power. Beads also increased in power if they were owned by one family for many years (Anya Ratan and Ratan Yak, Itanagar 2010: pers. comm.). When asked to seek help from benevolent *wiyus* or spirits, *nyibos* were often paid with beads. Tani blue melons were the most desired as payment. Only if the *nyibo* was happy with his reward would his requests to the spirits be answered (Dutta Choudhury 1981:110).

With some variation between the tribes, beads played an important role at birth, marriage, and death. Because "the eyes of love as well as the evil eye" could harm a baby, a Nishi mother would always have ready a small bracelet or anklet of protective beads (Figure 6) which she would put on her baby immediately after the umbilical cord was cut (Anya Ratan and Ratan Yak, Itanagar 2010: pers. comm.). Blue melon beads were thought to be the most suitable for this purpose, although sometimes Venetian eye beads and cowrie shells were used. The baby was given more beads at the age of one to wear around the neck or waist, and these were often still worn as the child grew older (Figure 7).

The Adis gave one type of beads to boys and another to girls. Beads were also believed to give protection to adults. Once blessed by the *nyibo*, they were worn to prevent illness and other misfortunes (Srivastava 1988:101). The Nishis also gave a present of beads to relatives or friends setting out on a journey (Anya Ratan and Ratan Yak 2010: pers. comm.). In the past, because of their protective powers, most Tani women wore their heirloom beads all the time. When working in the fields they stored their beads in a basket. In the evening, when they returned home, they would remove their heavy beads, but smaller, less valuable beads would still be worn when sleeping (Aka Murtem Ratan, Daporijo 2010: pers. comm.).

Figure 6. Child's protective bracelet containing a Venetian black eye bead and a cowrie shell.

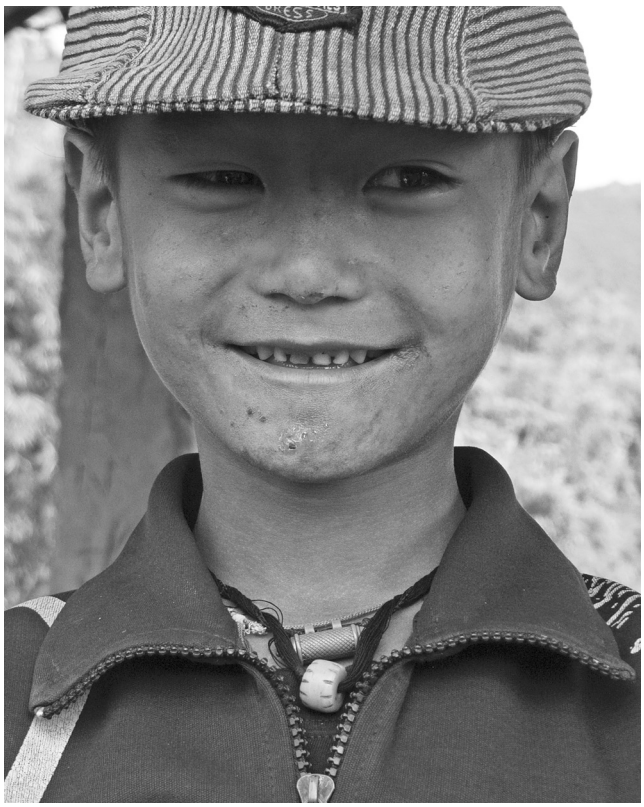

Figure 7. Young boy wearing a fake Tani melon bead and other amulets.

Beads were given during the protracted exchange of gifts between the families of the bride and bridegroom preceding marriage (Sarkar 1999:79). A Nishi boy might take a present of meat, a sword, and beads to the father of his intended bride in the hopes of winning his approval (Dutta Choudhury 1981:130, 131). The gift of half a broken bead was sometimes regarded as a token of attachment, the boy and girl each keeping one half (Dunbar 1915:55; Shukla 1959:69). Because of their value and protective powers, it was vital for a father to give his daughter beads as part of her dowry (Dutta Choudhury 1981:134; Sarkar 1999:119). Along with clapperless bells, dowry beads were worn by the bride at her wedding. Once married, an Adi Gallong bride would receive a large blue melon bead hung on a red cord from her new mother-in-law. Dowry beads and any beads given to a woman by her husband remained her personal property, usually the only share of family wealth that daughters received (Fürer-Haimendorf 1955:82; 1962:99). If a girl eloped or left her husband, she had the right to take her beads with her (Sarkar 1999:91). A man who had several wives would keep his clothes, weapons, and beads by the hearth of his favorite wife (Sarkar 1999:78).

The Lhopa Bokars in Toka village recount the following legend about their beads:

> Many years ago, there was a man called Nu Pu, who was to the Lhopa like a living Buddha. He had two daughters called Yabi and Yari. In ancient times, the Lhopa were very poor and Nu Pu's daughters asked how they could help him. The father had a dream and said to them the following morning: "Come outside and see the big rock in the east, and go there and pray." When the girls got half way they saw something shining on the rock. They took these shining objects to their bodies and suddenly they became beads. Since then *pokchi* are the ornaments for the Lhopa. So now, when girls get married, their parents must give them beads for protection and good fortune, and a prayer should always be said before they put their beads on (Ji Wenzhang 2010-2011).

When a woman died, her valuable beads were inherited by her daughters or daughters-in-law, and a man would leave his beads to his sons (Dutta Choudhury 1994:98, 109). It was considered a mark of respect to bury a relative

with beads (Anya Ratan and Ratan Yak, Itanagar 2010: pers. comm.), but less valuable beads were used rather than prestigious ones from Tibet (Sarkar 1999:95; Anya Ratan, Itanagar 2010: pers. comm.). Before burial, the Nishis and Tagins sometimes placed two beads strung on a thread in each ear of the deceased (Shukla 1959:118, 120).

Among the Nishis and Hill Miris, the family's most valuable beads, clapperless bells, and other ornaments were kept in the care of the first wife. Because of the fear of raids from hostile neighbors, the most valuable heirloom beads were never left on display. They were hidden in the rafters, sometimes stored in a large ox horn, or wrapped in a cloth buried in the ground in a place known only to the heads of the family (Dunbar 1915:37). There was always the risk that if they died unexpectedly, the beads might never be found (Bower 1953:50, 51; Fürer-Haimendorf 1955: 143, 155; Shukla 1959:15, 17, 60).

The importance of beads is reflected in the oral traditions of the Tanis including their migration myths (Dalton 1872:26), and there are many references to beads as items of trade in their myths and legends. The beads referred to are always "from Tibet" rather than from the plains. Beads often appear as sources of wealth. In a few stories, beads are made from the fingers, kneecaps, or toes of spirits and were given to a girl who then becomes rich (Blackburn 2003-2004:37). For the Nishi, to dream of beads brought bad luck. If a Nishi man dreamt of giving away his beads, his wife or child might die. If he dreamt of putting many beads around his neck, he feared that the *wiyus* or spirits were planning to put ropes around him and he would fall sick and die (Shukla 1959:107, 109).

INTER-TRIBAL TRADE WITHIN THE HILLS

Within the hills, each tribal village remained an independent unit which accepted no outside authority (Dutta Choudhury 1994:256). Trade was undertaken on foot because the terrain was too harsh for pack animals. Because of the constant risk of inter-tribal feuding, ambush, and kidnapping, it was dangerous for a man to travel to another village unless he had an established trade partner there who could guarantee his safety and help him find customers. Vital commodities such as salt and luxuries such as beads arrived through the slow trickle of village-to-village barter, traveling along a complex network of tracks throughout the hills. The occupants of each village acted as middlemen, guarding their individual trade monopolies by obstructing access to the villages beyond their own (Dalton 1855:151; Fürer-Haimendorf 1962:58).

Until the 1960s when the use of currency began to penetrate the hills, trade was carried out exclusively through barter. High value items such as oxen, slaves, salt, Tibetan swords, clapperless bells, and beads were all used as currency (Dunbar 1915:35, 37), the value of each item varying according to availability and the needs of both parties. Beads were used to buy valuable goods such as slaves, or used to pay compensation for murder, ransoms demanded for kidnappings, or fines imposed for theft (Shukla 1959:86, 93). Trade relations fluctuated between intense activity and periods of feuding and hostility (Fürer-Haimendorf 1955:177, 199; 1962:121). If a feud became too burdensome, a peace pact known as a *dapo* would be negotiated which often involved the transfer of goods of considerable value from one party to the other, such as oxen, clapperless bells, and beads (Fürer-Haimendorf 1955:154, 155, 171, 217). The peace pact would be sealed by a formal ceremony in which mutually binding oaths were made by both parties (Dutta Choudhury 1981:272).

From the late 19th century, the colonial British began to import glass beads into Assam via Calcutta. The great majority of these beads came from Italy, presumably Venice, and a small proportion came from China and Austria (Bohemia) (Francis 2002:177).[1] The beads were sold in the bazaars of the Assam plains and the most popular were small, light, and inexpensive, often red-on-white Venetian beads commonly known as "white hearts." These became known as "bazaar beads" (Bower 1953:13) or *tamintaya* and would gradually make their way to the tribes in the hills where they became popular among the tribeswomen for daily wear (Sarkar 1999:5; Anya Ratan, Itanagar 2010: pers. comm.). But most highly sought were the *nyaloma* or beads "from Tibet." Their supposed magical origin, protective powers, rarity, and high value made them the source of much prestige and envy (Fürer-Haimendorf 1955:139). Yet the harsh terrain and dangers of traveling far from one's village meant that Apa Tanis, Nishis, Hills Miris, and Adis had no direct trade with, or even any knowledge of, Tibet. Rumors gleaned from trading partners to the north provided reports of hostile tribes wearing clothes made of skins or plant fiber from whom valuable blue glass melon beads could occasionally be obtained, but through whose territory it was impossible to pass (Bower 1953:xiii; Dalton 1872:28; Fürer-Haimendorf 1955:85, 188; 1962:50, 59). Who were these tribes and from whence did they obtain the beads?

THE LHOPA TAGINS TO THE NORTH

The tribes living in the remote regions far to the north of the Subansiri region near the Tibetan border were known in Arunachal as the Tagins.[2] The Tagins were the northern-most branch of the Tani tribes. Because they had neither direct nor indirect contact with the Assam plains and were entirely dependent on Tibet for vital goods such as salt and

cloth, the Tagins are barely mentioned in British colonial records (Dutta Choudhury 1981:86).

Since the 11th century, the Tibetans have referred to all the non-Tibetan, non-Buddhist animist tribes living along their southern border with Arunachal as Lhopas or Lobas, a derogatory name meaning "savage" or "barbarian of the south" (Blackburn 2003-2004:25; Huber 1999:129, 172). For the Lhopa tribesmen, martial success brought status and prestige, but the peaceable Tibetans had the greatest contempt for the Lhopas' constant raiding and killing and regarded them as wild, warlike, uncivilized, and dangerous (Huber 1999:172). Within Lhopa territory were forest products which were much desired by the Tibetans, but the Lhopas guarded their trade monopoly by attacking any Tibetan who dared to enter their territory. To trade, the Lhopa tribesmen would cross the high passes of the Himalayas to Tibetan villages on the border. Because the Lhopas were greatly feared, the Tibetans would often not allow them to sleep in their villages and rarely allowed them to venture further into Tibet (Bailey 1957:142, 158; Desideri 2010:240).

THE TSARI PILGRIMAGE

The position of the Lhopas along the border gave them privileged access to Tibetan goods such as salt and Tibetan swords, clapperless bells, and beads (Dutta Choudhury 1981:216; Krishnatry 2007:180; Sarkar 1999:5, 6 [notes 4, 5]) which were so highly valued by the Tani tribes further south. The Lhopa Tagins living in the village of Mara, situated in the border region of the Upper Subansiri, had a significant trade advantage over their Lhopa neighbors, making their village a nodal crossroads in the trade of Tibetan goods. Within their homeland lies the sacred peak of Tsari which straddles the Upper Subansiri-Tibet border adjacent to the most remote and rugged part of the Tibetan province of Dakpo. Tsari is one of the most important pilgrimage sites for Tibetan Buddhists, ranking alongside Mount Kailash and Mount Amnye Machen. From the earliest Western account (Desideri 2010:239, 240) we know that since at least the early 1720s, and probably earlier, two pilgrimages took place around the sacred Tsari mountain: an annual pilgrimage known as the *Kingkor* circuit which was within Tibetan territory and could be completed within a week or ten days, and a second, far more grueling circuit known as the *Rongkor* which could take up to a month. The *Rongkor* pilgrimage was held every twelve years in the Tibetan year of the Monkey and was undertaken by up to 20,000 pilgrims, or perhaps as many as 100,000 according to some informants (Bailey 1957:200), who came from Tibet, Bhutan, and Sikkim (Desideri 2010:239, 240; Huber 1999:129). Both the *Kingkor* and *Rongkor* pilgrimage circuits involved intense physical hardships, crossing several passes of over 4,900 m on precipitous tracks which often led to fatalities (Krishratry 2005:167), but the longer *Rongkor* circuit involved far greater dangers; beyond the high passes, the latter route crossed the Tibetan border and descended into the unfamiliar, semi-tropical terrain of the hostile Lhopa Tagins whose habit was to attack and rob or murder the pilgrims. Because of the great dangers involved, to undertake the Tsari pilgrimage was regarded as an act of very great merit.

THE TSARI *RONGKOR* "BARBARIAN TRIBUTE"

The Tsari *Rongkor* pilgrimage and the formal payment of a *lodzong* or "barbarian tribute" to the Lhopa Tagins are thought to have been introduced in the 17th century in the time of the Great Fifth Dalai Lama (1617-1682) (Huber 1999:153). He had several personal and political associations with Tsari and is often depicted holding a sacred Tibetan bell. His successor, the Sixth Dalai Lama, composed a song about the Tsari region (Huber 1999:158; Sorensen 1990:113-142).

Since at least the early 18th century, the Tsari *Rongkor* pilgrimage received the direct patronage and support of the central Tibetan government and aristocracy (Huber 1999:129, 131, 167). Part of this patronage involved the payment of a "barbarian tribute" to the Lhopa Tagins. In return they swore an oath not to attack the Tsari pilgrims and to allow them safe passage through their lands (Krishnatry 2007:100, 101). The exact amount of the *lodzong* varied and discussions were protracted and tense. Though knowing that attacks would probably still take place, the Tibetans were obliged to pay whatever was demanded to lessen the likelihood of the deadly ambushes, extortion, enslavement, and kidnappings that would inevitably follow along the pilgrimage route if the Mara Lhopa Tagin clan chiefs were not satisfied with their tribute.

Once the amount of the *lodzong* was decided, a ritual oath-swearing ceremony or *dapo* took place similar to the *dapo* peace pacts made between feuding tribesman further south, and each Lhopa Tagin clan chief would receive an ox, a Tibetan woollen blanket, a Tibetan sword, and the most valued type of ancient clapperless bell. Their followers, the occupants of most of the valley around Mara, demanded bags of salt, cloth, Tibetan swords, and large quantities of "colored beads and shells" (Huber 1999:136,138; Krishnatry 2007:139).

Once the *lodzong* had been distributed and the pilgrimage began, the Mara Lhopa Tagins would extract a small "toll" from each pilgrim at the point where they entered Lhopa Tagin territory and at other points along

the pilgrimage route where access was restricted and the pilgrims were vulnerable. The form of payment was not fixed (Huber 1999:107, 145), but it was often paid with beads (informants, Gintong village 2011: pers. comm.). If the tribesmen were unhappy with their toll, extortion and robbery often took place in which the pilgrims were relieved of all their jewelry (Dunbar 1915:6). By tradition, every year the Mara Lhopa Tagins also received an annual payment of beads, salt, and other goods from inhabitants of the village of Lo Mikhyimdun, the gateway to Tsari on the Tibetan border (Krishnatry 2007:98). This regular and reliable influx of valuable Tibetan goods, including beads (Huber 1999:172-173, b212; Krishnatry 2007:180), into Mara made it the focal point of trade for the whole of the Subansiri region and even further afield. But how did the beads distributed to the Lhopa Tagins reach Tsari and from where were they obtained?

TRADE ROUTES TO TSARI

Although traditionally both Tibetan men and women wear large necklaces of coral, turquoise, *dzi*, amber, and pearls, and almost every Buddhist monk and layman owns a string of prayer beads, the Tibetans have no beadmaking tradition. Leh in Ladakh to the west of Tibet was the great trade entrepot for the coral, turquoise, and amber so valued by the Tibetans (Clarke 2004:37), but from early times, trade caravans had also traveled to Tibet from ports on the Bay of Bengal along trade routes through Darjeeling, Sikkim, Bhutan, and far western Arunachal near the Bhutan border. The ancient caravans carried conch shell and pearls, and later beads of amber and coral. Some of these goods were sold at Tsona, a town just across the Tibetan border where an important annual fair took place, attended by thousands of traders from throughout Tibet, Bhutan, Sikkim, Kashmir, Nepal, China, and northwestern Arunachal (Passan, Tawang 2010: pers. comm.). From the early 20th century and probably a little earlier, "English manufactured beads"[3] were sold at the Tsona fair (Tsybikoff 1904:745) which the Lhopas were sometimes allowed to attend (Dunbar 1915:8). From Tsona, some trade caravans would proceed north for a further two months to Lhasa, the capital of Tibet, which was a thriving trade center.

An important trade item brought by caravans from the ports on the Bay of Bengal were conch shells from southern India. In whole form, conch shells (*Turbinella pyrum*) were used in Buddhist monasteries as horns (*dungkar*) to accompany ritual dances and summon the monks to prayer (Clarke 2004:38, 39). Small, carefully crafted conch-shell beads were used in Tibetan Buddhist rosaries (Waddell 1895:206, 534), but cruder and much larger conch-shell beads were valued by the Tani tribes. Some of these larger beads were a rough barrel-shape, but beads made by drilling the central axis or columella of the shell were the most highly prized. Although conch-shell beads were also available on the Assam plains[4] (Campbell Cole 2008:17), the Tanis regarded their conch-shell necklaces as *nyaloma* or sacred beads "from Tibet" which were passed from generation to generation as heirlooms. They were also worn by *nyibo* or priests during Tani rituals (Plate IC). One necklace of about 40 glossy conch-shell beads was said to be worth an ox. Sections of shell in various sizes and shapes were also used as fasteners for necklaces. Conch-shell beads were a popular item sought by Lhopa traders along the Tibetan border (Bailey 1957:214). It is likely that the "shells" mentioned above in the list of goods given to the Lhopa Tagins at the Tsari *Rongkor lodzong* tribute were conch-shell beads, although they may have been cowries. The considerable age of some of the heirloom conch-shell necklaces that are still much valued by the Tani tribes today (2010: pers. obs.) suggests that they may have formed part of the Tsari *lodzong* for a considerable time.

Venetian beads were imported into Calcutta and Assam by the colonial British from the second half of the 19th century. These beads were also traded north via Tsona to Tibet and probably formed the majority of the glass beads given to the Lhopa Tagins as part of the Tsari *lodzong* and the "toll" beads extracted from pilgrims. Venetian black eye beads are found in many Tani heirloom necklaces and are known by the Apa Tani as *bimpu ami* or "eyed" *bimpu*[5] (Plate ID top). Wound glass beads known as either "dogtooth" or *nyime taju* ("Tibetan" *taju*) (Plate ID bottom) are also valued by the Tanis. Unlike the smaller and less valued *tamintaya* (white-heart beads) from the Assam plains which were used for daily wear, Venetian black eye beads, and dogtooth beads were highly valued and regarded by the Tani tribes as *nyaloma* ("from Tibet"). Like the more valued Tani blue melons, these Venetian beads were believed to have a magical origin. In 1956, Krishnatry (2007:162) reported the consternation of the Lhopa Tagins when they learned that beads given to them at Tsari, which they believed to have a sacred origin in Tibet, were in fact obtained by Tibetan traders from the Assam plains.

Informants living in the Tibetan villages just to the north of Tsari report that prior to the 1950s, itinerant Tibetan traders would arrive on foot with sacks of beads which they sold to the Tsari pilgrims for use as toll payments. Among the beads were some known as *ani mani* (*mani* [Sanskrit]: bead or pearl). Although some informants report that these beads were green, it is probable that they were *bimpu ami*, the Venetian black eye beads mentioned above which the same informants remember seeing being worn by the Lhopa

Tagins. The Tibetan bead traders also sold conch toggle clasps used in Tani necklaces (informants, Gintong and Ladok villages 2011: pers. comm.).

British colonial informants reveal that in the early 20th century, Tsari pilgrims also paid their passage with "strings of the blue porcelain beads" (Dunbar 1915:6). We know that the Tani tribes' much-valued melon beads were no longer available by the 1820s so the "porcelain" beads were probably the spherical, oblate, or disc-shaped beads of turquoise-blue glass produced in China until the late 20th century for the tribal market. These beads were also valued by the Tani tribes. They may have been imported into Tibet directly from China or they may represent the small percentage of "Chinese beads" mentioned previously which were imported by the colonial British into Calcutta starting in the late 19th century. In the 1950s, Tibetan traders also sold plastic copies of these beads for use as Tsari toll beads (informants, Gintong and Ladok villages 2011: pers. comm.).

In the early 20th century, necklaces of "imitation turquoise" made in "Birmingham, Germany, or India" (Dunbar 1915:6, 8) were also given by the Tsari pilgrims to the Lhopa Tagins. The Tibetan market for turquoise was a highly lucrative one and imitation turquoise was already made in the 19th century (Clarke 2004:39) although it is not known what material was used. Neither true nor imitation turquoise is worn or valued by the Tani tribes, but we know from informants that imitation turquoise necklaces were bought by Lhopa tribesmen both at the Tsona fair (Dunbar 1915:8) and from Tibetan traders along the border (informants, Gintong village near Tsari 2010: pers. comm.). It is possible that the Lhopas traded these imitation turquoise beads though middlemen to western Arunachal's Buddhist Monpa or Sherdukpen tribes which, like the Tibetans, value turquoise beads.

CAN BLUE MELON BEADS BE LINKED TO THE TSARI PILGRIMAGE?

It has been established that many of the 19th- and early-20th-century beads valued by the Tani tribes were likely acquired by way of the Tsari pilgrimages, but is it possible to link the much older Tani blue melon beads to Tsari? Tibetans in the villages nearby refer to the blue melon beads as *dolo* or *yu dolo* ("blue" *dolo*). One informant (Gintong village 2011: pers. comm.) suggested that the meaning of *dolo* was "god stone" from the Lhopa words *do* (stone) and *ha* (god). This suggested derivation is an interesting one because the small "Indo-Pacific" heirloom beads of red glass used by the Naga tribes living in the hills of southeastern Assam are known as *deo moni* or "god beads" (Sanskrit: *deo* [god]; *mani* [bead]) (Campbell Cole 2008:8). On the other hand, Krishnatry (2007:ix, 70, 119, 182, 184), who spent several weeks with the Lhopa Tagins in Mara village during the 1956 Tsari *Rongkor* circuit, relates the Lhopa Tagin meaning of *dolo* as "pilgrimage" and uses it in this context on several occasions. This suggests an association between the Tani melon beads and the Tsari pilgrimage, although *dolo* may later have become a generic name for beads given by the Tsari pilgrims to the Lhopa Tagins.[6]

Some 160 km to the east of Tsari, just to the north of the Tibetan border, Lhopa Metong tribespeople (*see* cover) in the Lhopa village of Tselbar call the large blue melon beads *dapo*, the Tani word for peace pact ceremonies. According to Krishnatry (2007:ix, 101, 102, 140, 153), the Mara Lhopa Tagins referred to the Tsari *lodzong* tribute as "the *dapo*," a second link between the Tani blue melons and the Tsari pilgimage. The Lhopa Metongs call the smaller blue melons *buma*. In their language, both *buma* and *dapo* also mean "currency." The blue melon beads, as well as oxen, Tibetan swords, and slaves were used as currency by the Tani tribes. The Tani melons are mentioned in traditional Lhopa songs which are still sung by older Lhopa women today (Tselbar village, Menling 2011: pers. comm.; Ji Wenzhang 2011: pers. comm.).

Unlike the Tani tribes in Arunachal who insist that their blue melon beads have a magical origin in Tibet, the Lhopa Metong now living in Tselbar village and the Lhopa Bokar from the nearby mixed Lhopa-Tibetan village of Toka all insist that their old blue melon beads came from the Arunachal side of the border. The traditional homelands of the Metong and Bokar Lhopas lie just to the south of the Tibetan border some 160 km east of the Tsari region. There are several passes across which the Lhopa Bokar traded with Tibet (Dutta Choudhury 1994:319) and through which in the distant past they could have obtained the blue melons, had these beads been widely traded along the length of the Arunachal-Tibet border. Again, this suggests that the Tsari pilgrimage was the main source of the blue melon beads. Older Lhopa Bokar informants report that prior to the 1950s, when they still lived on the Arunachal side of the border, of all the borderland Tani tribes, the Lhopa Tagins possessed the most beads (Tselbar and Toka villages 2011: pers. comm.).

WHERE DID TIBETAN TRADERS OBTAIN OLD BLUE MELON BEADS?

In Lhasa today, informants also refer to the blue melon beads as *dolo* (Tibetan: *dolo ngonpo* or "blue" *dolo*; Chinese: *lan zhoudze* or "blue beads"), and some report popular Tibetan songs which link the melon beads to the

Tsari pilgrimage (Dorje Gien Tsing, senior monk, Summer Palace, Lhasa 2012: pers. comm.). Several informants stated that blue melon beads of both sizes are occasionally seen worn as hair ornaments by Tibetan nomads from Shigatse, Sakya, and Dakpo, all to the north of Tsari. Tibetan nomads are more eclectic in their choice of beads than their settled counterparts, wearing a variety of odd beads as hair ornaments or in necklaces, particularly during the many horse-riding festivals which are held in the summer. Another informant reported that some 20 years ago the small blue melons, and less often the larger ones, were worn as hair ornaments by lower-status Khampa nomads,[7] particularly from Derge (Dege). One or two of the beads were also occasionally worn in their necklaces among beads of *dzi*, turquoise, banded agate, and Peking and Venetian glass (Thom Mond 2012: pers. comm.). The Derge region is just across the present-day Tibetan border in the autonomous Tibetan region of Garzê in Sichuan, China, but it was formerly a kingdom in Kham or Eastern Tibet. Its capital, also known as Derge, is located on one of the two ancient caravan routes into Tibet from China (Freeman and Ahmed 2011:5). Khampa nomads are traders and often combined trading trips with pilgrimages throughout Tibet. In former times they had contacts with the trade caravans which brought in tea and silks from China and left with Tibetan pastoral and forest products. The same informant also reported that the blue melon beads were sometimes worn by Golok nomads living in neighboring northeastern Amdo. Like Derge, Amdo is historically, culturally, and ethnically Tibetan but now forms part of the Chinese province of Qinghai.

According to informants in the jewelry shops in Lhasa's Barkhor district, until some 10 or 20 years ago, Tibetan nomads would occasionally offer the large blue melon beads for sale. The beads were sold to the nomads of Shigatse, Sakya, and Dakpo, in the region to the north of Tsari. It seems likely that some of these beads would have been traded on to the Lhopa Tagins across the Tibetan border. Barkhor informants reported that the price in Lhasa for the large blue melon beads was always very high: at least 300 Chinese yuan or US$48 per gram for a single bead which might weigh perhaps 16 g, a total of US$770 per bead. This is considerably more than the price paid for the coral, amber, and turquoise beads so valued by the Tibetans and suggests both rarity and age. Sadly, Barkhor informants had little knowledge regarding the origin or age of the blue melons. One suggested they were 100 years old and another 1,000. Another informant stated that the blue melons were made of very old turquoise and came from Kashmir or Bhutan. Yet another reported that their melon-shape suggests a Chinese origin (informants, Barkhor, Lhasa 2011: pers. comm.), perhaps due to melon-shaped beads of carnelian known as *pemaraka* that are worn and revered by some Tibetans and believed to come from China (Thom Mond 2012: pers. comm.).

The occasional appearance of the blue melon beads in the jewelry of nomads living in the regions to the north of Tsari as well as in the Derge area on one of the main caravan routes from China into Tibet might seem to confirm a Chinese origin for these beads. Yet, the scarcity of the blue melon beads among the Tibetan nomads and the large quantities still owned by the Tani tribes suggests otherwise. Rather than having been brought in from China by independent traders who were free to sell the beads to middlemen along the way, the beads could have been ordered by agents for a specific purpose and, as a result, their distribution was controlled. Perhaps the blue melon beads owned by the nomads were lost along the trading route from China to Tsari and picked up by chance by traders, or alternatively acquired by bandits such as the Goloks who raided the caravans which passed through their territory. Is it possible that the blue melons were ordered specifically for distribution to the Lhopa Tagins as part of the Tsari *Rongkor lodzong* tribute and, if so, were they obtained from China?

ARE THE BLUE MELON BEADS CHINESE?

With a history of glassmaking dating back to the late Yuan (1271-1368) or early Ming (1368-1644) dynasty (Francis 2002:31, 58, 76-80), Boshan became China's major beadmaking center (Francis 2002:85). Located in Shandong Province some 400 km to the southwest of Beijing, it is thought to be the source of the large quantities of beads identifiable as Chinese by their leadless, opaque bubbly glass, irregular outlines, large perforations, and wound method of production (Francis 2002:83). The beads were both furnace and lamp wound by relatively crude methods. These beads are widely distributed throughout Southeast Asia and beyond, and many are still valued as heirloom beads in island Southeast Asia.

Boshan glass produced during the Ming dynasty (1368-1644) is described as "clear, smooth and lovely" (Yang 1987:74), and was made into a wide array of luxury items including beads. It is, however, unlikely that such luxury items would have found their way into the hands of tribal peoples. While no melon beads were recovered from the early glassmaking site excavated at Boshan, such beads of blue and white glass attributed to the Yuan dynasty (1271-1368) have been found in Jilin Province to the north of Boshan (Plate IIA) (Kwan 2001:81) and in burial tombs at Sunjia Shan, Yiliang County, Yunnan, some 30 km southeast of Kunming, Yunnan's capital (Kwan 2001:81, 368).

Numerous, more complex melon or lobed glass beads in both blue and white are being offered today on the Kunming antiquities market (Plate IIB top). Purportedly from a nearby Tang site (A.D. 618-907), but probably later in date, they are said to have been found with combed glass polychrome beads similar to Yuan beads found in the Philippines, Sarawak, Singapore, and Thailand (Liu 2009:22-24). More significantly, Kunming informants report that up to ten years ago, large Tani blue melon beads were occasionally brought in from the countryside and sold for around 100 Chinese yuan or US$16 each. Unlike in Tibet and Arunachal, the blue melon beads do not appear to be worn today in an ethnographic context in Yunnan. All Kunming informants insist that the large blue melon beads date to the Yuan dynasty (1271-1368), although no one was able to attribute these beads to a particular source or archaeological site which might help date them. Yet, comparing them to the melon beads from early Chinese archaeological contexts, there is little similarity beyond the basic melon shape, and there is equal similarity with melon beads subsequently produced in China during the late 19th and early 20th centuries. Although glass melon beads similar in form to the small blue ones of the Tanis were found at the Yuan site of Sunjia Shan in Yunnan, their limited number there (only 22 in 91 tombs) (Kwan 2001:368) suggests they were luxury goods with a very limited availability. That the Tani blue melons reached Tsari in considerable numbers suggests that they are of a later date.

ARE THE BLUE MELON BEADS FROM INDIA?

Wound beads of opaque bubbly glass with large perforations are generally thought to have been made at Boshan in China (Francis 2002:83), but can we be certain that the ancient Tani blue melon beads were not made elsewhere, perhaps in India? Two major beadmaking centers remain in India today: Papanaidupet in Andhra Pradesh, South India, where drawn glass beads are produced, and Purdalpur in Uttar Pradesh, North India, some 100 km from Aligarh where fake Tani melons are made today. Purdalpur's glassmaking history is said to go back several hundred years – long enough to have produced the Tani melons in the 18th century or earlier – and its northern location and use of both furnace-winding and drawing techniques make it a possible candidate. Purdalpur beadmakers obtain their glass from Firozabad[8] (Francis 1982:12-16).

Conch and carnelian beads were imported from India into both Assam and Tibet from an early period, as were Venetian beads from the late 19th century. These beads were all widely traded, particularly throughout Northeast India, and are still found today in the heirloom necklaces of many of its tribal peoples (Campbell Cole 2008:16, 17), including the Tanis. If the Tani blue melons were also imported from India along the same trade routes, how can we account for the fact that they are worn exclusively by the Tani tribes, who did not trade directly with the Assam plains? The Tani blue melons do not appear in traditional heirloom necklaces in India except in the Tani regions of Arunachal. Nor does there appear to be a "trade trail" of the Tani blue melons stretching back from Arunachal southeast into India, and there is no evidence of a melon-beadmaking tradition at Purdalpur. Bead dealers in Delhi, only 150 km from Purdalpur, are not familiar with the Tani melons (Manoj Kumar, Delhi 2010: pers. comm.) which do not appear on the Delhi antiquities market.

In contrast, Tani myths and legends consistently mention Tibet as the source of their antique melon beads which they claim to have brought with them when they migrated from the north to their present location. While myths and legends cannot be regarded as proof of a northern origin, the content of tribal oral traditions is taken seriously by ethnographers and is generally regarded to hold at least partial truths (Blackburn 2003-2004:16, 26). For example, the legends of the Kachin and Chin tribes of Burma that relate their heirloom beads were goat droppings or found "fully formed in the ground" as a magical product indicate that the beads came from under the ground (Campbell Cole 2003:124, 2008:6).

The presence of Tani melon beads on the antiquities market in Lhasa and the trade trail of these beads along the ancient caravan routes from Tsari east through Tibet to Kunming in southwest China also suggest a Chinese origin. Indeed, beads and other ornaments of opaque turquoise blue glass – including melon-shaped beads – were a feature of Chinese glass production from the Yuan dynasty (Kwan 2001:82, 368) and continued to be made until the late 20th century.

DATING THE TANI BLUE MELON BEADS

While a Chinese origin for the Tani melons is likely, when were these beads made? British colonial reports reveal that large blue "porcelain" beads observed in the Tani region in the 1820s were highly valued and already of considerable age, suggesting that the Tanis have worn these beads since at least the 18th century. Although we cannot be certain that the beads observed were of the melon form, it seems highly likely that the heirloom beads most valued by the Tanis today – namely the two sizes of blue melons – would be the same as those most valued some 200 years ago. The

Tanis claim to have arrived at their present location by at least the 15th century, bringing their blue melon beads with them (Blackburn 2003-2004:19; Dalton 1855:151; Fürer-Haimendorf 1962:59). While there is no proof to verify these dates, beads that play an important role in the rituals and oral traditions of a particular tribe, and are the only beads to express that tribe's ethnicity, have generally been in their possession for a considerable time. The very high price of Tani blue melon beads among Tibetans who otherwise do not value glass beads also tends to support a degree of antiquity.

Can we learn anything about the age of the Tani melon beads from the beads worn with them? Throughout Southeast Asia, heirloom necklaces often include more recent beads as well as older, more highly valued ones (Francis 2002:182), so the presence of Venetian or Chinese glass beads of the late 19th or early 20th century in some Tani heirloom necklaces does not mean that the Tani melons are the same age. Indeed, Venetian eye and feathered beads are traditionally worn in Kachin heirloom necklaces along with Indo-Pacific beads which are some 2000 years old (Campbell Cole 2008: Plates IB, IC, IIB). In general, heirloom beads that are the most revered are the oldest, although this is not always the case; in Indonesia the elite value more recent but rarer Chinese-made *mutiraja* beads, rather than more ancient but more plentiful *mutitanah* Indo-Pacific beads (Francis 2002:187).

Could the Tani blue melon beads be contemporary with the introduction of the "barbarian tribute" given to the Lhopa Tagins at the Tsari *Rongkor lodzong* when it was formalized by the Fifth Dalai Lama (1617-1682) in the 17th century? It was during his reign that Tibet gained control of Kham in eastern Tibet through which the ancient trade caravan routes passed from China into Tibet. The conquest of Kham must have increased the Fifth Dalai Lama's extensive trading links with his agents in China (Desideri 2010:321), perhaps allowing access to beads from Boshan or another Chinese glass-beadmaking site which were specifically destined for the Tsari "barbarian tribute." This could account for the large quantities of blue melons found among the Tani tribes and their very limited occurrence elsewhere. It is known that beads formed part of the Tsari *Rongkor lodzong* tribute in the early 20th century (Huber 1999:136, 138) and, given the Tani tribes' great fondness for beads, it is likely that this followed a tradition established considerably earlier. The use of the names *dolo* and *dapo* – both associated with Tsari – for the Tani blue melon beads certainly suggests an early link to the Tsari pilgrimage. Attempts to trace and date traditional Tibetan songs about the Tsari pilgrimage which are said to mention *dolo* beads are ongoing (Sorensen 2012: pers. comm.).

TANI MOON BEADS

It is not clear if the skills to create large and perfectly symmetrical round beads were known at Boshan or if they were developed at the Beijing Imperial Glassworks established in Beijing in 1696. This point is of interest in assigning dates to the Tani blue melon beads because large, symmetrical, round beads of opaque dark blue and white glass are also valued as heirlooms by the Tani tribes (Plate IIB bottom). Called "moon" beads by the Nishi and "egg" beads by the Apa Tanis, they are not considered by the Tanis to be either as old or as precious as their blue melon beads (Anya Rattan 2010: pers. comm.). The distinctive circular to horseshoe-shaped marks found on the large Tani melons are also sometimes seen on the surface of moon beads (Figure 8). Six large spherical beads of opaque white, blue, and reddish brown glass in the Bristol City Museum, England, exhibit the same distinctive marks (PortCities Bristol 2012). They are loosely dated to the Ming (1368-1644) or Qing (1644-1911) dynasty. The beads were acquired by the museum in 1950 but, sadly, lack provenance data.

The presence of the horseshoe marks on the large Tani melons, the moon beads, and the Bristol beads strongly suggests that they were all made using the same or very

Figure 8. Tani blue "moon" beads showing horseshoe-shaped marks on the surface.

similar production techniques (furnace winding), quite possibly in the same production center and around the same time period. The moon beads may have been rolled along a trough mold to achieve their symmetrical spherical outline while the glass was still molten. It is possible that the large Tani melon beads were produced in the same manner, their indentations added by pressing the soft glass with a blade or tongs as in the case of the small melons. The ends of the moon beads are also truncated due to wear.

The Tani consider their moon beads to be "*nyaloma*" or beads "from Tibet." In 1836, Griffith (1847:57) reported "huge glass beads, generally blue or white" which the Mishmis obtained from "the Lamas" (Tibetans). The Mishmi tribes are part of the Tani group and live in eastern Arunachal. They traded with both the Tibetans to the north and via middlemen with the other Tani tribes to the east. The "huge" beads could have been recently made or old moon beads obtained from Tibetan traders, though by 1825, many Tani beads were already prized as heirlooms and rarely available or not at all (Wilcox 1832:403).

LATER OPAQUE BLUE GLASS BEADS

The Tani tribes also value small wound beads of opaque, turquoise-blue glass in spherical, oblate, and disc shapes (Plate IIC top) which they regard as more recent than either the blue melons or moon beads. They probably date to the 19th or early 20th century. In the far northwest of Arunachal, blue glass beads of this type are worn at the three-day sacred *chamm* dances performed once a year by monks of the Tawang monastery (Plates IIC bottom, IID top). During two of the dances, the traditional costume of the monks includes strings of spherical blue glass beads known as *ngo phrang-a* which are worn bandolier-style across the chest (Plate IID bottom). The original costumes for the *chamm* dances (which are copied in new fabric when they become worn) are said to have been brought from Lhasa in the 17th century when the Tawang monastery was first established (Yashi Khao, senior monk, Tawang 2011: pers. comm.). While it is possible that the blue glass *chamm* dance beads date to this period, spherical blue wound beads of this type are generally thought to date from the late 18th or early 19th century. They continued to be made in large quantities until the mid-20th century and are widespread in southwestern China and beyond. The Akha tribes of northern Thailand wear both the "coil" and "sphere" types in several colors, although blues predominate (Plate IIIA top) (Lewis and Lewis 1984:32). Akha heirloom necklaces occasionally contain blue glass melon beads different from those of the Tanis. These are thought to be from the 19th or early 20th century (Lewis 1980s:4; Buckley Bell, Chiang Mai 2011: pers. comm.). Plain turquoise-blue glass beads are also worn by the Kachin in northern Burma, along with an occasional blue glass melon bead of the "Akha" type (pers. obs. 2009) (Plate IIIA bottom). British colonial informants relate that "blue coloured composition beads" were obtained by the Konyak Naga at a trading entrepot called Longha on the Naga Hills-Burma border during the mid-19th century (Hannay 1873:312). Relatively small quantities of these beads are found in Naga necklaces (Jacobs 1990:252), but they were valued by the Khasi, Garo, and Lyngngam tribes in the hills to the south of the Assam plains (Gurdon 1907:194).

Spherical blue glass beads were also traded by the Chinese to Manila in the Philippines from where the Spanish shipped them to America where, in the Southwest, they are known as "Padre" beads, supposedly because they were associated with Spanish missionaries. The same beads are also known as "Canton" (Guangzhou) and "Peking glass" beads, and are generally thought to be made of leadless glass from Boshan. Yet five visually identical beads excavated in the American Northwest proved to belong to two different glass groups – a lead-barium group and a high potash lead glass (Burgess and Dussubieux 2007:69) – indicating multiple manufacturing sites or the use of recycled glass.

FAKE TANI MELON BEADS

In 1962, the brief Sino-Indian border conflict led to the closing of the border between Arunachal and Tibet. When the conflict was settled, the border remained closed and heavily militarized on both sides. This put a stop to the steady flow of cross-border trade which had existed for centuries between the Lhopas and the Tibetans. The closing of the border also put an end to the Tsari *Rongkor* pilgrimage which spanned the international border, as well as the *lodzong* tribute so valued by the Lhopa Tagins. Vital commodities such as salt which the northern Arunachal tribes had always obtained from Tibet now had to be traded up from the Assam plains, but precious Tibetan swords, clapperless bells, and "Tibetan" beads, new and old, were not obtainable from the plains and the supply of these prestigious goods came to a sudden halt. From this period, communication and trade with the Assam plains gradually began to increase, but Arunachal remained a remote hinterland and beads continued to play an important role in Tani rituals and exchange. Tani traditions required that a daughter should receive beads from her parents when she married. If a father had several daughters, he might be obliged to acquire more beads in order to provide suitable dowries.

As the shortage of prestige Tibetan goods grew, a Nishi tribal chief of unusual ability called Binni Jaipu was appointed *zemindar* or local magistrate at Daporigo in central Arunachal. Already a very wealthy man with

25 wives, he was one of the few tribal chiefs in central Arunachal to visit the plains. He was respected by both the Indian government and the local tribal people, for whom he did many favors. During a visit to the Assam plains to order bracelets from a Bihari goldsmith called Kailash Shah, Binni Jaipu complained of the interruption in the supply of prestige beads caused by the closing of the Tibetan border. Pointing to his necklace of valuable antique spiral conch-shell beads, Jaipu asked Shah if he could produce modern copies. Shah was an enterprising trader and managed to obtain a supply of raw conch shell which he shaped and ground to imitate the patina and polish of much-worn antique beads (Plate IIIB top). Encouraged by Shah's abilities, Jaipu paid him well, ordered more conch-shell beads, and asked him to produce copies of the Tani blue melon beads.[9] Having failed in this task in Calcutta, Shah approached Bihari Muslim beadmakers in Aligarh, Uttah Pradesh, about 150 km southwest of Delhi and only some 100 km from Purdalpur, one of India's major glass beadmaking centers. Both Aligarh and Purdalpur obtain their glass from nearby Firozabad. Had there been a tradition of making glass melon beads at Purdalpur, it seems likely that Kailash Shah would have selected this far-better-known glass beadmaking center to obtain the fake Tani melons, a further reason to suggest that Purdalpur was not the source of the antique Tani beads. The Aligarh Biharis produced copies of the Tani blue melons by cutting irregular grooves in spherical blue glass beads. Back home in North Lakhimpur, Shah used hand lathes powered by bicycle wheels to grind, polish, and age the new glass beads to imitate centuries of wear (Plate IIIB bottom).

The new Tani melons were purchased by Binni Jaipu, but soon enterprising hill men were making the five-day journey on foot to the plains to buy Shah's new beads. These traders were mostly Apa Tanis who at the time were beginning to visit the plains (the fake Tani melons are still known by the Hill Miris as "Apatani *tissi*" or Apatani "beads"). Lodging on a specially built bamboo platform outside Shah's house, the Apa Tanis would stay for three or four days to complete their purchases before returning to the hills to sell the beads. Unaware that they were new, many villagers were persuaded to swap one antique Tani melon for two or three new beads.

Communication in the hills was still very poor, but as knowledge slowly spread that the beads traded by the Apa Tanis were new, the value of antique Tani melons increased. Nevertheless, with the supply of antique beads from Tibet interrupted and only a limited amount in circulation in Arunachal, demand for the new Tani melon beads also increased from those who could not obtain or afford antique beads. As business grew, Shah began to employ out-workers, supplying them with grinders and polishers. In the late 1980s, he began to sell at Harmuti, a Sunday market in the plains (Plate IIIC top), which was more accessible for Apa Tani traders than North Lakhimpur. About ten years ago, Nishis and Adis as well as Apa Tanis began to come to the plains to buy the new beads. By this time, Shah had widened his production, obtaining copies of moon beads, Venetian feather and Peking glass beads (Plate IIIC bottom), carnelian beads from Cambay which are aged with acid, and imitation clapperless bells. For a while he also supplied red glass bugle beads from Aligarh to the Nagas (Ao 2003:13). Over the years, many of Shah's former employees began to order new beads from Aligarh and age them in their own small workshops, and today the Harmuti market is packed with buyers from the hills, as well as dealers who take the new beads as far as Darjeeling in northern India, Kathmandu in Nepal, and Chiang Mai in northern Thailand. But Tani informants still consider that Shah, now succeeded by his son (Plate IIID), produced the best quality "antique" melon beads using ever more sophisticated lathes, polishing drums, and other undisclosed ageing processes, although he and his family have never sought to disguise the fact that their beads are new.

In the late 1970s, the fake Tani melon beads even reached the Bokar and Toka Lhopas in Tibet, probably via bead dealers in Kathmandu. The price was very high: 3000 Chinese yuan or US$470 for one strand, a huge mark-up on the US$10 price per strand of small fake melons at the Harmuti market today. Some Lhopa informants reported that they knew the beads were new but believed that they would "become old." Today few Lhopas living on the Tibetan side of the border are lucky enough to have true antique beads. In 1951, China formalized its sovereignty over Tibet and during the Cultural Revolution (1966-1976), the Lhopas were forced to hand over their beads to Red Guards who put them in sacks and threw them in the river, an uncomfortable reminder of the activities of evangelical missionaries in Assam who also insisted that tribal people dispose of their beads when they became Christians (Campbell Cole 2008:19; informants at Tselbar and Toka villages 2011: pers. comm.).

Today the Tanis refer to the new melon beads as "duplicates" and the true antique beads as "originals." In the early days, some Tanis could distinguish between new and old beads because the new beads were heavier and made a different noise when two strands were rubbed together. The "duplicate" beads also broke more easily than the "originals." But every year new techniques are introduced which make it more and more difficult to distinguish between the new and true antique beads. More confusion is caused by older "duplicates" which have been worn since the 1960s and

1970s and have acquired a patina of their own. These older "duplicates" have more value than new beads. Some Tani informants report that they have stopped buying antique melon beads because it is so difficult to distinguish between "originals" and "duplicates."

TANI HEIRLOOM BEADS TODAY

Because of its mountainous terrain and poor roads, much of Arunachal remains remote and thinly populated. Yet, as access to education increases and traditional dress is set aside, heirloom beads – above all the blue melons – have remained an important part of Tani traditions and rituals. With only a limited supply of true antique beads available and an increasing population with more disposable wealth, the price of the Tani blue melons has become very high. Today, a single large blue melon bead is worth 25,000-30,000 Indian rupees or US$540-$650 each, while a small blue melon bead costs 10,000 Indian rupees or US$220. At weddings and festivals, for both educated urban and more traditional rural Tanis, their melon beads remain a symbol of prestige, status, and ethnicity. Their ownership has come to declare old rather than new wealth, attracting more respect than the possession of a large house or car (Anya Ratan 2010: pers.comm.).

At the *murung* and *miida* festivals held in the Apa Tani valley each year, the heirloom necklaces of the clan wives are still worn as a public display of the festival sponsor's wealth and his clan's fertility (Figure 9; Plate IVA top) (Blackburn 2003-2004:36). When the festival food is about to be served, the clan wives remove their necklaces and hang them in the sponsor's house in a secure display case, each set of beads labelled with its owner's name (Figure 10; Plate IVA bottom). To increase the clan's prestige, guests may be informed that no "duplicate" beads are present in the clan wives' heirloom necklaces.

For educated urban Nishis in Itanagar, Arunchal's capital, Tani blue melon beads (and clapperless bells) remain a vital part of a bride's dowry and both are still worn in great profusion at weddings. Nishi informants report that because of the rarity and high price of true Tani melon beads, the wedding ceremony is often delayed while parents acquire the required costly beads. The large number of necklaces worn at weddings can weigh 20-30 kg, but Nishi traditions state that if the beads are too heavy for a bride, she is not worthy of being wealthy, and that the more beads she can wear, the wealthier she will become (Anya Ratan, Itanagar 2010: pers. comm.). Well-off Nishi women add to their collection of heirloom beads if true antique beads become available. A large collection of "original" heirloom beads can be worth up to US$200,000 (Plate IVB) and are often stored in bank safes. Less wealthy Tanis buy "duplicate" beads, each new bead inspected in great detail in order to select those that most resemble antique "original" beads.

Figure 9. Clan wives wearing their heirloom beads at the *murung* festival in the Apa Tani valley.

CONCLUSION

Many questions remain unanswered. Is there a link between the larger Tani blue melon beads and the somewhat similar melon beads of opaque yellow glass thought to be of Chinese origin and found in heirloom necklaces in East Indonesia and Irian Jaya? These beads are loosely dated to the 17th-19th centuries (Adhyatman and Arifin 1993:85). Are the two sizes of Tani melon beads contemporary? The Tanis believe they are, but they value the larger ones more highly. Is this because of their larger size, or because in the distant past they were known to be older and as a result acquired a higher value? When and why did the supply of the Tani melon beads cease? Was it when the moon beads became available or are the moon beads the same age and from the same source as the large Tani melons?

Chemical analysis of the Tani blue melon beads might reveal their place of manufacture, but because of the rarity

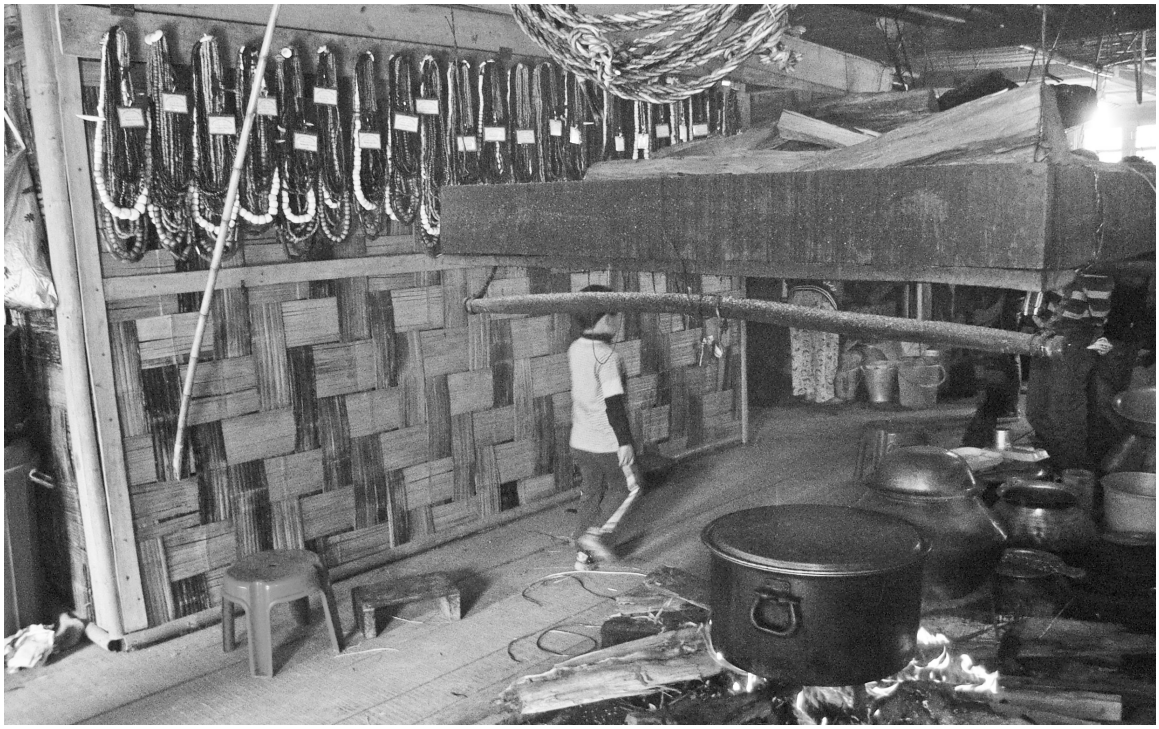

Figure 10. *Murung* festival in the Apa Tani valley; the clan women's heirloom necklaces on display in the festival sponsor's house before being secured in their display case. The festival food is cooking on the hearth.

and high cost of true antique Tani melon beads and the ready supply of excellent fakes, glass analysis is problematic and has yet to be undertaken. Beads that are still valued as heirlooms are not often found in archaeological contexts, and the author has been unable to find either the small or large Tani melon beads in museum collections. Without a known archaeological context or chemical analysis, the age and origin of the Tani blue melon beads remains unclear. Taking all the facts into account, the author tentatively suggests that they were produced in China during the mid-17th to 18th centuries. Obviously, much more research needs to be undertaken to substantiate this. It is hoped that more information will come to light as a result of this article.

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ENDNOTES

1. Between 1879 and 1884, the import of European glass beads into India nearly doubled. This proved to be devastating for India's ancient glass beadmaking industry (Francis 2002:177).

2. To avoid the confusion caused by the different names used in Arunachal and Tibet for the non-Tibetan border tribes, the Tagins are referred to as "Lhopa Tagins."

3. Sadly we lack further details of these beads which may have been imported into England for export rather

than made there. I am grateful to Toni Huber for this reference.

4. The conch-shell beads traded to Tibet may have been made in Bengal by Indian craftsmen, but they were also made by Angami Nagas in the village of Khonoma. The Angami excelled in this work and traded these beads over a wide area, even as far as Burma (Hutton 1921:66).

5. *Bimpu* is the generic name for medium-sized glass beads (Hage Dollo, Ziro 2010: pers. comm.).

6. Other suggested derivations for the word *dolo* are as follows: a) From the Tibetan *dolam* (*bgrod lam*) which means "passage" (Gyurme Dorje, London 2012: pers. comm.); b) *Yu dolo* ("blue" *dolo*) or *yu do lo* may translate as "turquoise stone:" *yu* may derive from *g.yu*, Tibetan for "turquoise", *do* may be from *rdo* (stone), and *lo* may just be a syllable used for assonance (Per Sorensen 2012: pers. comm.); and c) a Tibetan informant in Lhasa (2012: pers. comm.) stated that *dolo* meant "tax," i.e., a toll payment from Tsari pilgrims.

7. Khampa nomads plait their hair with red or black tassels which are wrapped around their heads and decorated with rings, beads, and other ornaments. The melon beads are not worn by aristocratic Khampas who prefer *dzi* beads, turquoise, coral, and gemstones (Thom Mond 2012: pers. comm.).

8. Glass manufacture in Firozabad, Uttar Pradesh, is said to date back to the 15th century. It was encouraged during the British colonial period and today Firozabad is often referred to as the glass capital of India (Francis 2002:249 n. 44, 250 n. 45).

9. The information on fake Tani blue melons was provided in 2010 by Ratan Yak and Anya Ratan, Itanagar, and Jamuna Prasad Shah, Kailash Shah's son, North Lakhimpur.

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CHEMICAL COMPOSITION OF 16TH- TO 18TH-CENTURY GLASS BEADS EXCAVATED IN PARIS

Laure Dussubieux and Bernard Gratuze

Dating from the 16th to 18th centuries, 63 glass artifacts (mostly beads) recovered from two sites in Paris, France, were investigated using chemical analysis in an attempt to determine their place of origin. The late-16th-century material from the Jardins du Carrousel consisted of small, monochrome drawn beads with a soda-lime composition. Attributed to the 17th and 18th centuries, the beads recovered at the adjacent site of the Cours Napoléon were more diverse in shape, color, and composition. Although provenance attribution was difficult due to a lack of comparative data, it was possible to identify an increasing variety of glass recipes after the 16th century that revealed a growing interest in glass beads in Europe. In the 17th century and afterwards, greater numbers of glass- and glass-bead production centers were active, quite certainly due to a growing demand for export goods but also due to a more extensive use of beads in France.

INTRODUCTION

Much of what is presently known about glass beads in France from the 16th to 18th centuries is through the work of Kidd (1979) and Francis (1988). Both their publications deal with the broader topic of glass beads in Europe and most of the information they present about France derives from Barrelet (1953) who wrote a comprehensive review of the subject ranging from antiquity to the present. This is also a significant source of information for a more recent book by Bellanger (1988) that focuses on glass vessels but also mentions glass beads, though infrequently.

Turgeon (2001, 2004) provides new insight into this topic by exploring bead importation to northeastern North America from France through the study of post-mortem inventories of Parisian beadmakers dating from the second half of the 16th century to the beginning of the 17th century, coupled with information derived from a contemporaneous collection of beads recovered at the Jardins du Carrousel in Paris. He suggests that glass bead production was significant in France and that beads were exported to North America from France, based on the similarity of the beads found at the Jardins du Carrousel and at sites in northeastern North America. It is, however, important to note that the point of origin of the Jardins du Carrousel beads is unknown and that a French origin is totally hypothetical. Indeed, glass beads recovered in France may have reached their final destination following different paths. One possibility is that they may have been imported from another European country. If previous researchers placed the centers of glass bead production in Holland and Venice, the recent archaeological discovery in London of a glass-bead-producing workshop dating from the mid-17th century (Egan 2007:5) shows that other centers may have existed. Another possibility is that the glass beads may have been manufactured in France from imported semi-finished products (rods for wound beads or tubes for drawn beads). A third possibility is that the rods or tubes and the beads may have both been manufactured in France in separate specialized workshops. A final possibility is that the glass, the rods or tubes, and the beads may have been produced at the same place in France. It is important to note that the production of canes is considered as unlikely as it would have been a Venetian monopoly (Guerrero 2010).

Coupled with archaeological data, it is hoped that the elemental composition of the Parisian glass artifacts will be useful in determining which one of the aforementioned scenarios is the most likely. While the fact that some Italian glassmakers were brought to France (Barrelet 1953) and produced glass according to Italian recipes may create difficulties in differentiating French and foreign productions, the fact that trace element studies have helped to distinguish Venetian and *façon-de-Venise* glassware made at different European locations (De Readt et al. 2001; Šmit et al. 2005) suggests that the same approach may be helpful in the case of the Parisian glass ornaments.

THE BEAD SAMPLES

In an attempt to better understand French glass bead production and trade, this study presents the results of the

compositional analysis of 63 beads and glass wasters from two archaeological sites in Paris: the Jardins du Carrousel (end of the 16th century) and the Cours Napoléon (17th-18th centuries). The goal was to define what types of glass composition were available during these periods, their evolution over time, and how they compare with other European glass compositions (Tables 1-2; Plates IVC-IVD). The full description of the corpus of small ornaments, tubes, rods, and wasters found at the two sites will be published separately (Dussubieux n.d.). In many cases in Table 1, Kidd and Kidd (1983) variety numbers could not be assigned to the beads as color nuances were very difficult to distinguish due to the deteriorated condition of the glass.

The Jardins du Carrousel site was excavated in 1989 and 1990. Most of the glass samples came from zone 106 that was used initially as a quarry and then as a dump site from the Renaissance period to modern times. Some beads were also found in zone 102 which was also a quarry and then a dump site. In both cases, the associated ceramics dated to the 16th and 17th centuries (Van Ossel 1998). Fifty-seven artifacts were recorded from this site and were either beads or tubes. The beads, mostly round or roundish, were manufactured using the drawing technique and were quite likely made from the associated tubes. The colors were dark blue, turquoise blue, black, colorless, amber, and greenish. In a few cases it was not possible to determine the color of the glass due to the presence of patination. With the exception of the black glass, the glass was either transparent or translucent.

Situated adjacent to the Jardins du Carrousel, the Cours Napoléon was excavated over a period of 24 months in 1984 and 1985. No excavation report has been published. Formerly living quarters during the 17th and 18th centuries, the site was located where the glass pyramid at the Louvre Museum now stands. The site produced 383 small glass artifacts, mostly in the form of beads and tubes. Other types of artifacts included rods, chain rings, and waste material. The shapes of the beads were quite varied although round and roundish shapes predominated (72%). Other beads were grain shaped, annular, barrel shaped, biconical, truncated bipyramidal, cubical, cornerless cubical, disc shaped, melon shaped, and raspberry shaped. The technique used to manufacture the beads was sometimes difficult to determine, however, drawn, wound, molded, blown, and, more rarely, ground beads are represented. Black beads were the most common followed by turquoise blue, colorless, and dark blue. A significant number of beads were polychrome.

The glass assemblages recorded for the Jardins du Carrousel and the Cours Napoléon sites are rather different in many respects. The modest size of the Jardins du Carrousel assemblage and the poor diversity of the material may be due to its being a dump site. Artifacts ended up there because they were broken or lost. The fact that this site is slightly earlier may also indicate that more diversity in color, shape, and manufacturing techniques appeared later. The Cours Napoléon beads, coming from a domestic context, may have served as personal ornaments or may have been used to decorate furniture, drapes, and other possessions.

As described in Tables 1-2, 14 small glass artifacts were selected for analysis from the Jardins du Carrousel collection and 49 from the Cours Napoléon.

THE ANALYTICAL PROCESS

The beads were analyzed at the Institut de Recherche sur les Archéomatériaux, UMR 5060 CNRS/Université d'Orléans, Centre Ernest-Babelon, using a PQXS-VG Plasma Quad quadrupole ICP-MS connected to a 266 nm UV Microprobe laser system.

In this process, a very small quantity of material is ablated (removed) using the laser. The ablated material is transported by a gas carrier (argon) to the plasma torch where it is dissociated, atomized, and ionized. The ions are then transferred to a quadrupole mass filter. This filter directs ions to the detector with a mass on charge ratio selected by the operator. Each isotope of each element corresponds to a unique mass on charge ratio which allows the identification of the elements present in the sample. The detector records how many ions of each type have traveled through the mass filter. The quantity of each type of ion is directly related to the concentration of the original element in the sample.

The measurements are carried out in peak jump acquisition mode, taking three points per peak. There are two detection modes; the analogue mode is used for major elements and the pulsed mode is used to detect minor and trace elements.

To be able to determine elements with concentrations in the range of ppm and below without leaving a trace on the surface of the sample that is visible to the naked eye, we use the single point analysis mode with a laser beam diameter of 100 μm. The laser operates at a maximum energy of 2 mJ and at a maximum pulse frequency of 10 Hz. A pre-ablation time of 20 s is set in order to first eliminate the transient part of the signal and, second, to be sure that possible surface contamination or corrosion does not affect the results. Measurements on each sample are corrected from the blank.

To improve reproducibility of measurements, the use of an internal standard is required to correct possible instrumental drifts or changes in ablation efficiency. Isotopes Si28 and Si29 were used for internal standardization.

Table 1. Paris Beads Analyzed Using LA-ICP-MS.

Technique	Kidd code	Color	Shape	Dimensions (mm)	Reference number	Comments
Drawn	IIa	Black	Round	L = 12	22.055 (11852) (B)	Faience?
Drawn	IIa	Black	Round	D = 3	12413 (7587)	
Drawn	IIa	Tsp. green	Roundish	D = 4	28551 (17169)	Lead glass
Drawn	IIa	Dark blue	Round	D = 6	3218 (4349)	
Drawn	IIa	Amber	Roundish	D = 7	33335 (19404)	
Drawn	IIa	Turquoise blue	Round	D = 4	3411 (4383)	
Drawn	IIa	Turquoise blue	Round	D = 2.5	3576 (5199)	
Drawn	IIa	Turquoise blue	Round	D = 2.5-3	3592 (5562)A	
Drawn	IIa	Turquoise blue	Round	D = 2.5-3	3593 (5562)B	
Drawn	IIa	Turquoise blue	Round	D = 3	5061 (2525)	
Drawn	IIa	Tsp. yellowish	Round	D = 7.5	6066 (2857)	Fragment, lead glass
Drawn	IIa	Turquoise blue	Roundish	D = 3	9018 (2132)	
Drawn	IIa	Dark blue	Roundish	D = 4	9083 (3654)	
Drawn	IIa	Turquoise blue	Roundish	D = 2-2.5	9380 (11504)A	
Drawn	IIa	Turquoise blue	Roundish	D = 2-2.5	9381 (11504)B	
Drawn	IIa	Turquoise blue	Roundish	D = 3	9596 (15859)	
Drawn	IIa	Turquoise blue	Roundish	L = 6	102.049 (30)A	Fragment
Drawn	IIa	Turquoise blue	Round	L = 6	102.049 (30)C	
Drawn	IIa	Dark blue	Oblate	L = 3	106.001 (59)B	
Drawn	IIb18	Colorless, white	Roundish	L = 7	106.001 (59)C	Colorless with white straight stripes
Drawn	IIa	Dark blue	Round	L = 7	106.001 (59)D	
Drawn	IIa	Black	Roundish	L = 2.5	106.035 (22)A	
Drawn	IIa	Turquoise blue	Roundish	L = 6	106.036 (61)	
Drawn?	IIa?	Dark blue	Grain-shaped	L = 6-7.5	5113 (1389)A	
?	?	Black	Oval	L = 2-3	5113 (1347)	Faience?
Drawn	IIa	Black or dark blue	Roundish	L = 12-16	5113 (1387)	Some tubes from this site may have been used to make these beads
Drawn	IIbb’	Dark blue, blue, white		D = 5-7	2068 (1261) dark blue	Dark blue with spiral blue-on-white stripes
Drawn	IIb18	Colorless, white	Round	D = 7	17498 (18032)	Colorless with straight white stripes; white is mixed lead-alkali glass
Drawn	IIb19	Colorless, white	Oval	D = 7 L = 10	26037 (15067)	Colorless with straight white stripes
Drawn	IIb19	Colorless, white	Oval	D = 6 L = 8	102.049 (30)B	Colorless with straight white stripes

Table 1. Continued.

Technique	Kidd code	Color	Shape	Dimensions (mm)	Reference number	Comments
Drawn	IVbb	Turquoise blue, red, white	Round	D = 7	5051 (1046)	Turquoise blue with red-on-white straight stripes; white is mixed lead-alkali glass
Drawn	IVbb	Black, red, white, dark blue	Round	D = 5 L = 5	3573 (5530)C	Red glass on a black core; dark blue-on-white straight stripes
Wound	WIb	Turquoise blue	Roundish	D = 7	33335 (19391)A	
Wound	WIb	Turquoise blue	Roundish	D = 7	33335 (19391)B	
Wound	WIb	Dark blue	Round	L = 12.5 Int. D = 4	48259 (19969)	Mixed alkali glass
Wound	WIb	Black	Roundish	D = 3-4	7401 (5580)	
Wound	WIb	Opalescent white	Roundish	L = 8	9421 (12217)	Potash glass
Wound	WId	Turquoise blue	Annular	D = 9	3187 (2333)	
Wound	WIIb	Tsp. purple	Tabular disk	D = 8 L = 3	10155 (10628)	
Wound	WIId	Colorless	Raspberry	D = 12 L = 8	44076 (22711)	Potash glass
?	?	Turquoise blue	Melon	D = 12 L = 6-7 Int. D = 6	10211(10960)	Faience?
Drawn	IVbb'	Red, white, dark blue	Round	D = 6	5080 (2710) core (C), dark blue (B), red (R)	Red-on-beige core; spiral dark blue-on-white stripes
Blown	BIa	Colorless	Round	D = 7	13420 (16859)	Sphere with very thin walls
Wound	WIIIb	Green, white	Round	D = 7	30024 (16.438)	White decoration is mixed lead-alkali glass
Wound?	WId?	Tsp. greenish	Annular	L = 4	106.001 (59)A	Bead fragment or vessel adornment
?	?	Colorless	Faceted	D = 12.5	13118 (6169)	
Drawn	If	Dark blue	Cornerless cube	L = 7	7576 (11598)	
Mold-Pressed	MP	Tsl. red	Faceted, drop-shaped	D = 8 L = 13	44076 (22709)	Mixed lead-alkali glass
Wound	WII	Black	Conical with 6 knobs around the middle	D = 12 L = 5	3208 (4684)	
Drawn?	?	Dark blue	Grain-shaped	D = 6-7.5	5113 (1389)B	

Reference numbers with a 10X.0XX(XX) format designate the Jardins du Carrousel site. Other reference numbers designate the Cours Napoléon site. Compositions are indicated in the Comments column for those samples that are not made of soda-lime glass.

Table 2. Paris Glass Samples Analyzed Using LA-ICP-MS.

Technique	Kidd code	Color	Shape	Dimensions (mm)	Reference number	Comments
n/a	n/a	Black	n/a	L = 45	24075 (10.1999)	Ceramic fragment with glaze on one side and a thick and irregular (1-5 mm) layer of glass on the other
Drawn	Ia?	Black	Round x-section	D = 4-6 L = 33	13.314 (15160)	Tube sealed at one end; mixed alkali glass
n/a	n/a	Dark blue	Square x-section	D = 4-5	5076 (1197)	Square and flaring tube with blobs of glass applied to the larger end
Drawn	Ia	Dark blue	Round x-section	D = 10 L = 29 T = 2.5	51.115 (19658)	Tube
Drawn	Ia	Greenish	Roundish x-section	D = 10 L = 12.5 T = 4	106.005 (47)A	Tube
Drawn	Ia	Turquoise blue	Roundish x-section	D = 6 L = 9 T = 2	106.005 (47)B	Tube
Drawn	Ia	Dark blue	Round x-section	L = 11	106.035 (22)B	Tube
Drawn	Ia	Dark blue	Round x-section	D = 8 L = 13 T = 2	106.036 (62)A	Tube
Drawn	Ia	Tsl. brown	Round x-section	D = 12 L = 10 T = 2	106.036 (62)B	Tube
n/a	n/a	Tsl. greenish	n/a	30 x 15	15445 (18196)	Raw glass attached to refractory material; lead glass
n/a	n/a	Tsl. greenish	n/a	L = 18	24019 (12278)	Waster containing unmelted quartz/mineral grains; potash glass
n/a	n/a	Tsl. greenish	n/a	D = 18	9596 (15.273)	Waster
n/a	n/a	Black	n/a	25 x 2	3168 (12471)	Waster; high lime glass

Reference numbers with a 10X.0XX(XX) format designate the Jardins du Carrousel site. Other reference numbers designate the Cours Napoléon site. Compositions are indicated in the Comments column for those samples that are not made of soda-lime glass.

Concentrations for major elements, including silica, were calculated assuming that the sum of their concentrations in weight percent in the glass is equal to 100% (Gratuze 1999).

Fully quantitative analyses are possible by using external standards. To prevent matrix effects, the composition of standards has to be as close as possible to that of the samples. Three different types of standards are used to measure major, minor, and trace elements. A standard reference material (SRM) is NIST SRM 610, a soda-lime-silica glass doped with trace elements in the range of 500 ppm. Certified values are available for a very limited number of elements. Concentrations from Pearce et al. (1997) were used for the other elements. Corning Glasses B, C, and D match compositions of ancient glass (Brill 1999, 2:544). An in-house standard with composition determined by Fast Neutron Activation Analysis was also used.

The detection limits range from 0.1 to 0.01% for major elements and from 20 to 500 ppb for others. Accuracy ranges from 5 to 15% depending on the elements and their concentrations. A more detailed account of the performances of this technique can be found in Gratuze (1999).

THE RESULTS

The summarized compositions of the artifacts from the Cours Napoléon and the Jardins du Carrousel sites, including maximum and minimum concentrations for the major and minor elements for the groups described below, are provided in Table 3. For polychrome glass beads, the different colors were analyzed separately. In some cases, however, the composition of some colors was not determined as it did not seem possible to sample only one color without contamination from adjacent ones. While most of the glass samples had a soda-lime composition, the glass samples that had a different composition will be described first.

Lead Glass

Four samples have lead oxide as the principal constituent in the glass (PbO > 50%). For three of them, the lead oxide concentration is close to 73%. Two of the beads are emerald green (samples 28551 [17169] and 106.001 [59]A) and one is transparent yellow (6066 [2857]). In these beads, the concentration of all the constituents, excepting lead oxide and silica, is less than 1%. The green color is due to the presence of small quantities of copper in the glass. No coloring element was intentionally added to the yellowish glass; quite likely the presence of iron and the absence of a decolorizer produced this color.

The fourth lead-glass artifact, sample 15445 (18196), is a small chunk of greenish glass that contains 55% lead oxide, 40% silica, and 3% potash. This sample also has notably low values of iron oxide and alumina suggesting that a very pure source of silica was used. Its color is probably due to the presence of small quantities of copper oxide (0.2%). The lead-glass beads and this small chunk are quite likely not related as their composition differs significantly.

Lead glass was present in Europe during the medieval period (Wedepohl et al. 1995) with a composition extremely similar to that of the lead-glass beads found at the Louvre sites. A lead-glass bead was identified in Rouen at a site dating from the 17th century (Dussubieux 2009). The three high-lead glass beads from the Louvre confirm that lead glass was used in Europe for the production of glass beads during the post-medieval period.

Mixed Lead-Alkali Glass

Two samples have a mixed lead-alkali composition: a lead-potash, gold ruby glass (44076 [22709]) and a lead-soda-lime emerald glass (30024 [16.438]). Sample 44076 (22709) contains 13% potash, 19% lead oxide, and almost 4% lime and soda. Other constituents in significant quantities are arsenic oxide (1.5%) and antimony oxide (2%). This artifact also contains 83 ppm of gold, 0.1% tin oxide, and 0.5% chlorine. Its composition is extremely similar to that of some 18th- to 19th-century beads presumed to be made in Venice and found at a site located in Washington state

Table 3. Minimum and Maximum Concentrations for Each Glass Group (in weight percent or ppm of oxides).

	Lead glass		Mixed-lead-alkali glass		Potash glass		Mixed alkali glass		Soda-lime glass	
Na_2O	0.02%	0.9%	3.6%	10.1%	0.2%	1.9%	6.1%	7.3%	8.2%	19%
MgO	117	204	0.6%	2.3%	0.4%	0.8%	0.8%	2.5%	0.7%	4.0%
Al_2O_3	0.1%	0.4%	1.0%	1.6%	0.2%	4.4%	2.1%	2.1%	0.5%	4.3%
SiO_2	24%	39%	50%	57%	60%	74%	59%	75%	57%	76%
K_2O	0.05%	3.3%	1.5%	13%	13%	20%	7.4%	8.5%	0.6%	7.0%
CaO	0.28%	0.65%	3.9%	7.9%	4.9%	12%	2.4%	10%	3.3%	16%
Fe_2O_3	0.05%	0.12%	0.6%	1.6%	0.3%	636	0.8%	1.5%	0.3%	3.6%
PbO	55%	73%	6.6%	19%	26	801	0.4%	111	0.1%	855

(Burgess and Dussubieux 2008). By comparison with those beads, this bead may belong to the late 18th century.

Ancient recipes report two main processes for achieving gold ruby glass. The first one, known as purple of Cassius, involves the precipitation of gold in a tin chloride solution. It was widely used in northern Europe starting in the last quarter of the 17th century. The second process involves the use of an arsenic compound along with gold. It is described in Venetian recipes dating from the end of the 17th century but was probably discovered in France by Bernard Perrot during the same period. The analysis of the French and Venetian lead-potash ruby glasses reveals the absence of tin and a low level of chlorine (Biron et al. 2011).

Bead 44076 (22709) contains chemical traces of both recipes but with respect to soda, the chlorine value for this glass is too high to have been caused only by the fluxing agent. Moreover, the tin concentration is more in agreement with that found in ruby glasses made using the purple of Cassius recipe. It is thus highly probable that arsenic was added to the glass batch as a refining agent. The use of both antimony and arsenic to eliminate bubbles in glass was already known by the end of the 17th century (Moretti 2002:122)

Sample 30024 (16.438) is a decorated emerald-green bead colored using copper. It contains 15.6% lead, 9.8% soda, 7.4% lime, and 5.9% potash. This composition may also be related to Venetian production.

The white glasses used to decorate beads are also part of the mixed alkali-lead glass group. Included are a turquoise blue, barrel-shaped bead with three red-on-white stripes (5051 [1046]), a dark blue, olive-shaped bead with four blue-on-white spiral stripes (2068 [1261]), and a colorless spherical bead with white stripes (17498 [18032]). Lead in the white glass is part of an opacifying agent that contains approximately 55% tin oxide and 45% lead oxide. The reduced composition of the different white glasses is approximately 66% silica, 13% soda, 10% lime, 3% potash and magnesia, and 1.5% alumina. The other colored glasses of these beads have the same reduced composition; they are made from a typical soda-lime glass that will be discussed below.

Potash Glass

Four samples have a composition where potash is more abundant than soda. Three beads (44076 [22711], 9421 [12217], 13118 [6169]) have potash-lime compositions. Beads 44076 (22711) and 13118 (6169) are composed of a colorless glass. Bead 44076 (22711) contains 13.5% potash and 9% lime. Arsenic oxide is the only other constituent (aside from silica) that is present with a concentration higher than 1%. Arsenic could act both as a decolorizer and a refining agent. Bead 13118 (6169) has a similar composition for major elements even if the concentrations of potash and lime are slightly higher (20% and 10%, respectively). To obtain a colorless aspect, no significant amount of arsenic was added to the glass but a very pure sand with very low concentrations of iron was used instead. The presence of manganese oxide (0.18%), which acts as a decolorizer, was also noted.

Bead 9421 (12217) is opalescent white with slightly more potash (18.6%) and slightly more lime (12%) than the previous bead. It contains more than 5% phosphorus. The presence of this element in a relatively high concentration suggests that this glass may have been opacified by introducing bone ash into the glass batch.

The last potash-rich sample (24019 [12278]) is identified as a waster. Its composition differs from that of the beads by having a higher alumina concentration (~ 4.5% instead of a maximum of 1.8%). Trace elements are also significantly different in this sample, indicating that this glass was not used in the production of the potash beads.

Potash glass dating from the 17th to 18th centuries is generally associated with a Bohemian origin.

Mixed Alkali Glass

Two glass artifacts (bead 48259 [19969] and tube 13.314 [15160]) exhibit similar quantities of soda (7% and 6%) and potash (7.5% and 8.5%). The tube has higher magnesia and lime concentrations compared to the bead (10% instead of 2% and 2.5% instead of 0.8%). It is colored with cobalt (> 3000 ppm) and contains a wide range of elements that may have been added to the glass along with the cobalt colorant: copper, arsenic, bismuth, uranium, and lead. These elements characterize the Erzgebirg cobalt mines exploited during the 16th and 17th centuries in Europe (Gratuze et al. 1996).

Bead 48259 (19969) is colored with copper (copper oxide concentration is 3.4%). Surprisingly enough, the composition of this bead, including major, minor, and trace elements, is identical to that of the beads produced during the final Bronze Age at the site of Frattesina and at other sites located in the northern part of Italy (Biaviati and Verità 1989; Brill 1992). Not only the composition but also the typology of the bead matches that of material associated with the Bronze Age. In France, a similar bead was found at Fort Harrouard, a late Bronze Age site located to the south-west of Paris (Gratuze et al. 1998). It is therefore possible that the bead is from the Bronze Age but was reused in the 17th or 18th century.

High-Lime Glass

Sample 3168 (12471), a glass waster, has an extremely high lime concentration (26%) together with a low alkali content (Na_2O = 0.4% and K_2O = 2%) and an unusually high alumina concentration (7%). This object also contains high amounts of the following oxides: iron (2.8%), copper (5.2%), and zinc (3.2%). Aside from the presence of copper and zinc, this composition appears to be very close to that of early 19th-century glass bottles such as the ones discussed by Berthier (1834). The only particularity of this glass seems to be the presence of copper and zinc, which is not mentioned in old texts. This sample is probably not related to glass beadmaking.

Unusual Compositions (Non Glass)

Three objects have compositions that do not correspond to glass and appear to be faience. Samples 5113 (1347) and 22.055 (11852) are black beads that have a thin vitrified outer layer and a core of an extremely heterogeneous and non-vitrified material as observed on broken beads. Their structure is closer to that of faience. Both beads share very low concentrations of soda, potash, and magnesia and relatively high concentrations of alumina (> 5%) and phosphorus oxide (3% and 5%, respectively). The coloring agents are different for the two specimens. Bead 5113 (1347) contains high concentrations of manganese oxide (14-20%), iron oxide (4%), and cobalt oxide (2700 ppm). Abnormally high concentrations of the following oxides were also measured: zinc (1.2%), arsenic (0.27%), bismuth (0.57%), and nickel (0.07%). If it is difficult to explain the presence of so much zinc, it seems quite likely that the other elements were added unintentionally at the same time as the cobalt. Bead 22.055 (11852) contains 3.4% manganese oxide, 8% iron oxide, and 2% copper oxide. Cobalt oxide concentrations are much lower in this bead (~ 200 ppm). The compositions of these beads are unusual and they are not considered to be glass.

The third object (10211 [10960]) is an indented, annular blue bead containing 83% silica, 7% soda, and about 2% of lime, potash, and alumina. The coloring agent is copper oxide (1.5%) which may have been added as bronze waste (presence of 0.2% tin). This object is also likely faience and not glass.

Soda-Lime Glass

Most of the glass samples have a soda-lime composition (Table 4). Figure 1 shows the concentrations of soda, lime, potash, and magnesia for the samples in the soda-lime glass group. Despite the wide variation that appears in the concentrations of these constituents, no discreet groups were identified that could suggest the existence of different production sites or periods. The glasses will be discussed by color.

Table 4. Average Reduced Composition for the Soda-Lime Glass Samples.

	Average +/- standard deviation
Na_2O	13.4 +/- 2.4%
MgO	2.2 +/- 0.9%
Al_2O_3	1.6 +/- 0.7%
SiO_2	69.1 +/- 3.3%
K_2O	4.3 +/- 1.7%
CaO	8.2 +/- 2.0%
Fe_2O_3	1.2 +/- 0.8%

Opaque Red Glass

Two red glass samples were analyzed. Sample 5051 (1046)R comes from the red stripes on a turquoise-blue bead decorated with red-on-white stripes. Sample 5080 (2710)R is from the red layer of glass covering a beige core. Opaque red glass is generally sparsely used. Both samples are plant-ash soda-lime glass. Different plants may have been used, however, as different concentrations of magnesia and potash were measured. Sample 5051 (1046)R contains 3.5% magnesia and 2% potash whereas sample 5080 (2710)R contains less magnesia (2.2%) but more potash (5%). Coloring recipes, which involve the use of copper, also differ. Sample 5080 (2710)R contains 1.7% copper oxide along with 3.6% tin oxide and 3.6% lead oxide. In sample 5051 (1046)R, a smaller quantity of copper was added to the glass batch (0.9%). Significant quantities of lead and tin oxides were detected in this glass but the concentrations for these two constituents are much lower than for 5080 (2710)R (0.3% and 0.2%, respectively). In both samples, iron oxide is present in rather high concentrations. They contain more than 3% whereas the average concentration for this constituent in all the soda-lime glass is 1.2%. Iron may have been used to facilitate the growth of metallic copper crystals in the glass as this element can act as an internal reducer.

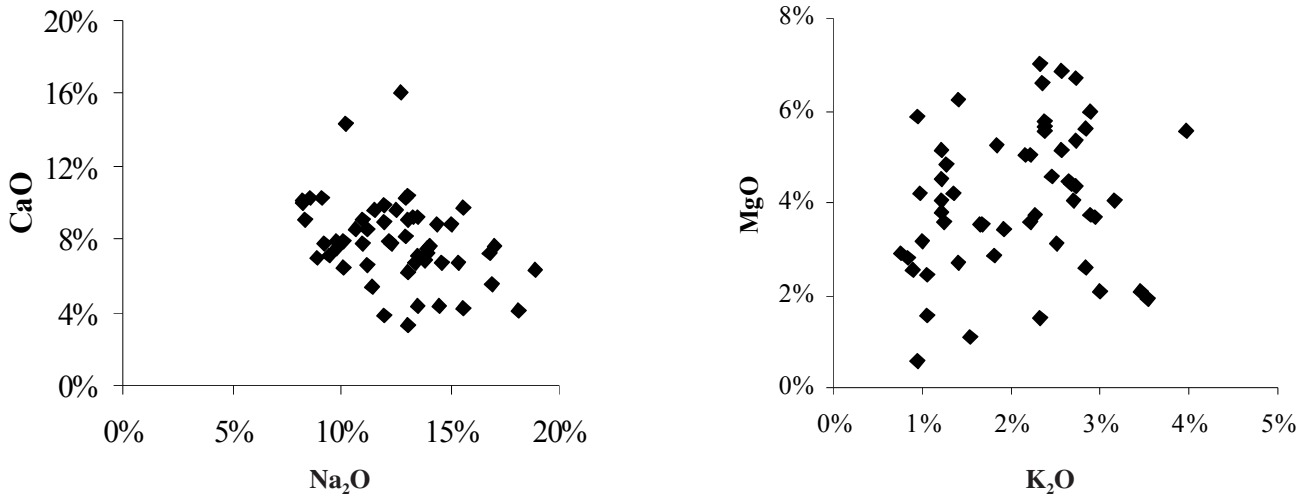

Figure 1. Two biplots (Na_2O-CaO and K_2O-MgO) for the soda-lime glass samples.

Manganese-Black and Cobalt Dark-Blue Glasses

"Black" glass is quite often not really black but blue, green, brown, or purple, and it is the saturation of the pigment in the glass that makes it look opaque and black. Soda-lime glass that is either dark purple (due to manganese) or dark blue (due to cobalt) is discussed here.

While sample 10155 (10628) only contains 1.8% manganese oxide and appears purple, eight beads contain high amounts of this constituent with concentrations ranging from 4% to 11% and appear black (12413 [7587], 3208 [4684], 7401 [5580], 5076 [1197], 106.035 [22]A, 9083 [3654], 5113 [1387], and 3218 [4349]). The composition of these beads is quite uniform: soda ranges from 8% to 13%, potash from 3.7% to 6.7%, lime from 7% to 10%, and magnesia from 2.4% to 2.8%. Iron oxide concentrations vary from 0.6% to 2%. Some samples also contain small amounts of the following oxides: copper (up to 0.4%), tin (up to 1.3%), arsenic (up to 0.5%), and lead (up to 1%). Two of these beads contain large amounts of cobalt (0.32% and 0.16%, respectively).

Ten dark blue glass beads contain cobalt oxide values ranging from 0.07% to 0.3%. All these samples contain much lower concentrations of manganese oxide than the manganese beads; from 0.05% to 2.1% with an average value of 0.68% (Figure 2).

High quantities of arsenic, nickel, and bismuth were detected in all the beads. These elements were quite certainly added unintentionally to the glass batch with the cobalt colorant (*see* the mixed alkali-glass section [p. 32] for more details).

Copper Turquoise-Blue Glass

Sixteen samples are of turquoise-blue glass colored with the use of copper with concentrations ranging from 0.8% to 2.7%. The presence of elements such as lead, tin, and zinc in some turquoise-blue glass reveals that the copper was introduced to the glass batch as brass or bronze. Most of the turquoise-blue glass samples have magnesia concentrations that are lower than the ones in the other glasses whereas the concentration of potash is in the same range compared to the other glass samples (Figure 3). It is interesting to note that sample 7576 (11598), a cornerless-cube bead, is dark blue although it does not contain cobalt but copper (2%).

Colorless Glass

Five colorless glass samples were analyzed: 17498 (18032)B, 13420 (16859), 102.049(30)B, 106.001(59)C, and 26037 (15067). These contain low concentrations of

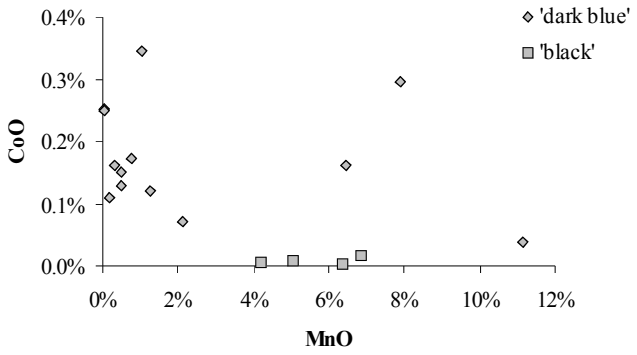

Figure 2. Biplot MnO-CoO for the "dark" glass samples.

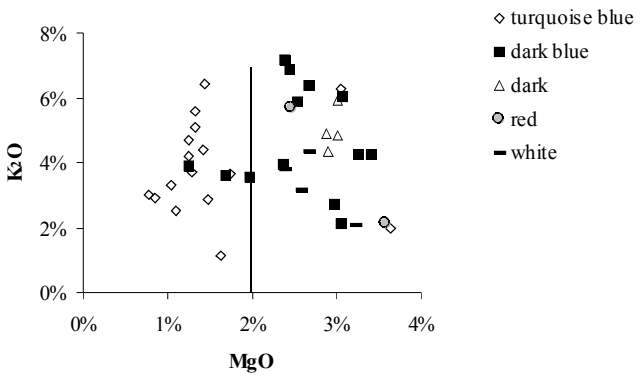

Figure 3. Bi-plot MgO-K_2O for the soda-lime glass.

iron oxide (with the exception of 13420 [16859]) and small amounts of manganese oxide (0.3-0.6%). The exception differs from the other three. Indeed, in addition to a higher iron oxide concentration, this sample has a high lime concentration (16%) which is much higher than that in the other colorless samples. This bead is a small glass sphere. It looks like a 17th-century imitation pearl. These were made of glass coated on the inside with a substance derived from fish scales called *essence d'Orient* (Riols 2011). These beads were marketed as "Parisian pearls or French pearls."

Greenish and Amber Glasses

Greenish (106.005 [47]A, 9595 [15.723]) and amber (33335 [19404], 106.036 [62]B) glass samples have concentrations of iron and manganese oxides that vary from 0.5% to 1.0% and 0.03% to 1.0%, respectively. Careful control of the atmosphere in the furnace may have been used to achieve the different colors.

DISCUSSION

The majority of the beads from the Jardins du Carrousel are of the soda-lime type whereas a larger range of compositions was identified for the material from the Cours Napoléon. This observation reflects the greater diversity in terms of the types of material recovered from the Cours Napoléon. Soda-lime glass was used for the earliest material which consists of drawn beads and tubes. If the use of soda-lime glass continued later on, new compositions may have been introduced later in the 17th century and during the 18th century to accommodate a larger range of colors and degrees of transparency. More diversity in manufacturing techniques appears during this period as well.

Karklins (1983) associates potash glass with the production of wound beads and soda-lime glass with drawn-bead technology during the 17th and 18th centuries. At the two Parisian sites, drawn beads are primarily made of soda-lime glass, whereas wound beads were manufactured from a variety of glass types. This may suggest a later date (late 18th to early19th centuries) for the wound non-potash beads. Archaeological evidence and the chemical composition of the beads suggest that as the demand for beads grew after the 16th century, their diversity increased as well.

Regarding the soda-lime glass, as elemental analyses of European post-medieval glass ornaments are unfortunately scarce, comparison of the compositional data from the Louvre sites is limited to two sites in The Netherlands (Karklins et al. 2001, 2002) and one in Rouen, France (Dussubieux 2009), all dating to the 17th century. (Soda-lime glass was manufactured in Venice, but analytical data from this major beadmaking center is non-existent.) These three sites primarily yielded soda-lime glass samples that were segregated into three different groups (Table 5) according to their lime, soda, and potash concentrations (Dussubieux 2009). While some of the Parisian soda-lime samples fall into these groups, a large proportion of them do not (Figure 4). Neither site can be associated more specifically with any of the three groups, but looking into glass coloring techniques does offer more opportunity for comparison.

An opaque red color is difficult to achieve and there were several recipes. For copper-red glass, it is necessary to add an internal reducer and to use a reducing atmosphere. One copper-red glass from the Louvre (5080 [2710]R) containing 3.6% tin and lead oxides is extremely similar to the copper-red glass from The Netherlands. In contrast, the composition of sample 5051 (1046)R does not match any of the Dutch or French compositions suggesting two other sources for the red glasses found at the Cours Napoléon.

White glass from the Cours Napoléon is made from a mixed lead-alkali glass containing tin. The use of tin as an opacifier in white glass seems related to earlier glass bead production from the 16th century to the very beginning of the 17th century (Karklins et al. 2001; Sempowski et al.

Table 5. Average Values for Na_2O, CaO, and K_2O for the Three Different Groups of Na-Ca Glasses Identified in The Netherlands and France (Dussubieux 2009).

	% Na_2O	% CaO	% K_2O
Group 1	17.4 +/- 1.0	5.9 +/- 0.8	2.5 +/- 0.7
Group 2	12.8 +/- 0.8	10.1 +/- 0.5	2.2 +/- 0.2
Group 3	12.0 +/- 1.9	8.2 +/- 1.5	4.5 +/- 1.2

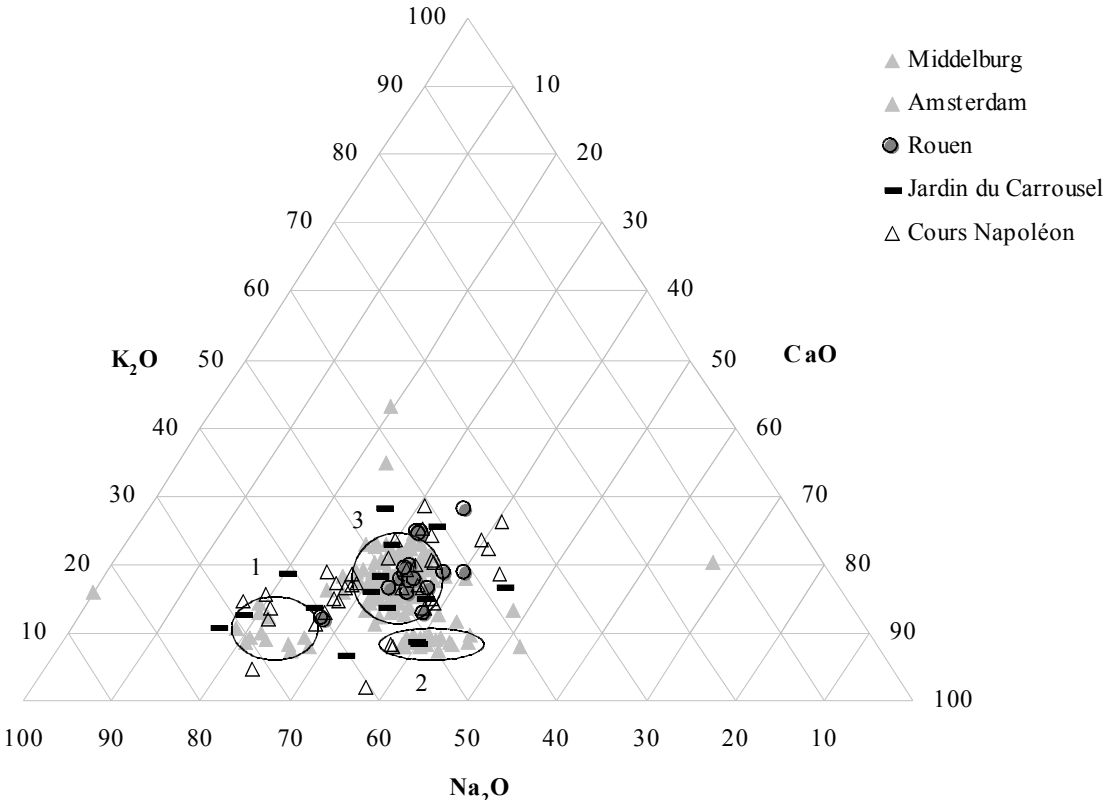

Figure 4. Na_2O-CaO-K_2O graph comparing soda-lime glasses from France (Dussubieux 2009) and The Netherlands (Karklins et al. 2001, 2002) and the soda-lime glass from Paris.

2000). White glass beads from Amsterdam and Middelburg do contain tin but in quantities lower (< 8.1%) than in the white Louvre glass. The white glass from Rouen has a very unique composition involving the presence of high quantities of tin (34%).

Turquoise-blue glass is always colored with copper with concentrations ranging from approximately 0.5% to 1.6%. Elements associated with copper (such as zinc, tin, and lead) exhibit different patterns but in general the proportion of tin and/or lead is more important in the turquoise-blue glass from the Louvre compared to the glass of the same color found in Rouen. No comparison was possible with the turquoise glass from The Netherlands as the concentrations of lead were not measured and tin has fairly high limits of detection (~ 1000 ppm).

Colorless and dark blue beads have more uniform compositions. Small quantities of manganese were used as a decolorizer in France and in The Netherlands, and cobalt associated with at least arsenic was detected in all the dark blue beads.

If some beads were imported (the potash beads were quite likely manufactured in Bohemia), the hypothesis of local bead production from imported or local raw glass or imported or local semi-finished products is more difficult to test. Sample 13.314 (15160) is a tube from the Jardins du Carrousel with one sealed end. This tube may have been used to manufacture beads but no firm conclusion can be made from just one sample. Additional possible evidence of local production is provided by the presence of sample 13420 (16859) which is a high-lime-glass sphere that could have been used to manufacture "Parisian pearls or French pearls."

CONCLUSION

This study reveals that glass beads available in France after the 16th century were more diverse in terms of variety but also in terms of composition and, therefore, provenance, suggesting more interest in this kind of adornment. That some of the beads were imported from Bohemia is indicated by the presence of potash glass. While soda-lime glass is the most common type, its provenance remains undetermined. Different coloring technologies were used to achieve certain colors (such as red and white), suggesting that soda-lime glasses were manufactured at different periods or locations.

While the data presented herein do not resolve the problem of the provenance of glass beads found at French sites, it does show that investigating coloring techniques as well as chemical compositions can be useful. It is also clear that more comparative data are necessary. Indeed, while similar studies were conducted on glass beads from manufacturing sites in The Netherlands, there is a definite lack of data for contemporary beads produced in Venice. Venice produced a variety of glass objects using different recipes and complex technologies but, at this point, very little is known about the chemistry of Venetian glass beads.

It is hoped that this research will inspire more investigation into European glass beads to refine what is known about their production and distribution during the post-medieval period.

ACKNOWLEDGMENTS

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A CLASSIFICATION SYSTEM FOR GLASS BEADS FOR THE USE OF FIELD ARCHAEOLOGISTS[1]

Kenneth E. Kidd and Martha Ann Kidd

As a result of examination of numerous collections of glass beads in northeastern North America and elsewhere, and as a result of a study of the procedures used in their manufacture, the authors propose a classification and nomenclature which they hope will permit exact descriptions and a reference base for all beads found in archaeological excavations. New bead types may be added to the system which is expansible to accommodate all possible variations.

PREFACE

Archaeologists working on sites occupied after the arrival of Europeans in northeastern North America, and indeed in other parts of the continent, frequently encounter glass beads. Describing these beads has proven to be frustrating for most archaeologists, involving the making of fine distinctions as to colour, size, shape, and other characteristics between many similar specimens. To date, there has been no completely satisfactory frame of reference, such as has been available in other branches of archaeology; e.g., ceramics. Many classification systems have been set up, but none has proven very useful under field or laboratory conditions, and none has found wide acceptance – a necessary factor if there is to be ready comparison of finds from different sites. It is with some temerity, therefore, that the authors venture to submit one more system of classification to the archaeological community. They do so in the hope that it may be of practical use to those who feel the need of a new system.

THE TECHNOLOGY OF GLASS BEADS

This paper is part of a much more comprehensive investigation on the study of glass beads used for trade with the Indians of northeastern North America. Basic to such a study is the need for a satisfactory terminology and the authors, not finding one ready at hand, decided to try to work one out. After accomplishing this to their satisfaction, they decided not to await the publication of the larger work, but to make the results available to any who might wish to use it. It should be stressed, however, that our firsthand knowledge has been confined largely to specimens from the Northeast, and while the classification scheme should be of worldwide application, our specific knowledge does not extend to all of North America, and there may be many types which we have not seen.

There have always been, of course, terms by which the different kinds of beads have been known and identified. Some of them have referred, however vaguely, to physical characteristics; in this category we would place such terms as "pound," "seed," and "tube." Others, derived from sources now often obscure, are "macca," "cornaline," and "rosetta." None of these has any precise significance, and although they may be useful in the trade, are of no assistance to the archaeologist. The use of such terms as "pony" and "Russian" beads, seemingly not used extensively by dealers but rather by the consumer and by students, are equally valueless. In the Old World, individual types of beads were often called by specific names, but these likewise have no classificatory use. Within the present century, several systems have been devised for bead classification, but so far as the authors are aware, none will permit the identification of each and every glass bead known. The one proposed here will, it is hoped, make good that deficiency, or at least pave the way. It is based on the first-hand study of approximately 500 different types, and has been designed to be infinitely extensible.

This classification is based, in the first instance, upon the processes of manufacture; in the second, upon such physical characteristics as shape, size, and colour (including translucency and opacity). The last class of attributes encompasses verifiable entities, for it is possible to subject any given specimen to an examination with regard to them, and to compare said specimen with any other bead with respect to each. Processes of manufacture can also be determined by inspection. It should not be inferred from

these remarks that the authors imply any sort of evolutionary development in the making of beads, but it is difficult, nevertheless, to see how some of the procedures used could have come into being except through some developmental process such as is outlined below.

The manufacture of glass beads will be discussed more fully in the book which is in preparation:[2] but in order to understand the function of the classificatory system under discussion, it is necessary to have at least some understanding of how beads are made. To this end, the following extremely brief and condensed synopsis of the various processes is given.

Glass, a complicated substance made from silica, an alkali, a stabilizer, and (usually) a colouring agent, is molten when raised to a high temperature, and solid at room temperature. In the molten state it is highly ductile, and while cooling can be manipulated into a vast variety of forms by using appropriate techniques. Beads may be made by two principle methods: (1) by drawing out a bubble of molten or viscid glass into a long, slender tube, and (2) by winding threads of molten glass around a wire which is later withdrawn. A third method, probably often used in conjunction with each of the above, is by molding the beads in two-part molds while the glass is still viscid.[3]

The first method of bead manufacture requires the services of two men (Figure 1). The first man gathers up a small amount of molten glass on the end of his blowing rod and by blowing into the rod enlarges it to a bubble. He then puts the bubble into the mass of molten glass to gather up more material. At this time, he may either add more glass of the same colour or glass of a different colour from another pot. If a different colour is added, the process is called "layering." Two or more colours may be used, and even five or six layers of different colours are not uncommon. If a simple round tube is required, the second man attaches another iron rod to the far end of the glass bubble, the blower hands his end to a servant and both these men then move in opposite directions until the glass becomes cool and will not pull out further. (In practice, neither of the runners, or *tiradors,* is the same man as he who withdraws the glass from the furnace and blows it.) The now rigid tube of glass is laid down on slabs of wood to cool. When it has cooled sufficiently, it is broken up into short lengths, and these are finally chopped into sizes which will serve as beads. It is necessary to note that during the process of drawing, the proportions at any given point along the length of the tube remain constant. This means that the bore is almost uniform throughout, but it becomes smaller and smaller the more slender the tube becomes. We now have cylindrical beads either of monochrome or polychrome glass, depending upon whether one or more layers have been given to the bubble.

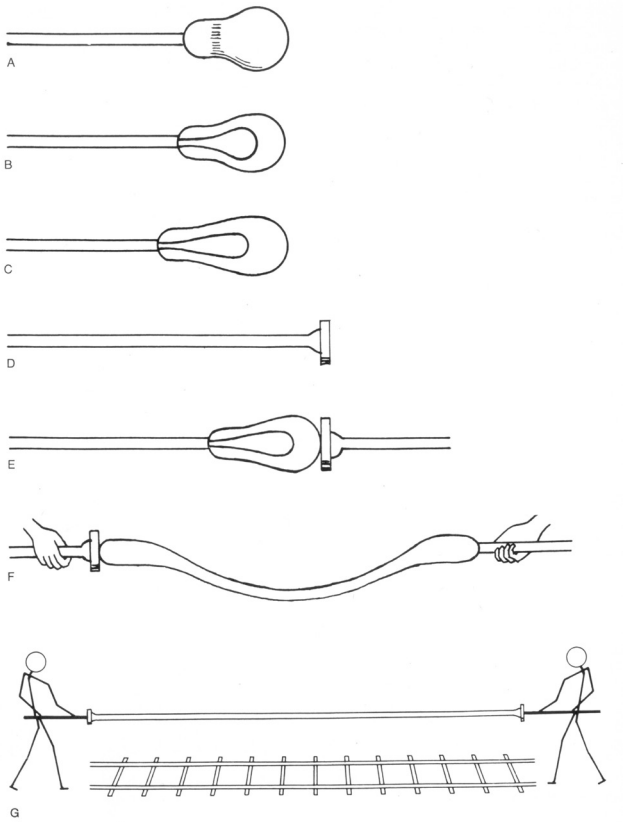

Figure 1. Drawing a tube for glass beads.

Other treatments than that described above may be given to the bubble. The first of these is the so-called inlay treatment, where "canes" or rods of coloured glass are affixed to it, ultimately producing striped beads. In this process, rods of the required colour are ranged around the inside wall of a pail-like container (Figure 2). These rods may be themselves either simple or multiple. The bubble is introduced into the centre of the bucket and expanded sufficiently to cause the rods to adhere, whereupon it is re-introduced to the furnace just long enough to cause the rods to coalesce with the surface of the bubble, but not to lose their form. The bubble is then drawn as described above and the resulting tube bears the diminutive remains of the rods on its surface.

Another treatment may be given on the "marver," or board. The bubble, whether it is layered, unlayered, striped, or a combination of these, is laid on the marver, and either flattened slightly, or paddled to make it triangular, square, or some other shape in cross-section. If a corrugated marver is used, the bubble is rolled over it to press the corrugations into the sides. The bubble is then drawn in the usual way, and the finished tube will retain the shape, though not the dimensions given it on the marver. (Generally, when the bubble is rolled on the corrugated marver, it is layered in

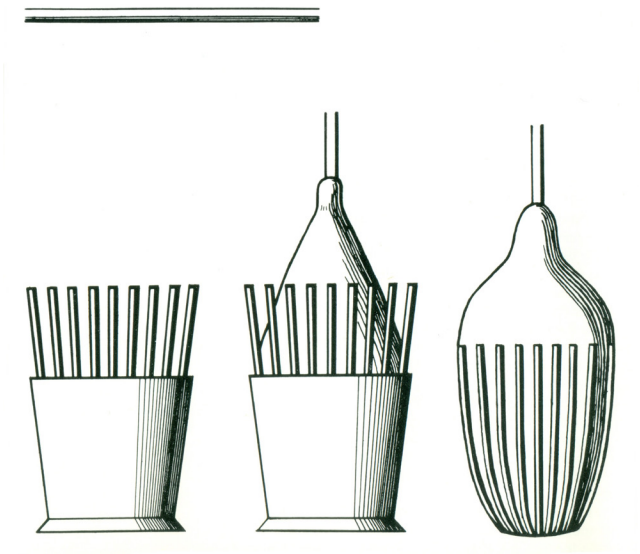

Figure 2. Inlay treatment for glass beads.

glass of another colour, and the process is repeated until five or six layers, and in some cases up to twelve, have been built up before it is drawn. The resulting bead is the so-called rosetta, star, or chevron.)

While the tube is being drawn, it may also be twisted. This applies not only to simple monochrome tubes drawn from the bubble as blown, but to layered, inset, and marvered beads as well; thus it is possible, and indeed it happens, that one finds such complicated forms as beads which have been layered, striped, squared in section, and twisted.

Some beads, especially large ones, like big chevrons, are often ground at the ends and for a short distance along the sides in order to bring out the colour effects in the layering. Most, however, are not given this rather costly treatment.

Imperfectly shaped beads are not uncommon on Indian sites, and their classification poses a slight problem. Even twinned beads sometimes occur. Generally the intended form is easy to see and they are classified accordingly. It would appear that the Indians were not very critical: in fact, one gets the impression that they actually preferred these eccentric specimens.

The diameter of the finished product will depend entirely on the extent to which the bubble has been elongated; it may vary from an eighth of an inch or less to an inch or even more. When the tubes have cooled, they are broken into long pieces which can later be chopped on a block to the desired length; that is, anywhere from a sixteenth of an inch or thereabouts to three or four inches. They may either be left in this condition, or they may be subjected to further treatment to reduce them to oval or rounded beads.

To effect this shaping, a mixture of ground charcoal and fine sand is worked into the orifices of the beads, and the whole is then placed in a metal container and re-subjected to heat. In order to keep the beads from fusing together while in this heated condition, the container is constantly agitated on an eccentric axle.

This action, in conjunction with the heat, reduces the beads to a round shape, while the mixture of sand and charcoal prevents them from sticking together and the orifices from disappearing. When cool, the beads are separated from the mixture, washed, and then agitated for some time in bags of bran to produce a polished surface.

Whether left in tube form or made into round beads, the finished products are sorted, first on a set of sieves of graded sizes, and finally by hand, during which defective examples are removed. They are then strung into hanks, but nowadays this is less often done than packaging in bulk, in which form they are ready for shipment.

Whereas tube beads are mass produced in the sense that thousands may be made from a single bubble or gathering of glass (which, however, is individually fabricated), wire-wound[4] beads are made one by one. Wire which has been covered with chalk, or some similar substance to facilitate removal of the final product, is heated at a flame (originally fed by whale oil) and at the same time a cane or solid rod of glass, about as thick as a lead pencil, is heated and a thread started from it. This thread or strand of molten glass, which may be of any colour, is wound around the wire until a bead of the desired size and shape is built up. Indeed, threads of different colours may be introduced to make multicoloured beads; and glass insets of various kinds, such as simple dots, rosettes, or flowers, may be set into the matrix while it is still soft. Such beads, often called *suppialume,* are capable of almost infinite variation and attempts to classify them are consequently no more successful than other individually made, handcrafted products.

Although little is known of the process, it is quite apparent that in the past some beads were molded, and it seems safe to assume that this was accomplished in conjunction with the processes outlined above for the making of both tube and wire-wound beads. Certainly there are many examples of beads which have been pinched in two-part molds; the so-called “raspberries,” “melons,” and facetted types being examples of such molded beads.

There is no problem, obviously, in determining when a bead has been molded, but it is not always quite so easy to decide whether a given specimen has been produced by the drawing method or by wire winding. Close inspection with a hand lens will usually reveal this, however, for in the former,

the fibres of glass are arranged side by side longitudinally. This is often more clearly shown in tubular beads which have lain in the soil long enough to disintegrate slightly, at which stage the fibres show up quite clearly. In wire-wound beads the fibres are arranged in heliacal fashion, round and round the circumference of the specimen. Such an arrangement is often obvious in the so-called milk-glass beads. But perhaps of even greater help in deciding the method of manufacture is the presence of small air bubbles. In both processes, these tiny inclusions of air are bound to occur, and it is seldom that inspection will fail to reveal them. In the case of tube beads, little bubbles, like the fibres of glass, have been drawn out into long, thin shapes, a sure indication of the method used to make them. Just as certainly in the case of wire-wound beads, the bubbles are either globular or oval and never elongated.

During the 17th, 18th, and 19th centuries, the control of the ingredients was a somewhat haphazard affair for the exact science of chemistry had not yet arisen. The materials which went into the manufacture of glass depended on many variables, but chiefly upon the judgement of the man in charge. It is true that the proportions of the various ingredients which made glass of certain qualities was recognized and followed; but it is equally true that they were not accurately controlled. (A modern analogy would be with a cook who does not follow her recipe exactly in making a cake, but uses her experience and judgement.) Furthermore, the ingredients which went into the glass batch were not chemically pure resulting in considerable variation in the quality of the finished product, some being less stable than others, and so on.

This matter of chemical variation is especially important with regard to colour. It was well understood that certain materials, like copper salts, would produce specific colours; and this knowledge was fully utilized and expanded with increasing experience. But again the colouring chemical was not pure, and slight variations in colour inevitably resulted. Furthermore, the resulting colour could be affected by the nature of the batch into which the chemical was introduced; and if the batch were not uniform in all cases, colour variations could result no matter how pure the pigments were nor how accurately they were measured. All told, therefore, there is room for considerable variation in colour, and 18th-century and earlier beads differ considerably in this regard from those made in the 19th and 20th centuries when strict standarization became the rule. In brief, one cannot expect to find consistency of colouring in these early beads; but on the other hand, one does find a rainbow range of beautiful soft colours, very different from the harsh, strident ones so frequently encountered in the modern product.

DESCRIPTION OF A CLASSIFICATION SYSTEM FOR GLASS BEADS

The Tube Bead Chart

The chart (Figure 3) illustrating tube beads is divided into four quadrants. Contiguous quadrants can be described as units in themselves but this cannot be done with non-contiguous quadrants. The beads in the lower quadrants (I and III) are all basically tube forms; those in the upper quadrants (II and IV) have been modified to a round form by reheating. Furthermore, the beads in quadrants I and II are "simple beads;" that is, they are basically monochrome but may have adventitious surface decoration; but those in the two left hand quadrants (II and IV) repeat the classes covered in I and II but are layered, and may therefore be regarded as compound and not simple. The one exception is the class of star beads which is not duplicated in the right quadrant. The chart is not strictly symmetrical because types corresponding to some that appear are hardly conceivable. For instance, there are innumerable beads of the types Id and Id', but their counterparts in quadrant II do not seem possible. The same is true for quadrants III and IV, but the numbers are available for use if the need should arise. All the beads assigned to a quadrant bear the designator for that quadrant (i.e., I, II, III, IV).

It cannot be emphasized too strongly that this chart shows only the most elementary of the possible forms. Examination of the plates will reveal something of the degree of possible elaboration of these basic types.

[Editor's note: the color notation and abbreviations used in the tables that follow are explained in Tables 1-2.]

Class I

All the beads in quadrant I are designated as Tube Beads, Class I (Table 3). They are simple monochromes with, in some cases, adventitious surface decoration. Bead Ia is the simplest possible monochrome tube. Bead Ib is made by adding simple or compound stripes of a different colour before drawing to a gathering similar to that from which Ia was made. Bead Ib' was made like Ib except that in drawing it was twisted. Bead Ic is made from a simple gathering which has been squared in section before drawing. Bead Ic' is like Ic but has been twisted in drawing. The same observations apply to Id and Id' as to Ib and Ib'. Bead Ie is made from a gathering which has been shaped to a ridged form before drawing, while Ie' is the same which has been twisted in drawing. Bead If is a section of tube whose surface has been modified into facets by grinding.

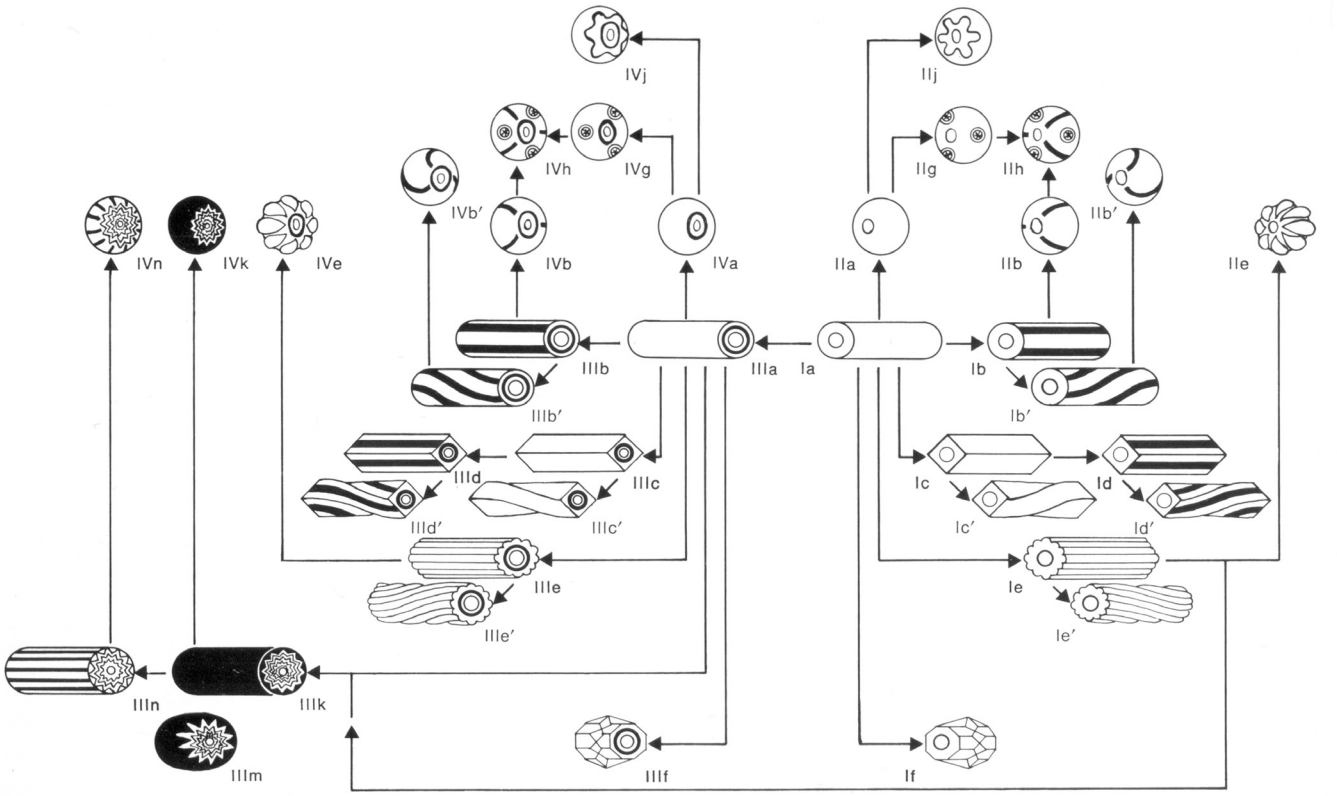

Figure 3. Master identification chart for tube beads.

Class II

Beads in the second quadrant are designated as Tube Beads, Class II (Table 4). Basically, all are theoretically, and probably in practice, derived from Class I types. The essential difference is that, instead of being left in the tube shape, they have been subjected to rounding by reheating (as previously described). The simplest form is, of course, bead IIa, which is derived from Ia by reheating and tumbling the latter until it assumes the round form. Similarly, IIb derives from Ib, IIb' from Ib', and IIe from Ie. Bead IIg is a derivative of IIa, to which round insets or "eyes" have been added, while IIh is a combination of IIb and IIg. Bead IIj is like bead IIa with the addition of two or more wavy lines of a different colour in which the waves may be parallel, crossed, or spiralled.

Class III

Beads in the third quadrant are designated as Tube Beads, Class III (Table 5). With the exception of the star beads (IIIm and IIIn), all the beads in this quadrant have analogies in quadrant I, the essential difference being that, whereas the latter are made from the monochrome gathering, those in quadrant III are made from a two- or multilayered gathering. The star[5] beads have up to seven layers of glass, each with twelve ridges, and each alternate layer consisting of an opaque white glass. Bead IIIk is a simple star tube; IIIm is derived from IIIk by grinding down the ends to show the internal design (and is the true star bead); IIIn is similar to IIIk with the addition of three stripes not unlike those in the "b" varieties.

Class IV

Beads in the fourth quadrant of the first chart are designated as Tube Beads, Class IV (Table 6). They derive from the Class III beads in a fashion parallel to the derivation of Class III beads from Class I beads, and are, like the Class III beads, rounded by reheating. The two beads IVk and IVn have no analogies in the second quadrant, for they are derived from IIIk and IIIn by reheating.

There are two special cases in the classification of tube beads which require explanation. The first is that in which compound stripes occur. It will be recalled that beads with simple stripes are classed as Ib, IIb, IIIb, and IVb. Similar beads with compound stripes are designated as Ibb, IIbb, and IIIbb, and IVbb, respectively. The second exception, including beads which look like inferior imitations of the bead IVn, is designated as IVnn.

Table 1. Color Names and their Codes.

Codes	Name	Type of Glass	Codes	Name	Type of Glass
6 le (10.0R 4/8)	Redwood	op - cl	23 ni (10.0GY 4/4)	Dark Palm Green	cl
8 pc (2.5R 3/10)	Ruby	cl	20 ng (5.0BG 3/6)	Teal Green	cl
7 pa (7.5R 4/14)	Scarlet	cl	17 pa (10.0BG 4/8)	Turquoise	cl
p (N 1/0)	Lamp Black	op	16 ea (5.0B 8/4)	Light Aqua Blue	op - cl - tr
c (N 7/0)	Light Gray	cl	18 gc (2.5B 6/4)	Aqua Blue	op - tr
b (N 8/0)	Oyster White	cl - tr	16 ic (5.0B 6/6)	Robin's Egg Blue	op - tr
a (N 9/0)	White	op	16 lc (5.0B 5/7)	Bright Blue	cl - tr
15 ca (7.5B 8/2)	Pale Blue	op - cl - tr	15 nc (7.5B 4/8)	Cerulean Blue	cl
1 la (10.0Y 8/10)	Lemon Yellow	op - cl	14 ia (2.5PB 6/9)	Bright Copen Blue	op - cl
2 ic (2.5Y 7/8)	Light Gold	op - cl	14 ie (2.5PB 5/4)	Shadow Blue	op - cl - tr
3 lc (10.0YR 7/8)	Amber	op - cl	15 ni (7.5B 3/3)	Dark Shadow Blue	op - cl
3 le (10.0YR 5/6)	Cinnamon	op - cl	13 la (7.5PB 4/11)	Bright Dutch Blue	op
4 ng (7.5YR 4/4)	Maple	cl	13 pa (6.25PB 3/12)	Ultramarine	cl
1 gc (10.0Y 7/5)	Citron	cl - tr	13 pg (7.5PB 2/7)	Bright Navy	cl
2 lg (5.0Y 4/4)	Mustard Tan	op	14 pi (10.0B 2/4)	Dark Navy	cl
2 pn (2.5Y 2/2)	Dark Brown	op	7 ga (5.0R 7/8)	Light Cherry Rose	op - cl
22 ia (2.5G 7/8)	Bright Mint Green	op - cl	8 le (10.0RP 4/6)	Rose Wine	cl
23 ic (10.0GY 6/6)	Apple Green	op - cl	11 lc (7.5P 4/8)	Amethyst	cl
22 ie (5.0G 5/4)	Surf Green	op - tr	7 pn (2.5YR 2/2)	Dark Rose Brown	cl - tr
21 nc (10.0G 5/10)	Emerald Green	cl	6 lc (10.0R 5/10)	Coral	tr

Editor's note: The color names are derived from Taylor, Knoche, and Granville (1950) and are those that appear in the *Color Harmony Manual* used by the Kidds to determine bead colors. Munsell color codes follow the *Color Harmony* ones as the manual is now long out of print and generally unavailable.

Table 2. Abbreviations Used in the Tables.

Shape		Type of Glass	Size
R - Round	CO - Corn	op - Opaque	VS - Very Small, under 2 mm
C - Circular (ring)	ME - Melon	cl - Clear [tsp - Transparent preferred]	S - Small, 2-4 mm
O - Oval	RA - Raspberry	tr - Translucent	M - Medium, 4-6 mm
T - Tube	ST - Star		L - Large, 6-10 mm
F - Flat	FA - Facetted		VL - Very Large, over 10 mm
D - Disk	DO - Doughnut		

Table 3. Description of Class I Beads.

Type	Bead Number	Size	Glass	Name of Colour
Ia	Ia1	VS	op	Redwood
		S	op	Redwood
		M	op	Redwood
		L	op	Redwood
	Ia2	S	op	Black
		M	op	Black
		L	op	Black
		VL	op	Black
	Ia3	M	cl	Lt. Gray
	Ia4	S	tr	Oyster White
		M	tr	Oyster White
	Ia5	S	op	White
		M	op	White
	Ia6	S	op	Lt. Ivory
	Ia7	S	op	Lt. Gold
	Ia8	S	tr	Citron
Ia	Ia9	L	op	Brite Mint Green
	Ia10	M	op	Surf Green
	Ia11	M	tr	Teal Green
	Ia12	M	cl	Turquoise
	Ia13	S	tr	Aqua Blue
	Ia14	M	op	Robin's Egg Blue
	Ia15	L	tr	Brite Blue
	Ia16	M	op	Shadow Blue
	Ia17	S	cl	Dk. Shadow Blue
	Ia18	S	cl	Ultramarine
		M	cl	Ultramarine
	Ia19	S	cl	Brite Navy
		M	cl	Brite Navy
	Ia20	L	cl	Dark Navy
	Ia21	S	cl	Rose Wine
	Ia22	S	tr	Dk. Rose Brown

Body					**Simple Stripes**		
Type	Bead Number	Size	Glass	Name of Colour	Number of Stripes and Name of Colour		
Ib	Ib1	L	op	Redwood	6 Black		
	Ib2	S	op	Redwood	6 White		
	Ib3	S	op	Black	3 Redwood		
		L	op	Black	3 Redwood		
	Ib4	S	op	Black	3 White		
	Ib5	L	op	Black	3 White	3 Redwood	
	Ib6	M	cl	Lt. Gray	6 Ultramarine		
	Ib7	S	tr	Oyster White	3 Redwood	3 Ultramarine	
	Ib8	L	tr	Oyster White	6 Redwood	6 Ultramarine	
	Ib9	M	tr	Oyster White	3 Redwood	3 Dk. Palm Green	
	Ib10	S	op	White	3 Redwood		
	Ib11	L	op	White	6 Redwood		
	Ib12	M	op	White	3 Black		
	Ib13	M	op	Pale Blue	3 Redwood		
	Ib14	S	op	Lt. Gold	3 Dk. Palm Green		
	Ib15	L	op	Lt. Gold	3 Dk. Palm Green	3 Redwood	
	Ib16	M	op	Amber	6 Redwood	6 Black	
	Ib17	S	cl	Apple Green	3 Redwood		
	Ib18	L	cl	Teal Green	8 White		
	Ib19	L	tr	Aqua Blue	3 Redwood		
	Ib20	M	tr	Robin's Egg Blue	3 Redwood		
	Ib21	S	op	Shadow Blue	6 Redwood		
	Ib22	L	cl	Dk. Shadow Blue	6 Redwood	6 White	
	Ib23	S	cl	Brite Navy	3 Redwood		
	Ib24	M	tr	Dk. Rose Brown	2 Redwood	2 White	

				Body	**Compound Stripes**		
Type	Bead Number	Size	Glass	Name of Colour	Number of Stripes and Name of Their Colours		
Ibb	Ibb1	M	op	Redwood	3 Brite Navy	on White	
		L	op	Redwood	3 Brite Navy	on White	
	Ibb2	S	op	Black	3 Redwood	on White	
		L	op	Black	3 Redwood	on White	
	Ibb3	L	op	White	4 Lt. Gold (Double)	on Maple	
	Ibb4	M	op	Pale Blue	3 White	on Redwood	
	Ibb5	L	op	Brite Mint Green	4 Lemon Yellow	on Scarlet	on White
	Ibb6	S	op	Aqua Blue	3 Redwood	on White	

Table 3. Continued.

				Body	Simple Stripes		
Type	Bead Number	Size	Glass	Name of Colour	Number of Stripes and Name of Their Colour		
Ib′	Ib′1	M	op	Redwood	8	White	
	Ib′2	M	op	White	9	Brite Navy (3 groups of 3 fine stripes)	
	Ib′3	M	cl	Dk. Shadow Blue	3	Redwood	3 White
	Ib′4	M	cl	Brite Navy	8	White	

				Body	Compound Stripes		
Type	Bead Number	Size	Glass	Name of Colour	Number of Stripes and Name of Their Colour		
Ibb′	Ibb′1	M	op	Surf Green	3	White	on Redwood

Type	Bead Number	Size	Glass	Name of Colour	Number of Sides
Ic	Ic1	M	op	Redwood	4
		L	op	Redwood	4
	Ic2	S	cl	Ruby	4
	Ic3	VS	cl	Scarlet	6
	Ic4	S	op	Black	6
	Ic5	S	cl	Lt. Gray	5
	Ic6	VS	cl	Oyster White	5
		S	cl	Oyster White	5
	Ic7	VS	cl	Lemon Yellow	6
	Ic8	S	cl	Amber	5
	Ic9	VS	cl	Apple Green	5
		S	cl	Apple Green	5
	Ic10	VS	cl	Turquoise	5
	Ic11	VS	tr	Brite Blue	4
	Ic12	S	cl	Brite Copen Blue	6
		M	cl	Brite Copen Blue	6
	Ic13	M	cl	Brite Navy	6
	Ic14	VS	cl	Brite Navy	5
	Ic15	S	tr	Dk. Rose Brown	4

Type	Bead Number	Size	Glass	Name of Colour	Type of Twist
Ic′	Ic′1	S	op	Redwood	Loose Twist
		M	op	Redwood	Medium Twist
		L	op	Redwood	Tight Twist
	Ic′2	M	cl	Apple Green	Tight Twist
	Ic′3	M	cl	Ultramarine	Tight Twist

				Body	Simple Stripe
Type	Bead Number	Size	Glass	Name of Colour	Number of Stripes and Name of Their Colour
Id	Id1	M	op	Redwood	8 White (Thin)

				Body	Simple Stripes	
Type	Bead Number	Size	Glass	Name of Colour	Number of Stripes and Name of Their Colour	Type of Twist
Id′	Id′1	M	op	Redwood	8 White (Thin)	Loose Twist

Table 3. Continued.

Type	Bead Number	Size	Glass	Name of Colour
Ie	Ie1	L	op	Redwood

Type	Bead Number	Size	Glass	Name of Colour	Type of Twist
Ie′	Ie′1	L	op	Redwood	Medium Twist
	Ie′2	M	cl	Apple Green	Medium Twist

Type	Bead Number	Size	Glass	Name of Colour	Number of Sides
If	If1	L	op	Black	6
	If2	L	cl	Lt. Gray	6
	If3	L	cl	Emerald	6
	If4	S	cl	Turquoise	5
	If5	L	cl	Amethyst	6

The Wire-Wound Bead Chart

Because they are handcrafted, it is impossible to reduce wire-wound beads to a neat classification, but for ease in reference, they have been divided into three groups. All wire-wound bead designations are prefaced by the letter W (Table 7; Figure 4). Group WI comprises beads of simple shapes; i.e., tube, round, oval, and doughnut. They are all monochrome. Beads of Group WII are also monochrome but are more elaborately shaped, either by pinching, molding, or some other form of manipulation. The so-called "corn" beads, disc, facetted, raspberry, melon, and odd-shaped forms occur in this group. Group WIII beads are beads of any of the above shapes which are not monochrome, and which may, and often do, have adventitious surface decorations of contrasting colours.

The numbering system has had to be rather more arbitrary than in the case of the tube beads where some systematic developmental order could be discerned. Hence, the following arrangement is presented as covering more or less adequately the contingencies encountered in this class.

Tubular forms are designated as WIa, round as WIb, oval as WIc, and doughnut-shaped beads as WId. The beads of the second group are subdivided as follows: flattened corn-shaped beads, WIIa; disc beads, WIIb; facetted beads, WIIc; raspberry beads, WIId; melon beads, WIIe; cog-shaped or multilateral beads, WIIf; and beads with a pressed design, WIIg.

WIII beads may be any wire-wound bead with additional decoration which may be superimposed on or inlaid in the metal. Thus bead WIb, with a surface coating of a different colour or material, becomes WIIIa; WIb with an inlaid decoration becomes WIIIb; WIIb with an inlaid decoration becomes WIIIc; WIc with a spiral overlaid decoration becomes WIIId; and WIIc with a coating of a different material or colour becomes WIIIe.

The taxonomic system outlined above is based essentially on such characteristics as are observable by visual inspection; the only mechanical aids which might be required would be a low-powered hand lens and a millimetre rule. It has not been within the authors' means to employ complicated laboratory tests to determine the chemical nature of the beads concerned, nor is the field archaeologist likely to have either this laboratory equipment or the background training to use it. His determinations will be, for the most part, empirical. The very simplicity makes the system more useful than would be the case if such devices as spectrographic analysis were an integral part. Certainly the desirability of such analyses can not be denied, however. It is greatly to be hoped that in the near future the means and the facilities for carrying out laboratory analyses of beads will be available. When this becomes possible, the inadequacies (and no doubt the errors) of the present system will be smoothed out and it will become more reliable. But till that happy day arrives, perhaps the system suggested here will serve a useful purpose and make the field archaeologist's task a little easier.

HOW TO USE THE CLASSIFICATION SYSTEM TO IDENTIFY BEADS

To identify any bead, it is necessary to consult (a) the Tube Bead chart and the Wire-Wound Bead chart; (b) the colour chart of beads already identified (Tables 3-7); (c) the

Table 4. Description of Class II Beads.

Type	Bead Number	Shape	Size	Glass	Name of Colour
IIa	IIa1	R	VS	op	Redwood
		R	S	op	Redwood
		R	M	op	Redwood
		R	L	op	Redwood
	IIa2	C	M	op	Redwood
	IIa3	O	S	op	Redwood
	IIa4	R	M	cl	Redwood
	IIa5	R	VS	cl	Ruby
	IIa6	R	VS	op	Black
		R	S	op	Black
		R	M	op	Black
		R	L	op	Black
		R	VL	op	Black
	IIa7	C	VS	op	Black
		C	S	op	Black
		C	M	op	Black
	IIa8	O	S	op	Black
		O	M	op	Black
		O	L	op	Black
	IIa9	R	L	cl	Lt. Gray
	IIa10	O	S	cl	Lt. Gray
	IIa11	R	VS	tr	Oyster White
	IIa12	C	S	tr	Oyster White
	IIa13	R	VS	op	White
		R	S	op	White
		R	M	op	White
		R	L	op	White
	IIa14	C	S	op	White
	IIa15	O	S	op	White
		O	M	op	White
	IIa16	R	L	op	Pale Blue
	IIa17	R	VS	op	Lt. Gold
		R	S	op	Lt. Gold
		R	M	op	Lt. Gold
	IIa18	R	VS	op	Amber
		R	S	op	Amber
	IIa19	C	S	op	Amber
	IIa20	R	S	op	Cinnamon
	IIa21	R	S	tr	Citron
	IIa22	R	S	op	Mustard Tan
	IIa23	R	S	cl	Brite Mint Green
	IIa24	R	S	op	Apple Green
	IIa25	R	VS	op	Surf Green
		R	M	op	Surf Green
	IIa26	R	VS	cl	Emerald Green
	IIa27	C	S	cl	Emerald Green
	IIa28	R	M	cl	Dk. Palm Green
		R	L	cl	Dk. Palm Green
IIa	IIa29	O	S	cl	Dk. Palm Green
	IIa30	F	L	cl	Dk. Palm Green
	IIa31	R	VS	cl	Turquoise
		R	M	cl	Turquoise
		R	L	cl	Turquoise
	IIa32	O	S	cl	Turquoise
	IIa33	R	L	cl	Lt. Aqua Blue
	IIa34	C	M	tr	Lt. Aqua Blue
	IIa35	R	M	op	Lt. Aqua Blue
	IIa36	R	S	op	Aqua Blue
		R	M	op	Aqua Blue
	IIa37	C	S	op	Aqua Blue
	IIa38	O	S	op	Aqua Blue
	IIa39	R	S	tr	Aqua Blue
	IIa40	R	VS	op	Robin's Egg Blue
		R	S	op	Robin's Egg Blue
		R	M	op	Robin's Egg Blue
		R	L	op	Robin's Egg Blue
	IIa41	C	S	op	Robin's Egg Blue
	IIa42	O	S	op	Robin's Egg Blue
	IIa43	R	VS	tr	Brite Blue
		R	S	tr	Brite Blue
	IIa44	R	VS	cl	Cerulean Blue
		R	M	cl	Cerulean Blue
		R	L	cl	Cerulean Blue
	IIa45	C	S	cl	Brite Copan Blue
	IIa46	R	S	op	Shadow Blue
		R	M	op	Shadow Blue
	IIa47	C	S	op	Shadow Blue
	IIa48	R	S	op	Dk. Shadow Blue
	IIa49	O	S	op	Dk. Shadow Blue
	IIa50	R	S	cl	Dk. Shadow Blue
		R	L	cl	Dk. Shadow Blue
	IIa51	C	S	cl	Dk. Shadow Blue
	IIa52	R	M	cl	Ultramarine
		R	L	cl	Ultramarine
	IIa53	C	S	cl	Ultramarine
	IIa54	O	L	cl	Ultramarine
	IIa55	R	S	cl	Brite Navy
		R	L	cl	Brite Navy
	IIa56	C	S	cl	Brite Navy
	IIa57	O	S	cl	Brite Navy
	IIa58	R	VS	cl	Lt. Cherry Rose
		R	S	cl	Lt. Cherry Rose
	IIa59	C	M	cl	Rose Wine
	IIa60	O	S	cl	Rose Wine
	IIa61	R	S	cl	Dk. Rose Brown

written description to accompany the bead charts; and (d) the table of colours (Table 1). The following steps will be found helpful:

1. Determine whether the bead under examination is a tube or a wire-wound bead *(see* section on Technology of Glass Beads).

2. If the bead is a tube bead type: (i) consult the tube bead chart to determine whether it follows the tube form or the rounded form; (ii) determine whether it is a Simple Bead (Class I or Class II) or a Layered Bead (Class III or Class IV). For example, in examining a group of tube beads, note those which are simple monochromes; those which are layered; and those which have stripes, eyes, etc. The same technique should be applied to round beads derived from tubes.

3. If the bead is wire-wound, consult the wire-wound bead chart for its proper placement.

Table 4. Continued.

Type	Bead Number	Shape	Size	Glass	Body: Name of Colour	Simple Stripes: Number of Stripes / Style of Stripes (Average width unless noted) / Colour of Stripes		
IIb	IIb1	R	S	op	Redwood	6 op Black		
	IIb2	R	M	op	Redwood	3 op White		
	IIb3	R	M	op	Redwood	4 op White		
	IIb4	O	S	op	Redwood	4 op White		
	IIb5	R	S	op	Redwood	6 op White		
	IIb6	R	S	op	Redwood	8 op White		
	IIb7	R	L	op	Redwood	12 op White		
	IIb8	R	L	op	Redwood	6 op Lemon Yellow		
	IIb9	R	M	op	Black	3 op Redwood		
	IIb10	R	S	op	Black	3 op White		
		R	VL	op	Black	3 op White		
	IIb11	O	M	op	Black	3 op White		
	IIb12	R	M	op	Black	4 op White		
	IIb13	R	L	op	Black	10 op White		
	IIb14	R	L	op	Black	3 op Double White		
	IIb15	R	L	op	Black	3 op Broad Redwood	3 Broad White	
	IIb16	R	L	op	Black	3 op Ruby	3 Lt. Cherry Rose	
	IIb17	R	M	op	Black	3 op Redwood	3 White	3 Lemon Yellow
	IIb18	R	S	cl	Lt. Gray	12 op Thin White	These are called "Gooseberry" beads. The stripes may vary from 12 to 15 and colour may vary from very light to dark with occasionally a yellow cast.	
		R	M	cl	Lt. Gray	12 op Thin White		
		R	L	cl	Lt. Gray	12 op Thin White		
	IIb19	O	S	cl	Lt. Gray	12 op Thin White		
	IIb20	R	L	op	White	3 op Redwood		
	IIb21	O	L	op	White	3 op Redwood		
	IIb22	F	L	op	White	8 op Redwood		
	IIb23	R	M	op	White	4 op Black		
	IIb24	O	M	op	White	4 op Black		
	IIb25	R	M	op	White	4 tr Brite Navy		
	IIb26	O	M	op	White	4 tr Brite Navy		
	IIb27	R	L	op	White	9 tr Brite Navy	(3 Groups of 3 Fine Lines)	
	IIb28	O	L	op	White	9 tr Brite Navy	(3 Groups of 3 Fine Lines)	
	IIb29	R	M	op	White	3 op Redwood	3 op Black	
	IIb30	O	M	op	White	3 op Redwood	3 op Black	
	IIb31	R	S	op	White	2 op Redwood	2 tr Brite Navy	
		R	M	op	White	2 op Redwood	2 tr Brite Navy	
	IIb32	O	M	op	White	2 op Redwood	2 tr Brite Navy	
	IIb33	R	M	op	White	3 op Redwood	3 tr Dk. Palm Green	
	IIb34	O	M	op	White	3 op Redwood	3 tr Dk. Palm Green	
	IIb35	R	M	op	White	4 op Lemon Yellow	4 tr Dk. Palm Green	
	IIb36	O	M	op	White	4 op Lemon Yellow	4 tr Dk. Palm Green	
	IIb37	R	M	op	White	2 op Dk. Brown	2 tr Dk. Palm Green	
	IIb38	R	M	op	White	2 op Dk. Brown	2 tr Dk. Palm Green	
	IIb39	R	M	op	White	2 op Redwood	2 Dk. Palm Green	2 Brite Navy

4. Consult the colour illustrations of the individual beads for visual identification (Plates V-IX).

5. Consult the written descriptions which correspond to the colour illustrations to determine the precise colour, quality, size, and shape classification (a full description of the above appears in Tables 3-7).

If no matching is possible, a new type may have been found; in which case it is desirable that it be reported in order that it may be properly incorporated into the system. If this suggestion meets with general favour, periodic supplements to this paper would be a possibility.[6]

ACKNOWLEDGEMENTS

Research work for this paper was first begun under a John Simon Guggenheim Fellowship which the senior

Table 4. Continued.

					Body	Simple Stripes			
Type	Bead Number	Shape	Size	Glass	Name of Colour	Number of Stripes Style of Stripes Colour of Stripes			
IIb	IIb40	O	M	op	White	2 op Redwood	2	Dk. Palm Green	2 Brite Navy
	IIb41	R	M	op	White	3 tr Dk. Palm Green	3 tr	Brite Navy	
	IIb42	R	M	op	Pale Blue	3 op Redwood			
	IIb43	R	M	op	Pale Blue	3 op Redwood	3 tr	Brite Navy	
	IIb44	O	M	op	Pale Blue	5 op Redwood	5 tr	Brite Navy	
	IIb45	R	M	cl	Lt. Gold	4 op White			
	IIb46	R	M	op	Lt. Gold	2 op Redwood	2 tr	Dk. Palm Green	
	IIb47	F	L	op	Lt. Gold	2 op Redwood	2 tr	Dk. Palm Green	
	IIb48	R	M	op	Mustard Tan	8 op Redwood			
		R	L	op	Mustard Tan	8 op Redwood			
	IIb49	O	L	op	Mustard Tan	8 op Redwood			
	IIb50	R	L	op	Mustard Tan	8 op White			
	IIb51	F	L	tr	Surf Green	8 op Lt. Gold			
	IIb52	R	M	cl	Emerald Green	4 op White			
	IIb53	R	L	cl	Teal Green	8 op White			
	IIb54	R	L	tr	Lt. Aqua Blue	8 op Redwood			
	IIb55	F	L	tr	Lt. Aqua Blue	8 op Redwood			
	IIb56	R	S	op	Robin's Egg Blue	3 op White			
		R	M	op	Robin's Egg Blue	3 op White			
		R	L	op	Robin's Egg Blue	3 op White			
	IIb57	R	L	op	Robin's Egg Blue	4 op White			
	IIb58	R	M	op	Robin's Egg Blue	2 op Redwood	2 op White		
	IIb59	R	L	tr	Brite Blue	3 op Redwood			
	IIb60	O	S	cl	Brite Copan Blue	12 tr Brite Navy "Gooseberry" Bead			
	IIb61	R	M	op	Shadow Blue	6 op Redwood			
	IIb62	R	M	cl	Dk. Shadow Blue	8 op Redwood			
	IIb63	O	S	cl	Dk. Shadow Blue	2 op White			
	IIb64	O	M	cl	Dk. Shadow Blue	2 op Redwood	2 op White		
	IIb65	R	L	cl	Brite Navy	2 op Broad Redwood			
	IIb66	O	L	cl	Brite Navy	4 op Redwood			
	IIb67	O	S	cl	Brite Navy	3 op White			
		O	L	cl	Brite Navy	3 op White			
	IIb68	R	M	cl	Brite Navy	4 op White			
	IIb69	O	S	cl	Brite Navy	4 op White			
	IIb70	R	L	cl	Brite Navy	16 op Thin White			
	IIb71	R	M	cl	Brite Navy	2 op Redwood	2 op White		
	IIb72	O	S	cl	Brite Navy	2 op Redwood	2 op White		
	IIb73	O	M	tr	Dk. Navy	3 op White			
	IIb74	R	L	tr	Dk. Rose Brown	9 op White (3 Groups of 3 Thin Lines)			

author held in 1951-52 for the general study of trade goods among the American Indians of the Northeast. He was later assisted by a grant from the Corning Museum of Glass, given for the study of glass beads in the same area, and by aid toward clerical assistance from the Canada Council. To each of these agencies he wishes to acknowledge a deep debt of gratitude, for without such help the study could not have been carried to completion.

At the outset, virtually all of the important collections, both in private hands and in public museums in the Northeast, were examined by both authors, notes made upon individual specimens, and numerous photographs and drawings made. At later dates, collections in British and European museums were examined, a visit made to the glassworks at Murano, Italy, and archival and library research carried out.

Both authors wish to thank all those who made their collections available for study. Their names are many, and it would be impossible to list them all here, but special thanks are due to one of them, Mr. Charles F. Wray, of West Rush, New York. Mr. Wray made his extensive bead collection available to us for study. His interest in the subject and generosity in imparting his hard-won knowledge greatly enhanced the value of the research.

Table 4. Continued.

					Body	Compound Stripes		
Type	Bead Number	Shape	Size	Glass	Name of Colour	Number of Stripes Style of Stripes Colour of Stripes		
IIbb	IIbb1	R	L	op	Redwood	3 Brite Navy	on White	
	IIbb2	F	L	op	Redwood	3 Brite Navy	on White	
	IIbb3	R	L	op	Redwood	4 Brite Navy	on White	
	IIbb4	R	VL	op	Redwood	3 Brite Navy 3 Lt. Gold	on White	
	IIbb5	R	L	op	Black	5 Thin Redwood	on White	
	IIbb6	O	M	op	Black	3 Thin Redwood	on White	
	IIbb7	R	VL	op	Black	3 Broad Redwood	on White	
	IIbb8	R	VL	op	Black	3 Double Redwood	on White	
	IIbb9	R	VL	op	Black	3 Lemon Yellow between Redwood		
	IIbb10	R	VL	op	Black	3 Lemon Yellow between Redwood 3 Fine Brite Navy	on White	
	IIbb11	R	VL	op	Black	2 Fine Redwood 2 Redwood 2 Amber	on White	
	IIbb12	R	M	op	White	3 Brite Navy	on Redwood	
	IIbb13	O	M	op	White	3 Brite Navy	on Redwood	
	IIbb14	R	M	op	White	3 Lemon Yellow	on Brite Navy	(Yellow stripe
	IIbb15	O	M	op	White	3 Lemon Yellow	on Brite Navy	appears green)
	IIbb16	R	M	op	White	3 Redwood	on Dk. Palm Green	
	IIbb17	O	M	op	White	3 Redwood	on Dk. Palm Green	
	IIbb18	R	M	op	Pale Blue	3 Redwood	on White	
	IIbb19	O	M	op	Pale Blue	3 Redwood	on White	
	IIbb20	R	VL	op	Mustard Tan	4 Brite Navy 8 Redwood (In Pairs Between Other Stripes)	on White	
	IIbb21	R	M	op	Teal Green	3 Redwood	on White	
	IIbb22	R	M	op	Lt. Aqua Blue	3 Redwood	on White	
	IIbb23	O	M	op	Lt. Aqua Blue	3 Redwood	on White	
	IIbb24	R	M	op	Robin's Egg Blue	3 Redwood	on White	
	IIbb25	O	M	op	Robin's Egg Blue	3 Redwood	on White	
	IIbb26	R	M	op	Robin's Egg Blue	3 Redwood	on Lemon Yellow	
	IIbb27	R	M	cl	Brite Navy	3 Redwood	on White	
	IIbb28	O	S	cl	Brite Navy	3 Dk. Brown	on White	
	IIbb29	F	L	cl	Dk. Rose Brown	3 Brite Navy	on White	

					Body	Simple Stripes	
Type	Bead Number	Shape	Size	Glass	Name of Colour	Number of Stripes Colour of Stripes	
IIb'	IIb'1	R	M	op	Redwood	6 White	
	IIb'2	R	S	op	Black	7 White	
	IIb'3	O	M	op	Black	3 White	
	IIb'4	O	L	tr	Oyster White	Numerous irregular stripes–Lt. Gold, Redwood, Ultramarine, Aqua Blue. (Marbled effect)	
	IIb'5	R	M	op	White	6 Redwood	
	IIb'6	O	M	op	White	6 Redwood	
	IIb'7	O	M	op	White	9 Brite Navy (3 Groups of 3 Thin Lines)	
	IIb'8	O	M	op	White	3 Lemon Yellow	3 Brite Navy
	IIb'9	O	L	op	Mustard Tan	6 White	
	IIb'10	F	L	op	Mustard Tan	6 White	
	IIb'11	R	L	op	Robin's Egg Blue	6 Redwood	(6 Stripes which had disappeared)
	IIb'12	R	M	tr	Brite Navy	4 White	
	IIb'13	R	L	cl	Dk. Rose Brown	9 White (3 Groups of 3 Thin Lines)	

Table 4. Continued.

					Body	**Compound Stripes**	
Type	Bead Number	Shape	Size	Glass	Name of Colour	Number of Stripes Colour of Stripes	
IIbb′	IIbb′1	R	L	op	Teal Green	3 Redwood	on Lemon Yellow
	IIbb′2	R	L	op	Robin's Egg Blue	6 Redwood	on Lemon Yellow

					Body	**"Melon" Beads**
Type	Bead Number	Shape	Size	Glass	Name of Colour	
IIe	IIe1	R	M	cl	Brite Blue	7 Ridges
	IIe2	R	M	cl	Brite Blue	8 Ridges

					Body	**"Flush Eye" Beads**	
Type	Bead Number	Shape	Size	Glass	Name of Colour	Name of Colour	Decoration
IIg	IIg1	R	M	op	Black	3 White Dots	
	IIg2	O	M	op	White	3 Redwood Stars	
	IIg3	R	M	op	White	3 Redwood Stars on White Dots on Brite Blue Dots	
	IIg4	R	M	op	White	3 Brite Navy Dots each containing 2 White Rings	
	IIg5	R	M	op	Shadow Blue	3 Redwood Dots on White Dots	

					Bead with "Flush Eye" and Stripes This bead has always appeared as two joined beads	
					Body	**Decoration**
Type	Bead Number	Shape	Size	Glass	Name of Colour	Name of Colours Description
IIh	IIh1	O	M	op	Shadow Blue	3 Redwood Stars on White Dots 3 White Stripes between "Flush Eyes"

					"Roman" Beads		
					Body	**Decoration**	
Type	Bead Number	Shape	Size	Glass	Name of Colour	Name of Colours Description of Decoration	
IIj	IIj1	R	M	op	Black	2 White Parallel Wavy Lines	
	IIj2	R	L	op	Black	3 White Alternating Wavy Lines	
	IIj3	R	L	op	Black	2 Lemon Yellow Alternating Wavy Lines	
	IIj4	R	L	op	Black	1 Lemon Yellow between 2 White Parallel Wavy Lines	
	IIj5	R	L	op	Black	2 White Spirals between 2 Lemon Yellow Spirals	
	IIj6	R	M	cl	Brite Blue	2 White Alternating Wavy Lines	

To Dr. Paul N. Perrot, Director of the Corning Museum of Glass, special thanks are due for encouragement and sound advice. The authors wish to emphasize, however, that they alone are responsible for whatever shortcomings the paper may have, as well as for any errors which may occur.

EDITOR'S ENDNOTES

1. The classification system for glass beads devised by Dr. Kenneth E. Kidd and Martha Ann Kidd is a classic in bead research. Originally published in *Canadian Historic Sites: Occasional Papers in Archaeology and History* 1 (1970), it remains the best system for classifying drawn beads and has found broad acceptance, especially in the eastern United States. Being a pioneering effort, it is far from complete and I subsequently added many new types and made a few corrections in my "Guide to the Description and Classification of Glass Beads" in *Glass Beads* (1982, 1985). Due to its historic value and its continued usefulness to those studying European glass beads, the Kidds' report is reprinted here complete with the color plates. The text remains unchanged except for

Table 5. Description of Class III Beads.

			Outside Layer		Core		Middle Layer	
Type	Bead Number	Size	Glass	Colour Name	Glass	Colour Name	Glass	Colour Name
IIIa	IIIa1	M	op	Redwood	op	Black		
	IIIa2	M	op	Redwood	cl	Lt. Gray		
	IIIa3	S	op	Redwood	cl	Apple Green		
		M	op	Redwood	cl	Apple Green		
	IIIa4	M	op	Redwood	cl	Brite Blue		
	IIIa5	M	cl	Scarlet	op	White		
	IIIa6	M	cl	Lt. Gray	cl	Lt. Gray	op	Redwood
	IIIa7	M	cl	Lt. Gray	cl	Lt. Gray	op	White
	IIIa8	S	tr	Oyster White	cl	Lt. Gray		
	IIIa9	S	tr	Shadow Blue	cl	Brite Navy		
	IIIa10	VS	cl	Ultramarine	cl	Ultramarine	op	White
		S	cl	Ultramarine	cl	Ultramarine	op	White
	IIIa11	S	cl	Brite Navy	cl	Lt. Gray	op	White
	IIIa12	VS	cl	Brite Navy	cl	Brite Navy	op	White
		S	cl	Brite Navy	cl	Brite Navy	op	White
		M	cl	Brite Navy	cl	Brite Navy	op	White

			Outside Layer		Core		Middle		Simple Stripes	
Type	Bead Number	Size	Glass	Colour Name	Glass	Colour Name	Glass	Colour Name	Colour Name Number of Stripes	
IIIb	IIIb1	VS	op	Redwood	op	Black			6 op White	
	IIIb2	M	op	Redwood	cl	Apple Green			6 op White	
	IIIb3	S	cl	Lt. Gray	cl	Lt. Gray	op	White	3 op Black	
	IIIb4	S	tr	Oyster White	cl	Brite Copan Blue			6 Redwood	6 Brite Navy
	IIIb5	L	tr	Oyster White	cl	Brite Copan Blue			4 Redwood	4 Brite Navy
	IIIb6	L	cl	Lt. Aqua Blue	cl	Lt. Aqua Blue	op	White	8 op White	
	IIIb7	M	cl	Shadow Blue	cl	Shadow Blue	op	White	8 op White	
	IIIb8	M	cl	Dk. Shadow Blue	op	Redwood	op	White	3 op White	
	IIIb9	L	cl	Brite Navy	cl	Brite Navy	op	White	15 op White	
	IIIb10	VL	cl	Dk. Navy	cl	Dk. Navy	op	White	16 op White	

			Outside Layer		Core		Middle		Compound Stripes	
Type	Bead Number	Size	Glass	Colour Name	Glass	Colour Name	Glass	Colour Name	Colour Name Number of Stripes	
IIIbb	IIIbb1	L	op	Redwood	cl	Black			3 op Black	on White
	IIIbb2	S	op	Redwood	op	Black			3 cl Brite Navy	on White
	IIIbb3	L	op	Redwood	op	Black			4 cl Brite Navy	on White
	IIIbb4	L	op	Redwood	cl	Apple Green			3 op Black	on White
	IIIbb5	L	op	Redwood	cl	Apple Green			3 cl Brite Navy	on White
	IIIbb6	L	op	Black	cl	Lt. Gray			3 op Redwood	on White
	IIIbb7	L	cl	Brite Navy	cl	Brite Navy	op	White	3 op Redwood	on White
	IIIbb8	L	cl	Brite Navy	cl	Brite Navy	op	White	3 cl Aqua Blue	on White

a few editorial adjustments and comments. Thanks are extended to the Ontario Service Centre of Parks Canada, Ottawa, for permission to reprint this important document.

2. This was never published.

3. "Wire-wound" beads are now generally simply referred to as "wound."

4. While some wound beads were imparted complex shapes in two-part molds (molded wound), a distinct mold-pressed category exists and has been well described by Neuwirth (1994, 2011). The principal difference between the two is that in the former case, a wound bead is pressed in a two-piece mold while in a viscid state on the mandrel. To produce a mold-pressed bead, the molten end of a glass rod is pressed in a mold.

Table 5. Continued.

Type	Bead Number	Size	Glass	Outside Colour Name	Glass	Core Colour Name	Glass	Middle Layer Colour Name
IIIc	IIIc1	L	cl	Brite Blue	cl	Brite Blue	op	White
	IIIc2	L	tr	Shadow Blue	cl	Lt. Gray	op	White
	IIIc3	L	cl	Brite Navy	cl	Lt. Gray	op	White
IIIc′	IIIc′1	L	op	Redwood	op	Black		
	IIIc′2	L	op	Redwood	cl	Apple Green		
	IIIc′3	L	cl	Turquoise	op	Redwood	op	White
	IIIc′4	L	cl	Turquoise	cl	Brite Navy	op	White
IIIe	IIIe1	M	op	Redwood	op	Black		
	IIIe2	M	cl	Lt. Gray	cl	Lt. Gray	op	Redwood
IIIe′	IIIe′1	M	op	Redwood	op	Black		
IIIf	IIIf1	L	cl	Lt. Gray	tr	Oyster White		
	IIIf2	L	cl	Ultramarine	tr	Lt. Aqua Blue		

Tube "Star" Beads (The Layers are Named from the Outside Inward)

Type IIIk "Star" Tube Bead with Plain Outside Layer

Type	Bead Number	Size	Glass	Outside		2nd		3rd		4th		5th	
IIIk	IIIk1	VL	op	Redwood	op	White	cl	Brite Blue	op	White	cl	Brite Blue	(*1)
	IIIk2	L	cl	Teal Green	op	White	op	Redwood	op	Black			(*2)
	IIIk3	S	cl	Brite Navy	op	White	op	Redwood	op	White	cl	Brite Blue	(*3)

*1 Outside layer very thick. Ends of bead slightly milled.

*2 Outside layer thin so ridges of next layer show through like stripes.

*3 Ends of bead ground to point to show design of inner layers.

Type IIIm True "Star" Bead (Large tube ground down to round or oval form to show ridges of next layer and end design of inner layers). Beads occur in size from Small to Very Large–up to 2½" long.

Type	Bead Number	Glass	Outside	2nd	3rd	4th	5th	6th	7th
IIIm	IIIm1	cl	Brite Blue	op White	op Redwood	op White cl	Brite Blue	op White cl	Brite Blue

Type IIIn "Star" Tube Bead with Stripes Inlayed in Outside Layer

Type	Bead Number	Glass	Outside		2nd		3rd		4th		5th	Stripes		
IIIn	IIIn1	tr	Oyster White	op	White	op	Redwood	op	White	cl	Lt. Gray	6	op	Redwood
												6	cl	Brite Navy
	IIIn2	tr	Oyster White	op	White	op	Redwood	op	White	cl	Brite Blue	6	op	Redwood
												6	cl	Brite Navy
	IIIn3	tr	Oyster White	op	Redwood	op	White	op	White	cl	Brite Blue	4	op	Redwood
												4	cl	Dk. Palm Green
												4	cl	Brite Navy

Table 6. Description of Class IV Beads.

Type	Bead Number	Shape	Size	Glass	Outside Name of Colour	Core Glass	Core Name of Colour	Middle Layer Glass	Middle Layer Name of Colour
IVa	IVa1	R	M	op	Redwood	op	Black		
	IVa2	R	VS	op	Redwood	cl	Lt. Gray		
		R	S	op	Redwood	cl	Lt. Gray		
		R	M	op	Redwood	cl	Lt. Gray		
		R	L	op	Redwood	cl	Lt. Gray		
	IVa3	C	M	op	Redwood	cl	Lt. Gray		
	IVa4	O	S	op	Redwood	cl	Lt. Gray		
	IVa5	R	VS	op	Redwood	cl	Apple Green		
		R	S	op	Redwood	cl	Apple Green		
		R	M	op	Redwood	cl	Apple Green		
		R	L	op	Redwood	cl	Apple Green		
	IVa6	C	M	op	Redwood	cl	Apple Green		
	IVa7	O	M	op	Redwood	cl	Apple Green		
	IVa8	R	M	op	Redwood	cl	Brite Blue		
	IVa9	R	VS	cl	Scarlet	op	White		
		R	S	cl	Scarlet	op	White		
	IVa10	R	M	op	Black	op	Black	op	White
	IVa11	C	M	cl	Lt. Gray	cl	Lt. Gray	op	White
	IVa12	C	M	cl	Lt. Gray	cl	Lt. Gray	op	Brite Navy (Bead Appears Blue)
	IVa13	C	S	tr	Oyster White	cl	Lt. Gray		
		C	M	tr	Oyster White	cl	Lt. Gray		
	IVa14	C	M	tr	Oyster White	cl	Lt. Aqua Blue		
	IVa15	R	M	cl	Apple Green	cl	Apple Green	op	White
	IVa16	R	M	op	Robin's Egg Blue	op	Robin's Egg Blue	op	White
	IVa17	C	M	cl	Ultramarine	cl	Ultramarine	op	White
	IVa18	R	M	cl	Brite Navy	cl	Lt. Gray		
	IVa19	C	M	cl	Brite Navy	cl	Brite Navy	op	White

The authors also fail to include blown and wound-on-drawn beads, as well as the somewhat problematic Prosser-molded beads which are generally considered to be ceramic but often have a high silica content and appear to be glass. These are discussed in the accompanying article, "Guide to the Description and Classification of Glass Beads found in the Americas."

5. The term "chevron" is preferred to "star."

6. Unfortunately, this did not occur. Nevertheless, numerous new types and varieties have been recorded since this was written and the new types are described in the accompanying Guide.

7. There is an error here. Overlaid should read Inlaid. The W group has been greatly expanded with more specific definitions provided for the WIII type beads (*see* the Guide mentioned above).

SELECT BIBLIOGRAPHY

For those who may wish to investigate this subject further, the following selected titles are offered. There is not, so far as the authors know, an entirely satisfactory treatment of the making of glass beads in English, and it is necessary to piece the story together from various sources, such as Dillon, Nesbitt, and Pellatt, after having first read a general exposition of glassmaking such as may be found in Marston. Those who are able to do so may wish to go further afield and examine the writing of some of the more outstanding continental authors. The subject becomes complicated at this point because numerous writers have discussed the manufacture of glass objects (though seldom beads specifically), and some of the more important are of considerable antiquity, e.g., Kunckel, Neri, and Theophilus. Unfortunately, these last three are not easily obtainable. The publications of Morazzoni and Pasquato, Pazaurek, and Zecchin, however, are recent and perhaps the most satisfactory for the readers of this article. [Editor's note:

Table 6. Continued.

Type	Bead Number	Shape	Size	Glass	Body of Bead: Outside Colour	Glass	Core Colour	Glass	Middle Colour	Simple Stripes: Number of Stripes Colour of Stripes Type of Glass		
IVb	IVb1	R	M	op	Redwood	op	Black			8	op	Black
	IVb2	R	M	op	Redwood	cl	Lt. Gray			11	op	Black
	IVb3	R	M	op	Redwood	op	Black			3	op	Broad White
	IVb4	R	M	op	Redwood	op	Black			6	op	White (3 Pairs)
	IVb5	R	L	op	Redwood	op	Black			6	op	White
	IVb6	R	S	op	Redwood	op	Black			8	op	White
	IVb7	R	L	op	Redwood	op	Black			12	op	White
	IVb8	R	L	op	Redwood	op	Black	op	White	4	op	White
	IVb9	R	S	op	Redwood	cl	Brite Blue			8	op	White
	IVb10	R	M	op	Redwood	cl	Apple Green			3	op	White
		R	L	op	Redwood	cl	Apple Green			3	op	White
	IVb11	R	L	op	Redwood	cl	Apple Green			6	op	White
	IVb12	R	S	cl	Scarlet	op	White			8	op	White (4 Pairs)
	IVb13	R	M	op	White	cl	Lt. Aqua			6	op	Redwood
	IVb14	C	S	op	White	cl	Lt. Gray			4	op	Redwood 4 op Black
	IVb15	C	S	op	White	cl	Lt. Gray			4	op	Redwood 4 cl Br. Navy
	IVb16	C	S	op	White	cl	Lt. Aqua Blue			3	op	Redwood 3 cl Br. Navy
	IVb17	C	S	op	White	cl	Lt. Gray			2	op	Black 2 tr Lt. Aqua Blue
	IVb18	R	M	cl	Apple Green	cl	Apple Green	op	White	3	op	White
	IVb19	R	M	cl	Apple Green	cl	Apple Green	op	White	3	cl	Lemon Yellow
	IVb20	R	M	cl	Dk. Palm Green	cl	Apple Green	op	White	6	op	White
	IVb21	R	M	cl	Teal Green	cl	Lt. Gray			4	op	White
	IVb22	R	M	cl	Lt. Aqua Blue	cl	Lt. Aqua Blue	op	Lemon Yellow	3	op	Lemon Yellow
	IVb23	R	S	cl	Shadow Blue	cl	Lt. Gray			3	op	Redwood
	IVb24	R	L	cl	Dk. Shadow Blue	cl	Lt. Gray			6	op	Redwood
	IVb25	R	VL	cl	Ultramarine	cl	Lt. Aqua Blue	op	White	16	op	White
	IVb26	R	VL	cl	Brite Navy	cl	Lt. Aqua Blue	op	White	16	op	White
	IVb27	R	M	cl	Brite Navy	op	Redwood	op	White	3	op	Lemon Yellow
										3	op	Lt. Cherry Rose
	IVb28	R	M	cl	Brite Navy	op	Redwood	op	White	4	op	Redwood
										4	op	White
										4	op	Lemon Yellow
	IVb29	R	M	cl	Brite Navy	cl	Brite Navy	op	White	3	op	White
	IVb30	R	L	cl	Brite Navy	cl	Brite Navy	op	White	3	op	Broad White
	IVb31	R	S	cl	Brite Navy	cl	Brite Navy	op	White	6	op	White
		R	M	cl	Brite Navy	cl	Brite Navy	op	White	6	op	White
	IVb32	R	L	cl	Brite Navy	cl	Brite Navy	op	White	7	op	White
	IVb33	R	M	cl	Brite Navy	cl	Brite Navy	op	White	16	op	White (8 Pairs)
	IVb34	R	M	cl	Brite Navy	cl	Brite Navy	op	White	16	op	White
	IVb35	R	L	cl	Dk. Navy	cl	Dk. Navy	op	White	8	op	White
	IVb36	R	VL	cl	Dk. Navy	cl	Dk. Navy	op	White	12	op	White
	IVb37	R	L	cl	Dk. Rose Brown	cl	Dk. Rose Brown	op	White	12	op	White

Keep in mind that this was written in the late 1950s; a lot has been published since then but this bibliography shows the state of knowledge at that time. To increase the value of this bibliography, several titles have been added. These are marked with an asterisk (*).]

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Table 6. Continued.

					Body of Bead					Surface Decoration	
Type	Bead Number	Shape	Size	Glass	Outside Colour Name	Glass	Core Colour Name	Glass	Middle Colour	Type Colour Name	
										Compound Stripes	
IVbb	IVbb1	R	M	op	Redwood	op	Black			3 Black	on White
	IVbb2	R	M	op	Redwood	cl	Lt. Gray			3 Black	on White
	IVbb3	R	M	op	Redwood	cl	Apple Green			3 Black	on White
	IVbb4	R	L	op	Redwood	op	Black			3 Brite Navy	on White
	IVbb5	O	S	op	Redwood	op	Black			3 Brite Navy	on White
	IVbb6	R	M	op	Redwood	cl	Lt. Gray			3 Brite Navy	on White
	IVbb7	R	M	op	Redwood	cl	Apple Green			3 Brite Navy	on White
	IVbb8	O	M	op	Redwood	cl	Apple Green			3 Brite Navy	on White
	IVbb9	R	M	cl	Brite Navy	cl	Brite Navy	op	White	3 Redwood	on White
	IVbb10	R	M	cl	Brite Navy	cl	Brite Navy	op	White	3 Redwood Pairs	on White
	IVbb11	R	L	cl	Dk. Rose Brown	op	Black	op	White	3 Brite Navy	on White
										Simple Stripes	
IVb′	IVb′1	O	M	cl	Apple Green	cl	Apple Green	op	White	3 op White	
										Compound Stripes	
IVbb′	IVbb′1	R	L	cl	Brite Navy	cl	Brite Navy	op	White	3 Redwood	on White
										"Flush Eyes"	
IVg	IVg1	O	M	cl	Brite Blue	cl	Brite Blue	op	White	3 Redwood Stars Dots on Brite Blue Dots	on White

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Table 6. Continued.

In Recording "Star" Beads the Layers are Named from the Outside Inward

Layers:				Outside		Body of Bead 2nd		3rd		4th
Type	Bead Number	Size	Glass	Colour Name	Glass	Colour Name	Glass	Colour Name	Glass	Colour Name
Milled "Star" Beads with Plain Outside Layer										
IVk	IVk1	L	op	Redwood	op	White	cl	Brite Blue	op	White
	IVk2	M	cl	Brite Navy	op	White	cl	Brite Blue	op	White
	IVk3	M	cl	Brite Navy	op	White	op	Redwood	op	White
	IVk4	L	cl	Brite Navy	op	White	op	Redwood	op	White
	IVk5	F	cl	Brite Navy	op	White	op	Redwood	op	White
	IVk6	M	cl	Dk. Palm Green	op	White	op	Redwood	op	White
	IVk7	L	cl	Dk. Palm Green	op	White	op	Redwood	op	White
Type	Bead Number	Size	Glass	Colour Name	Glass	Colour Name	Glass	Colour Name	Glass	Colour Name
Milled "Star" Beads with Stripes Inlaid in Outside Layer										
IVn	IVn1	M	tr	Oyster White	op	White	op	Redwood	op	White
	IVn2	M	tr	Oyster White	op	White	op	Redwood	op	White
	IVn3	L	tr	Oyster White	op	White	op	Redwood	op	White
	IVn4	M	tr	Oyster White	op	White	op	Redwood	op	White
	IVn5	M	tr	Oyster White	op	White	op	Redwood	op	White
	IVn6	L	tr	Oyster White	op	White	op	Redwood	op	White
	IVn7	F	tr	Oyster White	op	White	op	Redwood	op	White
Type	Bead Number	Size	Glass	Colour Name	Glass	Colour Name	Glass	Colour Name	Glass	Colour Name
Milled "Star" Beads which look like Porcelain Imitations of IVn Beads										
IVnn	IVnn1	VL	op	Redwood	op	White	op	Redwood		
	IVnn2	VL	op	Redwood	op	White	op	Redwood		
	IVnn3	VL	op	Black	op	White	op	Black		
	IVnn4	VL	op	White	op	Redwood	op	White	op	Redwood
	IVnn5	VL	op	White	op	Redwood	op	White	cl	Brite Blue

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Table 6. Continued.

	5th	Simple Stripes and Comments about Individual Beads Number of Stripes and their Colours
Glass	Colour Name	
cl	Brite Blue	Like IIIk1 but Milled Round
cl	Lt. Gray	Outside layer very thin making ridges of next layer appear as stripes
cl	Brite Blue	Outside layer very thin making ridges of next layer appear as stripes
cl	Brite Blue	Outside layer thick giving a solid blue appearance to surface
cl	Brite Blue	Like above bead but flattened
cl	Lt. Gray	
cl	Brite Blue	

Glass	Colour Name	Simple Stripes								
cl	Lt. Gray	6	op	Broad Redwood	6	cl	Thin Dk. Palm Green			
cl	Lt. Gray	6	op	Redwood	6	cl	Brite Navy			
cl	Brite Blue	6	op	Redwood	6	cl	Brite Navy			
cl	Lt. Gray	6	cl	Lemon Yellow	6	cl	Brite Navy			
cl	Lt. Gray	6	cl	Dk. Palm Green	6	cl	Brite Navy			
cl	Lt. Gray	4	op	Redwood	4	cl	Dk. Palm Green	4	cl	Brite Navy
cl	Lt. Gray	4	op	Redwood	4	cl	Dk. Palm Green	4	cl	Brite Navy

		Simple Stripes					
		8	op	White			
		6	op	White	6	cl	Brite Navy
		8	op	Lt. Gold			
		6	op	Broad Redwood	6	cl	Thin Brite Navy
		6	op	Broad Redwood	6	cl	Thin Brite Navy

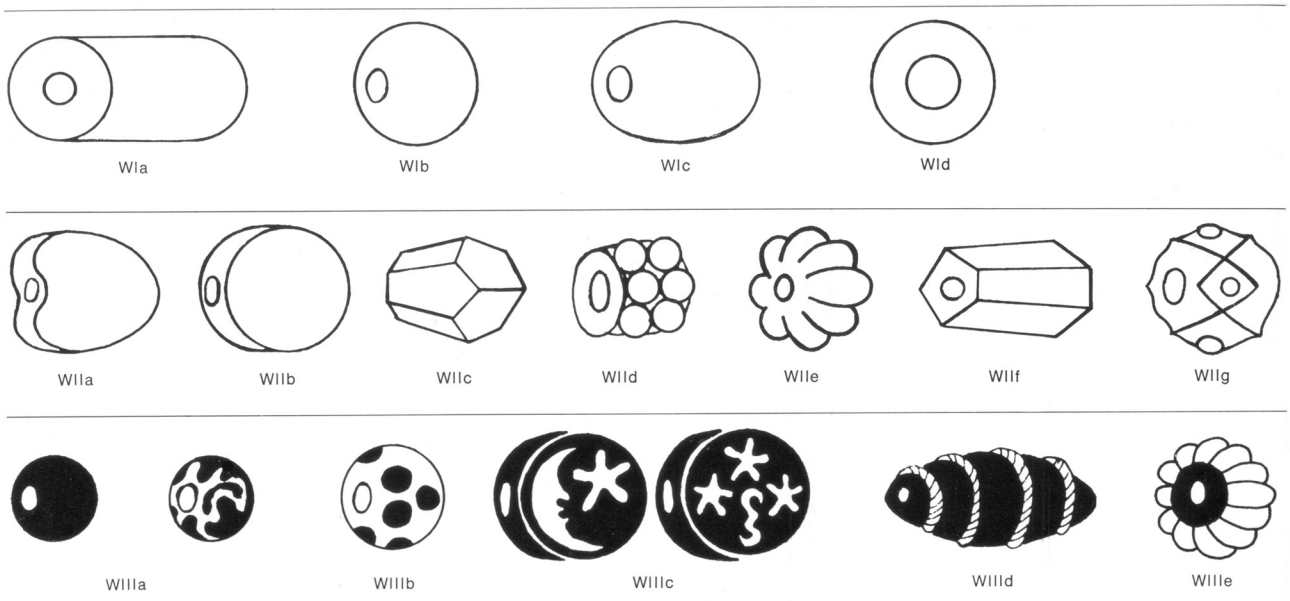

Figure 4. Master identification chart for wire-wound beads.

Table 7. Description of Class W Beads.

"Tube"

Type	Bead Number	Shape	Size	Glass	Name of Colour
WIa	WIa1	T	L	cl	Lt. Gray
	WIa2	T	M	cl	Oyster White
	WIa3	T	M	op	White

"Round"

Type	Bead Number	Shape	Size	Glass	Name of Colour
WIb	WIb1	R	L	cl	Lt. Gray
	WIb2	R	VS	op	White
		R	S	op	White
		R	M	op	White
	WIb3	R	M	cl	Pale Blue
	WIb4	R	M	cl	Pale Blue (Opal)
		R	L	cl	Pale Blue (Opal)
		R	VL	cl	Pale Blue (Opal)
	WIb5	R	M	tr	Pale Blue (Alabaster)
		R	L	tr	Pale Blue (Alabaster)
		R	VL	tr	Pale Blue (Alabaster)
	WIb6	R	S	cl	Lt. Gold
		R	M	cl	Lt. Gold
	WIb7	R	VS	cl	Amber
		R	L	cl	Amber
	WIb8	R	L	cl	Maple
		R	VL	cl	Maple
	WIb9	R	S	cl	Dk. Palm Green
	WIb10	R	VS	op	Lt. Aqua Blue
		R	M	op	Lt. Aqua Blue
	WIb11	R	VS	op	Robin's Egg Blue
		R	S	op	Robin's Egg Blue
		R	M	op	Robin's Egg Blue
	WIb12	R	L	op	Brite Blue
	WIb13	R	VS	op	Brite Copan Blue
		R	L	op	Brite Copan Blue
	WIb14	R	VS	op	Brite Dutch Blue
		R	L	op	Brite Dutch Blue
	WIb15	R	L	cl	Ultramarine
	WIb16	R	L	cl	Brite Navy

"Oval"

Type	Bead Number	Shape	Size	Glass	Name of Colour
WIc	WIc1	O	S	op	White
	WIc2	O	L	cl	Pale Blue (Opal)
	WIc3	O	VL	tr	Pale Blue (Marble)
	WIc4	O	L	cl	Lt. Gold
	WIc5	O	L	cl	Amber
	WIc6	O	S	cl	Maple
	WIc7	O	S	cl	Citron
	WIc8	O	L	cl	Turquoise
	WIc9	O	S	op	Aqua Blue
	WIc10	O	L	op	Lt. Aqua Blue
	WIc11	O	L	cl	Ultramarine

"Donut"

Type	Bead Number	Shape	Size	Glass	Name of Colour
WId	WId1	DO	L	cl	Amber
	WId2	DO	L	cl	Maple
	WId3	DO	L	cl	Turquoise
	WId4	DO	L	cl	Amethyst

"Corn Beads"

Type	Bead Number	Glass	Name of Colour
WIIa	WIIa1	cl	Lt. Gold
	WIIa2	op	Surf Green
	WIIa3	cl	Dk. Palm Green

Flat "Disk" Beads

Type	Bead Number	Glass	Name of Colour
WIIb	WIIb1	cl	Ultramarine

Table 7. Continued.

Facetted "Five Sided" Beads

Type	Bead Number	Glass	Name of Colour
WIIc	WIIc1	op	Black
	WIIc2	cl	Lt. Gray
	WIIc3	cl	Pale Blue (Opal)
	WIIc4	cl	Lt. Gold
	WIIc5	cl	Amber
	WIIc6	cl	Cinnamon
	WIIc7	cl	Teal Green
	WIIc8	cl	Turquoise
	WIIc9	cl	Lt. Aqua Blue
	WIIc10	cl	Brite Copan Blue
	WIIc11	cl	Ultramarine
	WIIc12	cl	Brite Navy
	WIIc13	cl	Amethyst

"Raspberry Beads"

Type	Bead Number	Glass	Name of Colour
WIId	WIId1	cl	Lt. Gray
	WIId2	cl	Pale Blue (Opal)
	WIId3	cl	Lt. Gold
	WIId4	cl	Amber
	WIId5	cl	Ultramarine
	WIId6	cl	Brite Navy
	WIId7	cl	Amethyst

"Melon" Beads

Type	Bead Number	Glass	Name of Colour
WIIe	WIIe1	cl	Lt. Gray
	WIIe2	cl	Lt. Gold
	WIIe3	cl	Amber
	WIIe4	cl	Cinnamon
	WIIe5	cl	Teal Green
	WIIe6	cl	Brite Copan Blue
	WIIe7	cl	Ultramarine
	WIIe8	cl	Brite Navy

"Ridged Tube" Beads

Type	Bead Number	Size	Glass	Name of Colour
WIIf	WIIf1	M	cl	Lt. Gold
	WIIf2	L	cl	Maple
	WIIf3	M	cl	Apple Green
	WIIf4	M	op	Surf Green
	WIIf5	L	cl	Turquoise

Round Bead with Pressed Design

Type	Bead Number	Size	Glass	Name of Colour
WIIg	WIIg1	M	cl	Lt. Gold
	WIIg2	M	cl	Apple Green

WIII Type is any Wirewound bead of WI or WII Type with applied Decoration

	Type	Bead Number	Glass	Colour	Decoration
Solid Plain Glass Overlay	WIIIa	WIIIa1	tr	White	with op Coral Plain Coating
		WIIIa2	tr	White	with cl Amethyst Plain Coating
Plain Glass Overlaid in a Design	WIIIb	WIIIb1	tr	White	with 3 groups of 3 cl Dk. Palm Green Dots
Plain Glass Inlaid in a Design[7]	WIIIc	WIIIc1	cl	Ultramarine	— A Side; 3 five pointed stars and comet — B Side; Man in the moon and five pointed star
		WIIIc2	cl	Ultramarine	— A Side; 3 five pointed stars with "S" growing out of top star — B Side; Crescent Moon connected to cross (Variation of WIIIc1)
Complex Designed Glass Overlay	WIIId	WIIId1	cl	Ruby	Large Oval with fine cane of op White & cl Brite Navy twisted together applied in a spiral around bead
Overlay of Material Other than Glass	WIIIe	WIIIe1	op	Black	"Melon" with Gold Leaf Overlay

GUIDE TO THE DESCRIPTION AND CLASSIFICATION OF GLASS BEADS FOUND IN THE AMERICAS[1]

Karlis Karklins

This guide provides information relevant to the description and classification of glass beads recovered from archaeological sites in North and South America and the Caribbean. It is partly based on and intended to be used with "A Classification System for Glass Beads for the Use of Field Archaeologists," by Kenneth and Martha Kidd. Material presented includes a critical evaluation of several bead classification schemes, an overview of bead manufacturing techniques, a descriptive listing of the various classes and types of beads that have been recorded to date, and an explication of the physical attributes of a bead, as well as interpretative material concerning dating and likely origins.

INTRODUCTION

Several systems have been proposed for the classification of glass beads over the years. Although the majority are elementary in nature and have limited application, four are noteworthy.

The first classificatory scheme for beads was published in 1928 by Horace C. Beck. Comprehensive though it was, his "Classification and Nomenclature of Beads and Pendants" was aimed primarily at Old World researchers and never achieved popularity in North America. Nevertheless, Beck's work remains a valuable research tool especially as concerns bead shape and is a classic in its own right.

Little progress was made during the next two decades. Then, in the 1950s, Kenneth E. Kidd formulated a scheme which, with modifications and the collaboration of his wife Martha, was published in 1970 as "A Classification System for Glass Beads for the Use of Field Archaeologists." Utilizing primarily the process of manufacture to sort beads and secondarily the physical attributes, the system is most notable for its extensive color plates illustrating each recorded bead variety. Also noteworthy is the extremely well-developed typological flow chart for drawn beads (Kidd and Kidd 1970:51). Unfortunately, the wound-bead chart (Kidd and Kidd 1970:52) is woefully inadequate, and wound-on-drawn, mold-pressed, blown, and Prosser-molded beads are not dealt with at all. Furthermore, many of the bead classes and some of the terms are not adequately defined, making the system difficult to use at times. Another drawback centers on the fact that the system, developed using beads derived from early historical period sites in the Northeast, has been found to be of little utility by several researchers in the Pacific Northwest who dealt with beads of a later period (Ross 1976:671-673; Sprague 1971:128-129). In its favor is the fact that it is an open-ended system so that new categories, classes, types, and varieties can be added as required.

In the same year that the previous report was published, Lyle M. Stone completed his treatise on Fort Michilimackinac. Published four years later, it contains a substantial section on beads wherein the primary sorting is based on function as revealed by relative size (Stone 1974). The two pertinent functional categories (necklace beads and seed beads) are each further subdivided into Class (method of manufacture), Series (structure or form), Type (shape), and Variety (color and diaphaneity). All of the varieties are illustrated in color photographs.

A drawback to Stone's approach is that relative size and function do not always equate; "large" beads were not used just for necklaces while "seed" beads sometimes were. There is also the problematic "medium" size group which overlaps both categories. Furthermore, having the method of manufacturing as a secondary trait is awkward as it is considered the primary classification trait for glass beads (Sprague 1985:87). Like the Kidd system, this one only deals with drawn and wound beads and has not found broad acceptance.

The final classification system to be dealt with herein appeared in 1976. In that year, Lester A. Ross completed his monograph "Fort Vancouver, 1829-1860: A Historical Archeological Investigation of the Goods Imported and Manufactured by the Hudson's Bay Company" which contains a lengthy and well-illustrated section on glass

beads. The system he used was refined and published in 1990 (Ross 1990). The specimens are classified using a typological scheme reminiscent of and apparently lightly influenced by that of Kenneth and Martha Kidd (1970). The Fort Vancouver typology, however, is much more comprehensive, covering all the major manufacturing types. While it is well thought out, the use of relatively complicated variety codes makes it difficult to work with and typographical errors could be a significant problem. Notwithstanding, Ross' scheme is a milestone for a part of the continent where the typical classification "system" had for so long consisted of a loosely ordered list of inadequately described bead types.

Although each of the foregoing systems has its drawbacks, the one that seems to offer the most potential and appears to have found the most universal acceptance is the one devised by Kenneth and Martha Kidd. Consequently, it has been chosen to form the basis for this guide. As it has long been out of print and not readily available to researchers, it has been published as a companion article.

The typology for drawn and wound beads that follows is a corrected and expanded version of that proposed by the Kidds. The other manufacturing types are classified using a similar coding system and attribute hierarchy, with the classes and types being defined on the basis of archaeological specimens and several 19th-century bead sample cards and books. Although every attempt has been made to make the typology as comprehensive as possible, it is inevitable that some categories will have been overlooked and new ones will be encountered as more bead assemblages are analyzed. Should you record a new class or type, please inform the author so that it can be added to the inventory. Although instructions for defining varieties are presented for each manufacturing type, no varieties are listed because they are far too numerous. Furthermore, the practicability of recording varieties in a comprehensive classification system becomes doubtful when one considers that well over 100,000 varieties of glass beads have been produced in the world to date (Liu 1975b:31).

If a new variety is encountered and thus lacks a Kidd variety number, it can be designated with an asterisk (*). To facilitate the discussion of such varieties in a report, a sequential letter may be appended to the appropriate Kidd type designation; e.g., Ia*(a).

GLASS BEAD CLASSIFICATION

The primary criterion for sorting glass beads into typological categories is the technique of manufacture. Six major types are pertinent to researchers in the Americas: drawn, wound, wound on drawn, mold pressed, blown, and Prosser molded.

Drawn Beads

Also called tube, cane, and hollow-cane beads, the appellation "drawn" is preferred because it refers to the production process rather than the form of the finished product. In the manufacture of drawn beads, a tube possibly up to 150 ft. in length was drawn out from a hollow globe of molten glass by two men (Carroll 1917:7, 2004:30). Depending on what stylistic variation was required, the gather may have been 1) composed of several differently colored layers; 2) supplied with rods or lumps of colored glass to create stripes; 3) marvered or thrust into a mold to create a specific shape; and/or 4) twisted during the drawing process to impart a spiral effect. Starting in 1917, monochrome tubes were also produced using an automated process developed by Edward Danner of the Libbey Glass Company wherein molten glass flowing over a metal mandrel was mechanically drawn out into a continuous tube (Douglas and Frank 1972:46-51; Ross 2005:43). Compressed air pumped from the end of the mandrel created the perforation. If the mandrel (which formed the perforation) was polyhedral, the perforation of the resultant tube was the same shape. This is the only characteristic that distinguishes "mandrel-drawn" beads from those produced using the older method.

When the tubes created by either process were sufficiently cool, they were broken into manageable lengths which were then sorted according to their diameter. If desired, enamel paint was sucked up into the tubes to color them internally. The tubes were subsequently chopped into bead lengths. In the early days this was accomplished by placing them on a sharp broad chisel set in a bench or block of wood and striking them with another similar blade. About 1822, a mechanical tube-cutting machine was developed which greatly increased the speed and efficiency of this task (Karklins and Adams 1990:72).

The resultant tube segments were either left unaltered, except for the possible grinding of facets, or their broken ends were heat rounded. Prior to 1817, this was accomplished by placing the segments (those generally under about 6 mm in diameter) in a copper pan with sand or ground charcoal (Karklins and Adams 1990:73) or a mixture of sand and ash (Karklins and Jordan 1990:6) and then heating the pan. The contents were continually stirred with a hoe-like tool until the tube segments became sufficiently rounded. A contemporary method for rounding larger beads involved the use of a spear-like tool (*a speo*) (Gasparetto 1958:186)

or a large fork-like instrument with sturdy prongs protruding from a metal handle (Karklins 1993). The tube segments were slipped onto the prongs so that they did not touch and the tool was revolved in a furnace, rounding the segments.

A much more efficient process for rounding beads came into use in 1817. It involved mixing the rough beads with lime and charcoal to plug the holes and then placing them in a metal drum containing sand occasionally mixed with charcoal dust (Karklins and Adams 1990:72). The drum was then placed in a furnace at an angle and rotated at a slow speed, a technique commonly referred to as "tumbling." In this and the pan method, the heat and agitation rounded the broken ends while the various packing mixtures kept the beads from sticking together and prevented their perforations from collapsing as the glass became viscid. Depending on the temperature and the amount of time that the tube segments were heat treated, they might range from practically unaltered tube segments to practically globular.

After cooling, the beads were cleaned and then sized by passing them through a series of graduated screens. They were generally then polished and strung in bunches or packaged loose for the world market. During the 17th century, however, certain beads were subsequently turned over to lampworkers who reheated each of the beads and applied insets ("flush-eye" beads) or trailed decoration (e.g., "Roman" beads). Others were heated until soft and pressed with a tool to flatten them.

Drawn beads exhibit certain characteristics. They may consist of unaltered tube segments (generally known as "bugles") with uneven broken ends. Bubbles in the glass and striations on the surface, if present, are oriented parallel to the axis of the perforation. The perforation is usually parallel sided and has a smooth surface. Beads rounded using the *a speo* method sometimes exhibit a slight projection at one end or a scar where two beads had fused but were later broken apart. Two drawn beads fused end to end with their perforations perfectly aligned may also indicate spit rounding (Note: these features should not be confused with similar ones found on some wound beads; for a thorough discussion, *see* Karklins 1993).

For additional details regarding the manufacture of drawn beads, consult the following creditable accounts: Anonymous (1835), Carroll (1917, 2004), J.P.B. (1856), Karklins and Adams (1990), Karklins and Jordan (1990), and *The Pottery Gazette* (1987, 2009).

In the Kidds' system, drawn beads are divided into four classes according to their structure (simple or compound) and manufacturing sub-type (tubular or non-tubular). Each class is segregated into types on the basis of the general form of the beads and their decorative elements. Varieties are based on bead shape and the number, color, and diaphaneity of the structural elements.

Beads made by the hand-drawn method were often cased in clear glass to increase their brilliance. This was frequently done for translucent grayish white and opaque Indian-red beads but apparently never for transparent blue, opaque black, or opaque white beads. The presence of this layer, often microscopic, should be noted but does not qualify an otherwise Class I or II bead for inclusion in one of the multilayered classes (III and IV).

The various classes and types recorded to date are listed below and illustrated in Figures 1-4. Drawn and wound types marked with an asterisk (*) were encountered after the Kidds' classification system was published. The varieties are too diversified to be listed; *see* Kidd and Kidd (1970: 67-83) for the ones they classified.

Three of the bead types included here (Io, IIg, and IIj) need a bit of explanation. All three consist of drawn beads that were subsequently modified at the lamp to impart an "alternating twist" pattern to type Io, and to apply insets and wavy lines to IIg and IIj, respectively. Although they might best be assigned to a "lamp-worked" category, they have been retained in the drawn-bead section to prevent confusion as these types have been referred to in a number of research reports.

Class I. Tubular beads with simple (monochrome) bodies which may exhibit adventitious surface decoration. Cross-sections are round unless otherwise noted.

Ia	Undecorated
Ib	Decorated with straight simple stripes
Ib'	Decorated with spiral simple stripes
Ibb	Decorated with straight compound stripes
Ibb'	Decorated with spiral compound stripes
Ic	Beads with straight polyhedral bodies
Ic'	Beads with twisted polyhedral bodies
Id	Beads with straight polyhedral bodies decorated with straight simple stripes
Id'	Beads with twisted polyhedral bodies decorated with spiral simple stripes
*Idd	Beads with straight polyhedral bodies decorated with straight compound stripes
Ie	Beads with straight ribbed (rounded crests) or ridged (angular crests) bodies

Ie' Beads with twisted ribbed (rounded crests) or ridged (angular crests) bodies

If Polyhedral beads whose surfaces have been modified by grinding

*Irr Beads with straight ribbed (rounded crests) or ridged (angular crests) bodies decorated with straight compound stripes

Class II. Non-tubular (heat-rounded) beads with simple (monochrome) bodies which may exhibit adventitious surface decoration.

IIa Undecorated

IIb Decorated with straight simple stripes

IIb' Decorated with spiral simple stripes

IIbb Decorated with straight compound stripes

IIbb' Decorated with spiral compound stripes

IIe Melon (lobed bodies)

*IIf Beads whose surfaces have been modified by the application of ground facets

IIg "Flush eye" beads (decorated with insets; lamp-worked)

IIh "Flush eye" beads with insets and straight simple stripes (lamp-worked)

*IIhh "Flush eye" beads with insets and straight compound stripes (lamp-worked)

IIj "Roman" beads encircled by two or more wavy lines (lamp-worked)

Class III. Tubular beads with compound (multi-layered) bodies which may exhibit adventitious surface decoration. Cross-sections are round unless otherwise noted.

IIIa Undecorated

IIIb Decorated with straight simple stripes

*IIIb' Decorated with spiral simple stripes

IIIbb Decorated with straight compound stripes

*IIIbb' Decorated with spiral compound stripes

IIIc Beads with straight polyhedral bodies

IIIc' Beads with twisted polyhedral bodies

*IIId Beads with straight polyhedral bodies decorated with simple stripes

*IIId' Beads with twisted polyhedral bodies decorated with simple stripes

IIIe Beads with straight ribbed (rounded crests) or ridged (angular crests) bodies

IIIe' Beads with twisted ribbed (rounded crests) or ridged (angular crests) bodies

IIIf Polyhedral beads whose surfaces have been modified by grinding

IIIk Chevron beads with straight bodies and plain outer layers (any of the chevron and semi-chevron beads except type IIIm may have facets ground on the ends and these should be noted)

*IIIkk Semi-chevron beads (all layers except the core are "starry") with plain outer layers

*IIIl' Chevron beads with twisted polyhedral bodies and plain outer layers

IIIm Chevron beads made by grinding large, multi-layered tubes into round or oval forms to show the ridges of the second layer and the end design of the various layers

IIIn Chevron beads decorated with straight simple stripes on the outer layer

*IIInn Chevron beads decorated with straight simple stripes on the outer layer; these resemble porcelain imitations of type IIIn beads and are the tubular counterparts of type IVnn beads

*IIInn-a Chevron beads decorated with straight compound stripes on the outer layer (properly, this should be type IIInn but the Kidds assigned that designation to the former type)

*IIIp Chevron beads decorated with straight simple stripes on the surface of the second layer

*IIIpp Semi-chevron beads (all layers except the core are "starry") decorated with straight simple stripes on the surface of the second layer

*IIIq Semi-chevron beads (all layers except the core are "starry") decorated with straight simple stripes on the outer layer

*IIIr Beads with straight ribbed (rounded crests) or ridged (angular crests) bodies decorated with straight simple stripes

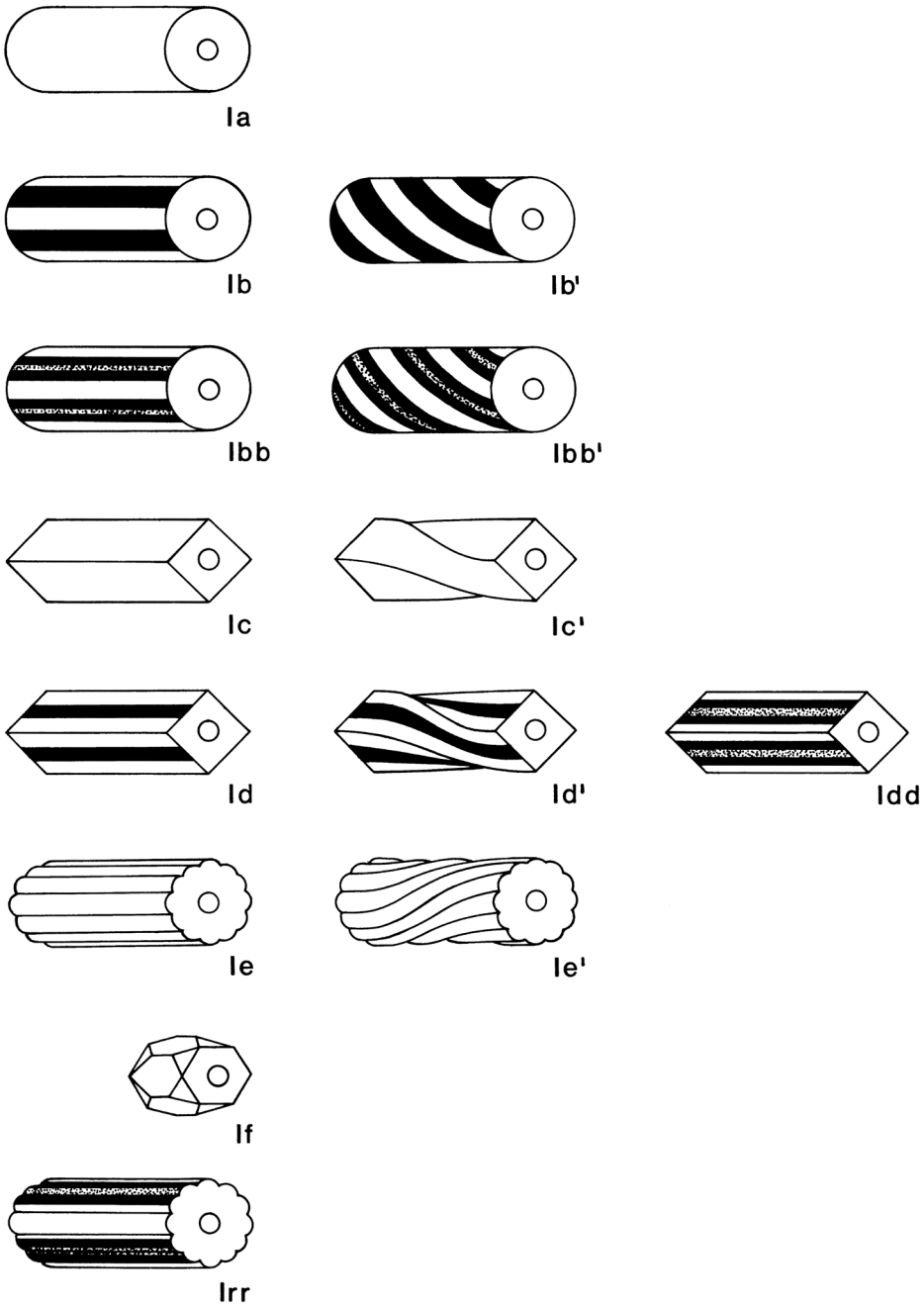

Figure 1. Recorded types of Class I drawn beads (all drawings by Dorothea Larsen).

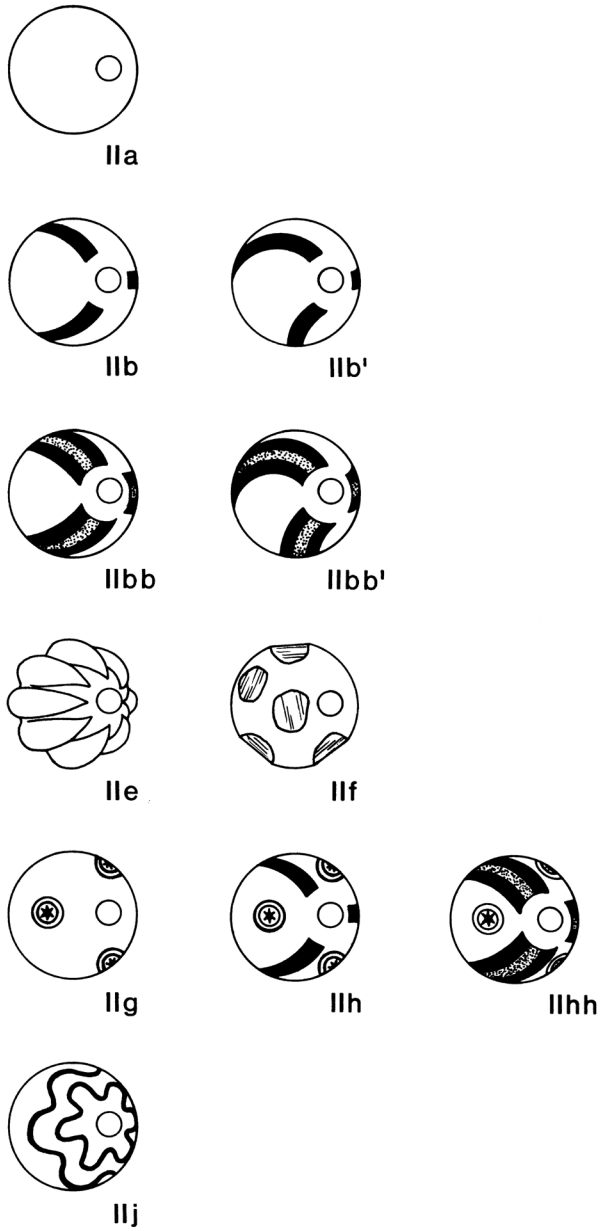

Figure 2. Recorded types of Class II drawn beads.

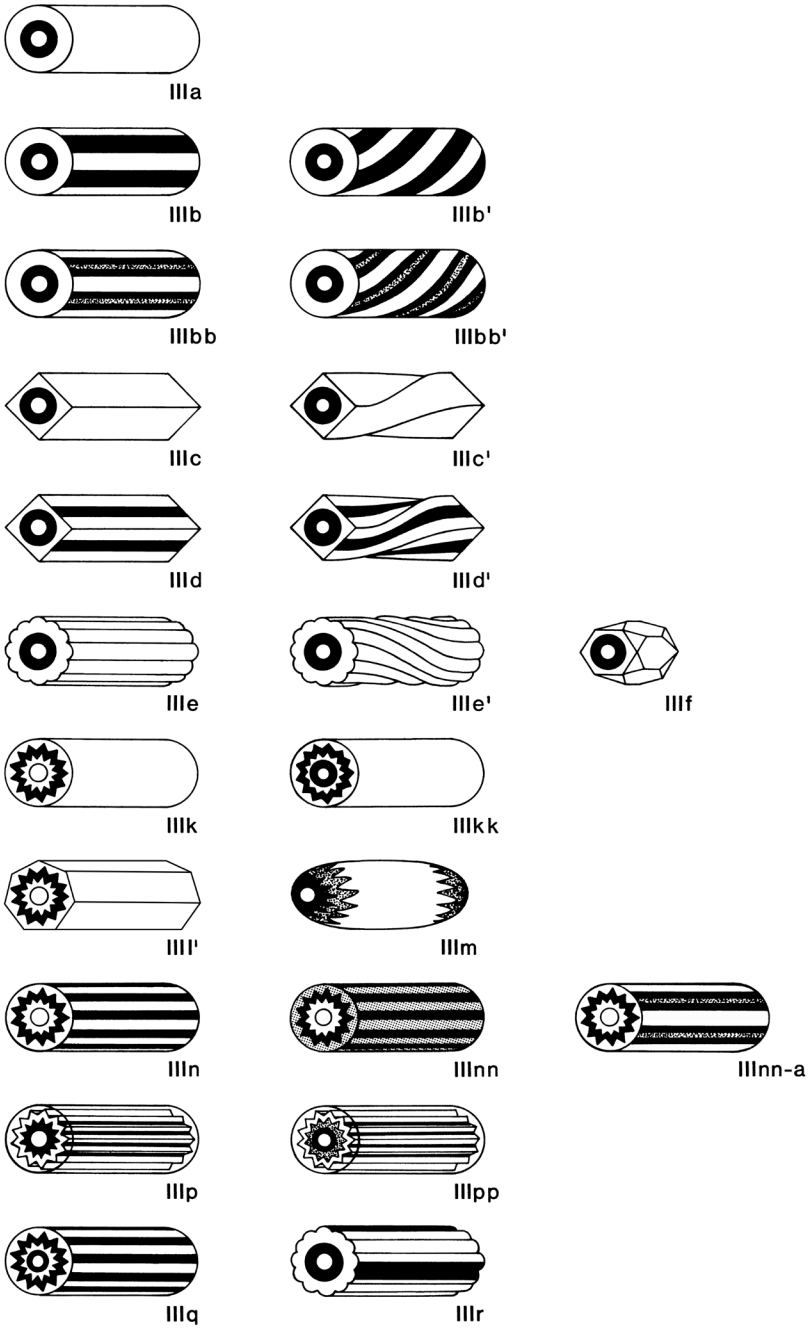

Figure 3. Recorded types of Class III drawn beads.

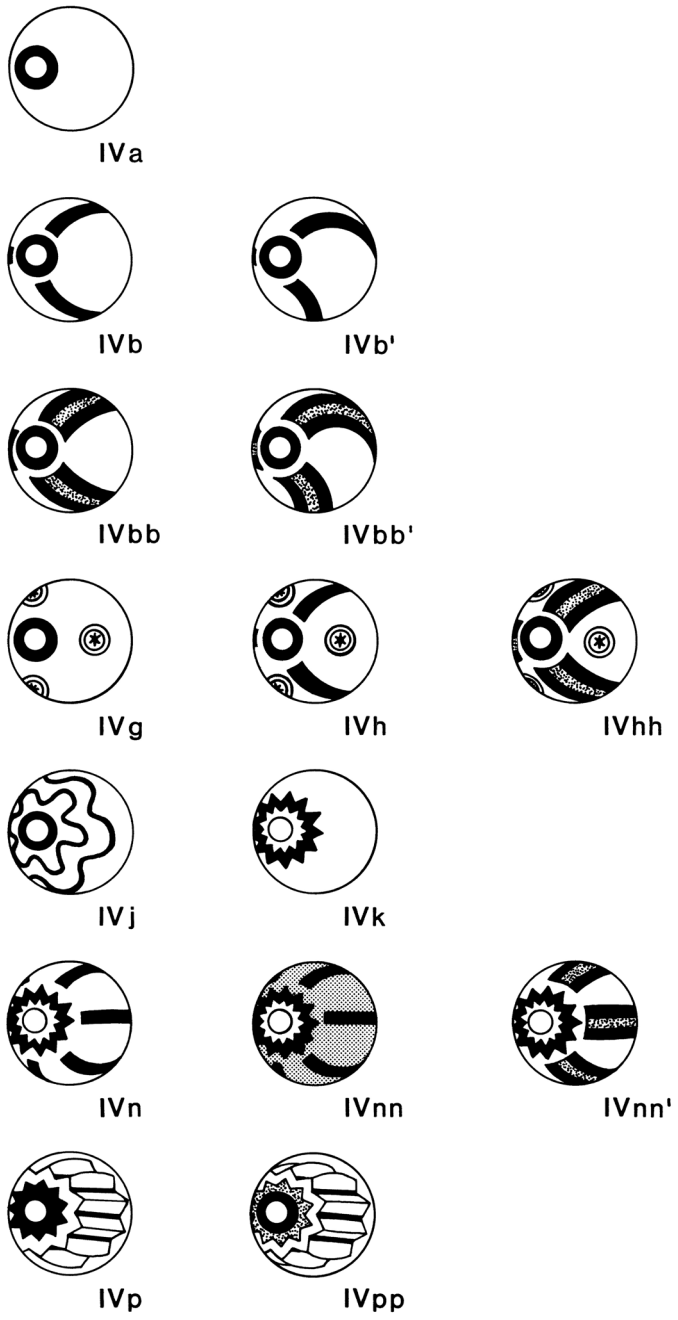

Figure 4. Recorded types of Class IV drawn beads.

Class IV. Non-tubular (heat-rounded) beads with compound (multi-layered) bodies which may exhibit adventitious surface decoration.

IVa Undecorated

IVb Decorated with straight simple stripes

IVb' Decorated with spiral simple stripes

IVbb Decorated with straight compound stripes

IVbb' Decorated with spiral compound stripes

IVg "Flush eye" beads (decorated with insets; lamp-worked)

*IVh "Flush eye" beads with insets and straight simple stripes (lamp-worked)

*IVhh "Flush eye" beads with insets and straight compound stripes (lamp-worked)

*IVj "Roman" beads encircled by two or more wavy lines (lamp-worked)

IVk Chevron beads with plain outer layers (any of the chevron and semi-chevron beads may have facets ground on the ends and these should be noted)

IVn Chevron beads decorated with straight simple stripes on the outer layer

IVnn Chevron beads decorated with straight simple stripes on the outer layer; these resemble porcelain imitations of type IVn beads

*IVnn' Chevron beads decorated with straight compound stripes on the outer layer

*IVp Chevron beads decorated with straight simple stripes on the surface of the second layer

*IVpp Semi-chevron beads (all layers except the core are "starry") decorated with straight simple stripes on the surface of the second layer

Wound Beads

Wound beads, also termed wire wound and mandrel wound, were produced by winding a viscid rod or a strand drawn therefrom around a rotating metal mandrel one or more times until the desired size and shape were achieved. While still soft, the beads might be decorated with any of a myriad of inlays or appliques. They might also be pressed with small paddles to impart soft facets or rolled in a trough mold to produce a symmetrical form. The beads could also be clamped in tong-like molds to impart a design or a uniform shape (this should not be confused with the "mold-pressed" process (cf.) where production begins with a glob of molten glass and not an already formed wound bead). When cool, the beads were stripped from the mandrel which was sometimes tapered and covered with chalk, graphite, or clay to facilitate this step (Kidd and Kidd 1970:49; Sprague 1979:8).

A variation of this technique that was not common in Europe and appears to have only been used in the Fichtelgebirge region of Germany is called furnace winding. In this process, a worker gathered a glob of glass onto the point of an iron rod directly from a pot of molten glass and formed it into the desired shape with a tool that may have been an open-faced mold. Once the bead had cooled, it was removed from the iron rod and put into a clay annealing box next to the furnace (Kenyon et al. 1996, 2009).

The surfaces of wound beads usually exhibit swirl marks that encircle the axis. Bubbles are either round, or elongate and oriented like the swirl marks. The perforation may taper slightly and have an uneven surface.

The Kidds segregate wound beads into three classes according to their structure (simple or compound) and the relative complexity of their shape (Figure 5). Types are determined according to the shape and general configuration of the decoration, if any, whereas varieties are based on the color and diaphaneity of the structural elements.

A listing of the various classes and types recorded to date follows. Types marked with an asterisk (*) were encountered after the Kidds' classification system was printed. The diversity of the varieties precludes their being listed; *see* Kidd and Kidd (1970:84-86) for the few they recorded. Forms not listed below will certainly be encountered and should be identified using the terminology and codes in Beck (1928, 2006).

Class WI. Single-layered, monochrome and polychrome beads with simple shapes.

WIa Cylinder

WIb Round (includes globular, oblate, and barrel shaped; specify which)

WIc Oval

WId Doughnut-shaped

*WIe Conical

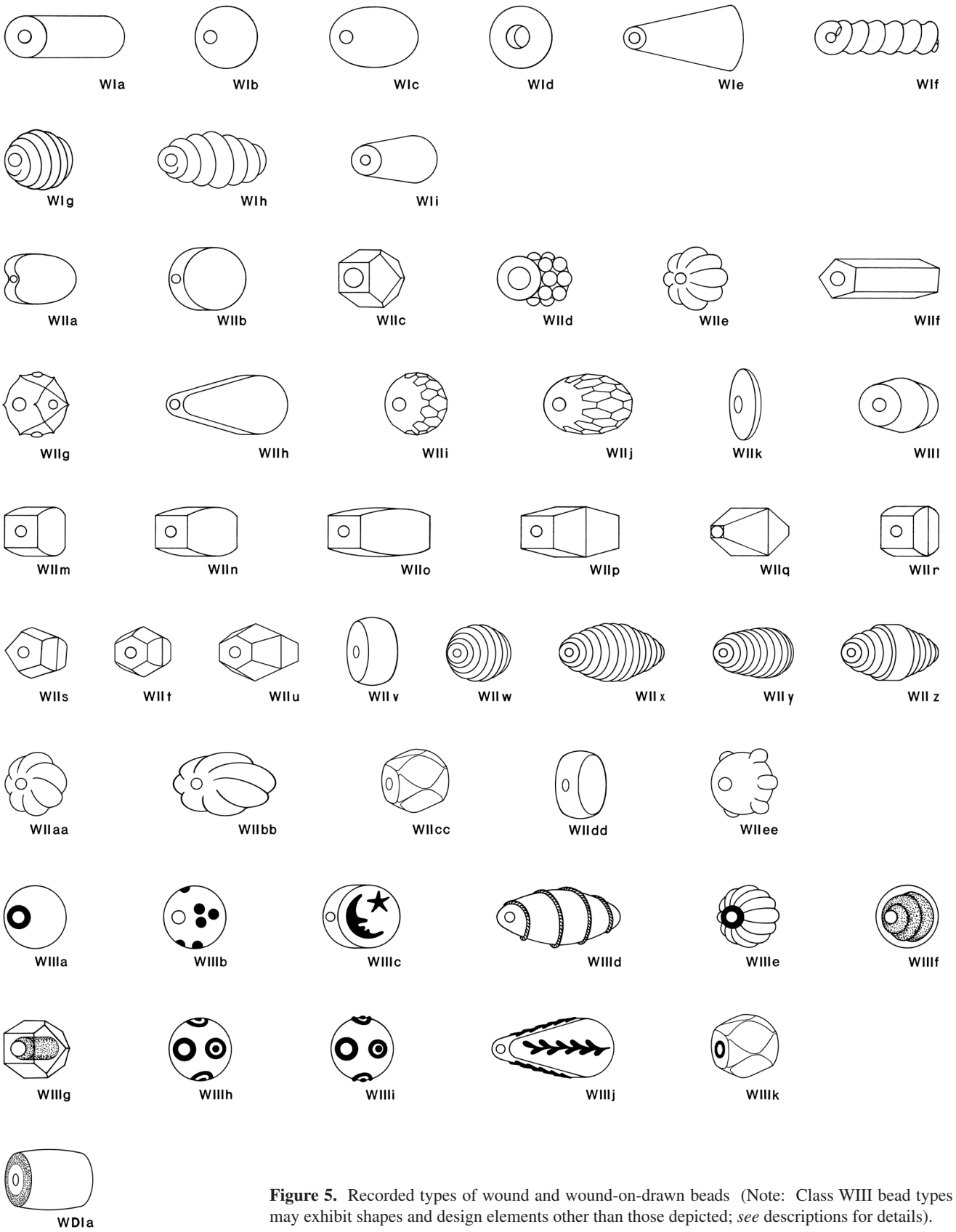

Figure 5. Recorded types of wound and wound-on-drawn beads (Note: Class WIII bead types may exhibit shapes and design elements other than those depicted; *see* descriptions for details).

*WIf Spiral cylinder (shaped like a compressed cylindrical spring, this type consists of a glass rod wound in a spiral fashion)

*WIg Round raised spiral (formed by winding a glass rod into a round form; there is no core, the interior is hollow)

*WIh Oval raised spiral (formed as above)

*WIi Truncated teardrop

Class WII. Single-layered, monochrome and polychrome beads with relatively elaborate shapes formed by pressing, pinching, molding, grinding, or some other form of manipulation.

WIIa Corn (tabular beads in the shape of corn kernels)

WIIb Flat disc (tabular beads with circular outlines)

WIIc Faceted "five-sided" or pentagonal (each has eight or ten pentagonal pressed facets)

WIId Raspberry (these exhibit several rows of prominent nodes)

WIIe Melon (lobed beads resembling melons)

WIIf Ridged tube (tubular beads with rectangular pressed facets that extend their entire length)

WIIg Beads with complex pressed designs (specify the exact configuration)

*WIIh Flattened teardrop (teardrop-shaped beads pressed flat)

*WIIi Round-faceted (round beads whose surfaces have been modified into facets by grinding)

*WIIj Oval-faceted (oval beads whose surfaces have been modified into facets by grinding)

*WIIk Circular convex bicone (Beck [1928] type I.A.1.e - I.B.1.e.)

*WIIl Standard circular truncated convex bicone (type I.C.1.f.)

*WIIm Short square barrel (type IX.B.1.b.)

*WIIn Standard square barrel (type IX.C.1.b.)

*WIIo Long square barrel (type IX.D.l.b.)

*WIIp Long square truncated bicone (type IX.D.2.f.)

*WIIq Standard square bicone (type IX.C.2.e.)

*WIIr Truncated square convex bicone (type IX.B.1.f.)

*WIIs Truncated pentagonal convex bicone (type XII.C.1.f.)

*WIIt Truncated hexagonal convex bicone (type XIII.C.1.f.)

*WIIu Truncated hexagonal bicone (type XIII.D.2.f.)

*WIIv Short barrel (type I.B.1.b.)

*WIIw Round ribbed (apparently rolled in a linear ribbed mold to impart a contiguous series of ribs or rings that encircle the bead perpendicular to the perforation)

*WIIx Oval ribbed (formed like type WIIw)

*WIIy Ribbed truncated teardrop (formed like type WIIx)

*WIIz Oval ribbed with medial band (formed like type WIIy but with a plain broad band around the middle)

*WIIaa Round spiral lobed (twisted melon)

*WIIbb Oval spiral lobed

*WIIcc Round/irregular with irregular pressed facets

*WIIdd Flattened oblate (beads pressed flat parallel to the perforation)

*WIIee Round knobbed (similar to the WIId "raspberry" form but with only a single row of knobs about the equator)

Class WIII. Single-layered, monochrome and polychrome beads with adventitious decoration, and multi-layered beads with or without adventitious decoration or faceting.

WIIIa Class WI beads with a surface coating of a different color or material

WIIIb Class WI beads with inlaid decoration (incorrectly described in Kidd and Kidd [1970:86] as "overlaid in a design")

WIIIc Class WII beads with inlaid decoration

WIIId Class WI beads with overlaid decoration

WIIIe Class WII beads with a surface coating of a different color or material (incorrectly described in Kidd and Kidd [1970:86] as "overlay of material other than glass")

*WIIIf Class WI beads with internal decorative elements

*WIIIg Class WII beads with internal decorative elements

*WIIIh Type WIIIa (multi-layered) beads with inlaid decoration

*WIIIi Type WIIIa (multi-layered) beads with overlaid decoration

*WIIIj Class WII beads with overlaid decoration

*WIIIk Class WIIIe beads with pressed facets

Wound-on-Drawn Beads

This is a rare manufacturing type recorded at only a few sites in the Pacific Northwest (e.g., Burgess and Dussubieux 2007:64; Sprague 1979:9). It consists of a short section of drawn tubing about which has been wound a layer of contrastingly colored glass. Having a red exterior and white core, the only variety observed to date is practically indistinguishable from its more common, all-wound counterpart. The only difference is that the cores of the former contain linear bubbles that parallel the perforation. Preliminary chemical analysis suggests that these beads may be the products of the Bohemian beadmaking industry (Burgess and Dussubieux 2007:70).

As only one variety has been observed to date, it is impossible to do more than make a few suggestions concerning a classificatory scheme for wound-on-drawn beads (Figure 5). Using the wound bead system as a basis, the wound-on-drawn category (designated WD) may be classified as follows:

Class WDI. Multi-layered, undecorated.

*WDIa Barrel shaped

Additional types would be designated according to the shape of the beads. Varieties would be based on the color and diaphaneity of the structural components.

Mold-Pressed Beads

Variously cited in the literature as molded, pressed, and mold pressed, the latter designation is adopted here as it seems to best describe the process of manufacture. Two basic methods were employed to produce the mold-pressed beads found on North American sites. In the first, the end of a glass rod was heated over an oil flame or in a furnace until it melted. A piece was then pinched from it and pressed in a tong-like two-piece mold. As the glass was compressed, any excess was forced out at the seam while a moveable pin (or pins, depending on how many holes were desired) pierced the glass and formed the perforation.

In a variation of this, termed "mandrel-pressing" by Ross (2003), a tapered pin attached to the interior of one half of the mold formed the perforation. As the pin did not extend all the way to the other side of the mold when it was closed, the narrow end of the perforation was sealed and had to be ground down and/or broken through once the bead had hardened.

In the second method, two pieces of viscid glass, one in either half of a two-piece mold, were pressed together to fuse them. This permitted the production of beads with complex colored patterns that would have been distorted or destroyed in the previous processes. The movable pin that formed the perforation usually extended from one half of the mold to the other in the case of round and oblate beads and across the open face of the mold for flattened and elongated specimens. Consequently, the beads in the former group have seams about their equators, whereas those in the latter group have seams along their edges. Some faceted beads have mold seams that zig zag around the middle, following the edges of the central facets. The nature of the mold seam, if visible, should be noted (Ross 2003:46).

After the beads were removed from their respective molds, any flash along the mold seam was removed by tumbling and facets imparted by the mold were frequently ground smooth. If the perforation remained sealed off at one end as in the case of the mandrel-pressed beads, the closed end of the bead was ground down and, if need be, punched through.

Mold-pressed beads are usually symmetrical though they may display tiny flattened areas. They may also have uneven "orange peel" surfaces, or exhibit mold marks in the form of slight to bold ridges and linear bulges, seams in colored patterns, or slightly differently colored linear zones caused by differential light refraction. The perforations (and there may be several) sometimes taper distinctly, especially in the case of the mandrel-pressed beads, and frequently have crackled surfaces. It is sometimes difficult to distinguish mold-pressed beads from Prosser-molded beads (cf.) having a high silica content.

Mold-pressed beads were produced in a wide variety of forms, styles, and colors (Neuwirth 1994, 1995, 2011). While relatively few of these appear in archaeological collections, a basic classificatory framework may be created on the basis of recovered specimens and those illustrated in various publications

The mold-pressed category (designated MP) is divided into two major classes based on the presence or absence of faceting or molded designs[2] (Figure 6). Shape determines the type, whereas varieties are defined according to the color and diaphaneity of the structural elements, the configuration

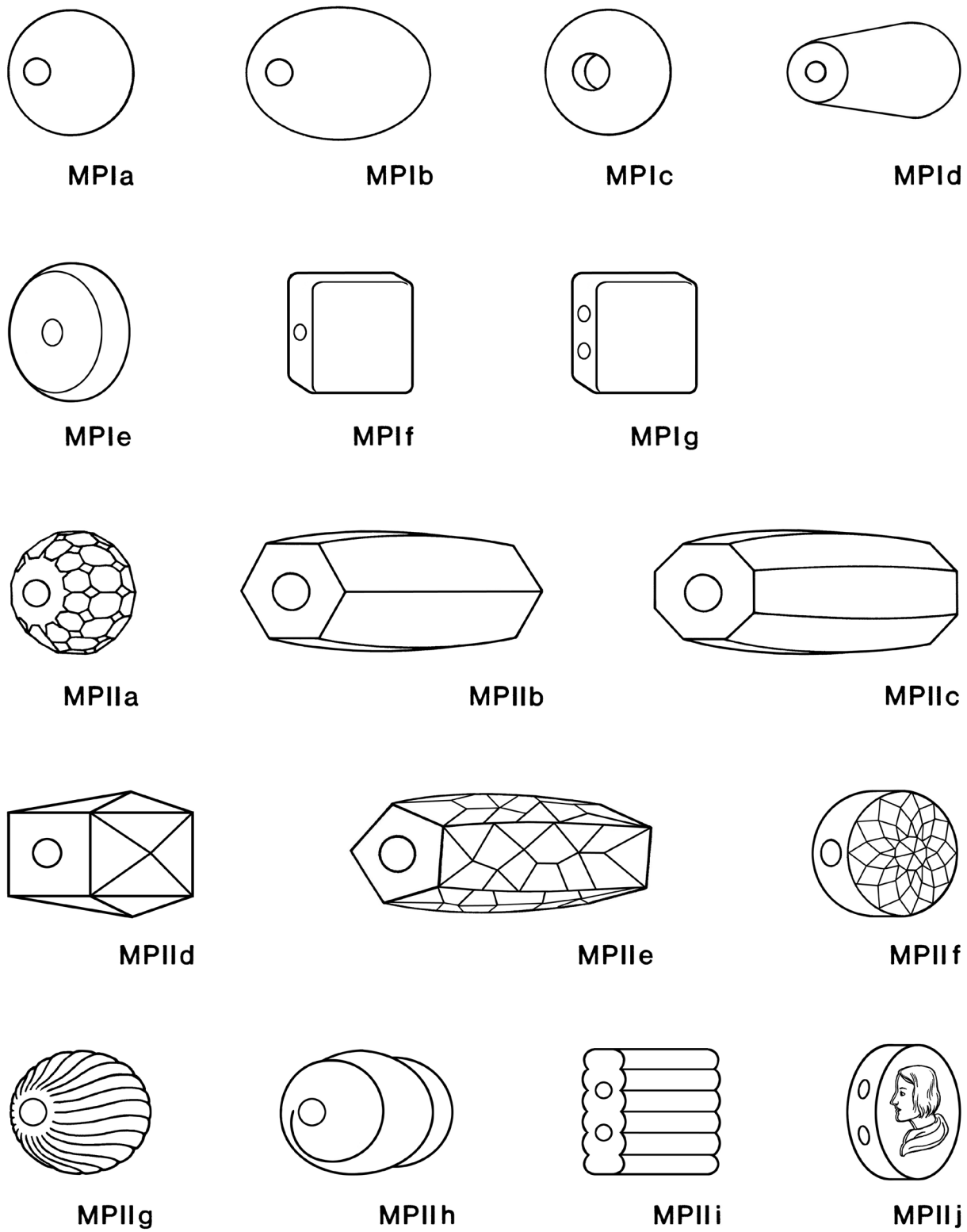

Figure 6. Recorded types of mold-pressed beads (Note: Class MPII bead types may exhibit shapes and design elements other than those depicted; *see* descriptions for details).

of the decoration, the shape, number, and configuration of the perforation(s), the number, shape, and type (mold imparted or cut) of facets, and the nature of the mold seam, if visible. In all cases where the manufacturing sub-type can be determined, it should be appended to the description; e.g., MPIIa. Round-faceted (mandrel pressed). For a detailed study of 19th-century faceted mold-pressed beads, *see* Ross (2003).

Class MPI. Undecorated monochrome and polychrome beads.

MPIa Round

MPIb Oval

MPIc Doughnut-shaped

MPId Truncated teardrop

MPIe Barrel disk

MPIf Rectangular tabular

MPIg Rectangular multi-hole spacer beads (describe exact configuration)

Class MPII. Monochrome and polychrome beads exhibiting various forms of surface decoration such as facets or molded designs (specify which and describe).

MPIIa Round faceted (describe exact configuration)

MPIIb Long hexagonal barrel (Beck type XIII.D.1.b.)

MPIIc Long octagonal barrel (type XIV.D.1.b.)

MPIId Square-faceted

MPIIe Faceted pentagonal barrel (pentagonal cross-section)

MPIIf Plano-convex faceted (circular outline, plano-convex cross-section)

MPIIg Round beads with molded designs

MPIIh Oval beads with molded designs

MPIIi Rectangular multi-hole spacer beads with facets or molded designs (describe exact configuration)

MPIIj Oval multi-hole spacer beads with facets or molded designs (as for above)

Blown Beads

Beads in this category were either free blown or mold blown. In the former case, one method entailed blowing a bubble of molten glass at the end of a blowpipe. This was a slow process; a more common technique was to individually blow one or more bubbles in a glass tube heated at the lamp. If desired, a design could be trailed onto the surface while the glass was hot.

There were two basic methods in mold blowing as well. A simple technique was to blow a small bubble at the end of a glass tube which was quickly inserted into a two-piece mold. Additional air was then blown in so that the bubble filled the cavity. A more complicated (and more productive) process involved placing a glass tube in a two-piece mold with up to 24 connected cavities. The mold and tube were heated until the glass became viscid and air was blown into the tube either by mouth or mechanically using compressed air to expand the tube and make it conform to the shape of the mold. Mold blowing could produce beads with very complicated designs. If a row of beads was produced, it was either used as such or the individual segments could be broken apart to form individual beads. In either case, the protruding ends were usually fire polished to round the broken edges.

"Constricted-tube" beads (Figure 7, BIk-l) are a related form that was made at the lamp but apparently did not involve increasing the diameter of the tube by blowing. Consisting of thin, unaltered tube sections with constricted ends, the beads were apparently produced by heating a small section of a tube over a flame and then pulling the tube in opposite directions to form a narrow waist. After a series had been produced, the segments were broken apart and the constricted ends fire polished. These beads retain the same diameter as the original tube and are usually in the form of long cylinders or standard barrels.

The beads created using any of the aforementioned methods could subsequently be decorated or otherwise enhanced by painting designs on their surfaces or introducing paint, colored wax, powdered fish scales, or metal dust into their interiors (Pazaurek 1911:2). They were often filled with white wax to render them less fragile (Lardner 1972:236). Blown beads are easy to identify as they are all hollow.

Blown beads were produced in a myriad of forms and styles (Neuwirth 1994, 1995, 2011) but are rarely encountered at archaeological sites because of their fragility. Consequently no attempt has been made to list all the possible types as most will probably never be encountered by researchers. An examination of recorded specimens and those illustrated by Neuwirth (1994, 1995, 2011) does, however, allow the creation of a basic classificatory framework.

Beads in the blown category (designated B) are divided into two major classes based on the presence or absence of surface decoration, whether faceting, painting, or applied

components. Types are distinguished according to shape and form (Figure 7). Varieties are defined by the color and diaphaneity of the components; the nature of the coloration (external, internal, or in the glass itself); and where applicable, the number, shape, and type (mold imparted or cut) of facets; the nature and configuration of the decoration; and the number of segments.

Class BI. Undecorated monochrome and polychrome beads including those with gilded, silvered, or otherwise coated exteriors or interiors.

BIa Round

BIb Barrel

BIc Oval

BId Segmented

BIe Teardrop

BIf Melon (lobed)

BIg Round ribbed

BIh Oval ribbed

BIi Round spiral ribbed

BIj Oval spiral ribbed

BIk Barrel shaped (constricted tube)

BIl Long ribbed cylinder (constricted tube)

BIm Ribbed double-bulge oblong

BIn Hexagonal alternating twist (lamp-worked bead apparently produced by twisting a heated hexagonal tube one way and then the other until a series of undulations were formed in the body facets; formerly drawn type Io)

Class BII. Monochrome and polychrome beads exhibiting various forms of surface decoration including facets (specify which and describe).

BIIa Round with painted or gilded decoration

BIIb Oval with painted or gilded decoration

BIIc Round with trailed glass decoration and/or facets

BIId Oval with trailed glass decoration and/or facets

BIIe Faceted teardrop

BIIf Complex molded (describe exact configuration)

Prosser-Molded Beads

This manufacturing type was defined by Sprague (1973, 1983) and Ross (1974:18) who termed it "Prosser molded" because of its similarity to the molding technique for ceramic buttons that was patented by Richard Prosser (1840). Although the beads are technically ceramic, depending on the amount of silica in the composition, they sometimes have the appearance of grainy glass so are included here. Unlike the beads discussed previously, Prosser-molded or "tile" beads, as they are generically called in the manufacturer's parlance, are not produced from viscid glass but from a powdered mixture consisting of feldspar, calcium fluoride, silica sand, and a colorant. Milk is used as a binding medium and the paste is then pressed in a gang mold to impart the desired shape (Opper and Opper 1991:49). The mold is then inverted and the beads are expelled onto a metal sheet which is then placed in a furnace until the material fuses. Some varieties had colored stripes or other decoration of colored glaze applied to them prior to firing. The bead could also be rolled in glaze and/or the ends could be dipped in it to impart the appearance of a cored or multi-layered body. The beads may be glazed or have the appearance of unglazed porcelain. Beads with a high silica content have a glassy appearance and a granular structure is visible if the material is sufficiently transparent.

Prosser-molded beads often exhibit a broad, slightly raised equatorial band. Generally, one end is rounded and smooth, while the other is somewhat flattened and rough or pebbled. The perforation tapers toward the rounded end.

Neuwirth (1994, 2011) illustrates a wide range of Prosser-molded beads (designated PM). Using her illustrations, coupled with an examination of archaeological specimens and beads on 20th-century sample cards, it is possible to group the beads into two major classes based on the presence or absence of surface decoration, including stripes, dots, or elaborate faceting (Figure 8). Types are determined based on shape and the nature of the decoration, if any, while varieties are determined by the color and diaphaneity (most beads are opaque but those with a high silica content are translucent) of the structural components and the color and configuration of the decoration. As there are so many different forms of Prosser-molded beads and relatively few have been found in American archaeological assemblages, no attempt has been made to list them all. The most common ones are listed below. New types may be added as they are encountered.

Class PMI. Undecorated monochrome and polychrome beads.

PMIa Round

PMIb Oblate

PMIc Oval

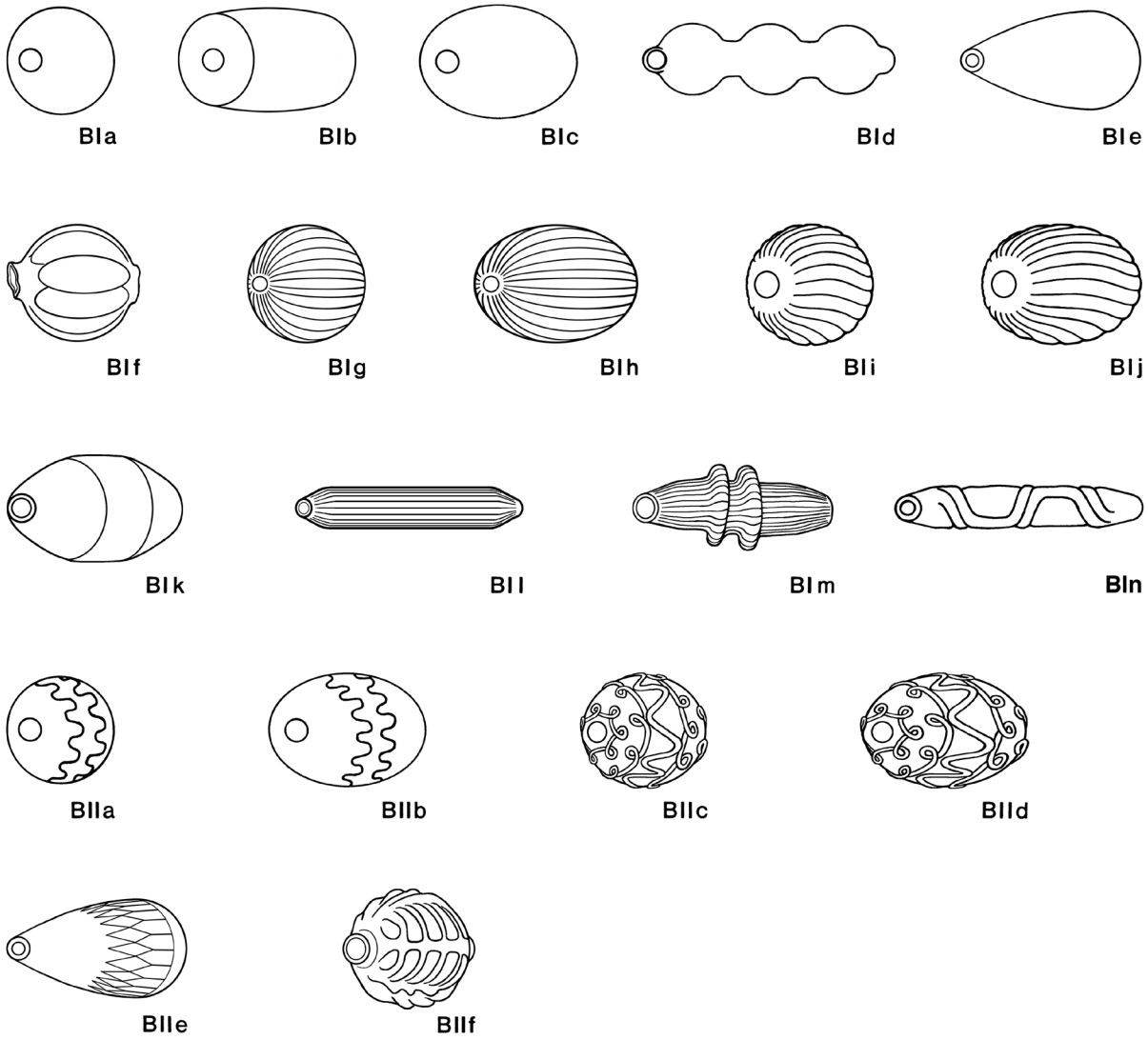

Figure 7. Recorded types of blown beads (Note: Class BII bead types may exhibit shapes and design elements other than those depicted; *see* descriptions for details).

PMId Barrel shaped

PMIe Demi-oval (an oval cut in half perpendicular to the perforation)

PMIf Cylinder (indicate whether long, standard, or short)

PMIg Barrel disk

PMIh Ring

PMIi Interlocking (beads with crenelated ends that allow the beads to interlock; specify exact form)

PMIj Elaborate forms (describe exact configuration)

Class PMII. Monochrome and polychrome beads exhibiting surface decoration such as stripes, facets, or nodes or other protrusions (specify which and describe).

PMIIa Oval with straight stripes

PMIIb Oval with spiral stripes

PMIIc Oval with dots or eyes

PMIId Cylinder with straight stripes

PMIIe Cylinder with colored nodes

PMIIf Round faceted

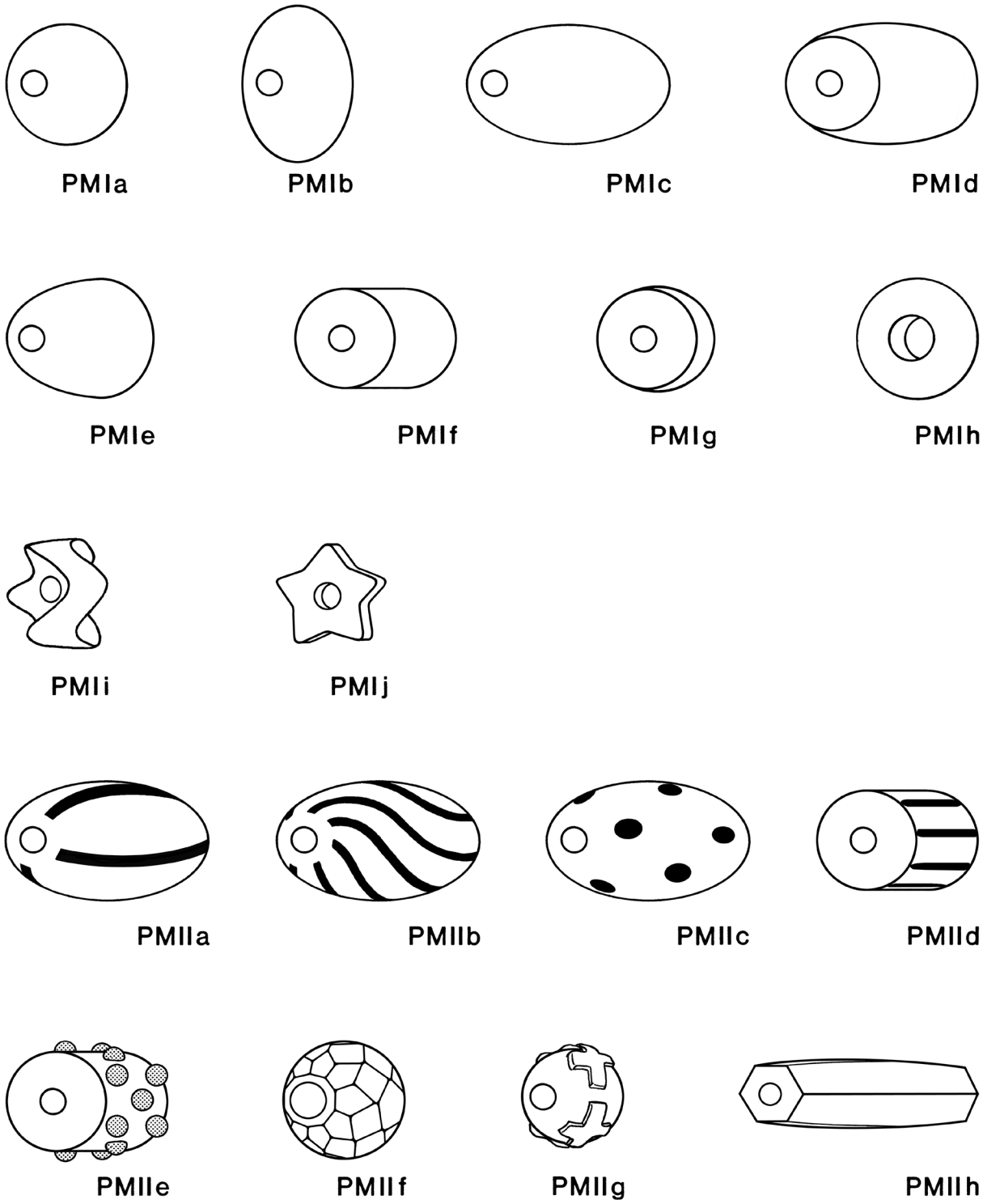

Figure 8. Recorded types of Prosser-Molded beads (Note: Some MP bead types may exhibit shapes and design elements other than those depicted; *see* descriptions for details).

PMIIg Round with complex molded surface decoration (describe exact configuration)

PMIIh Long hexagonal barrel

GLASS BEAD ATTRIBUTES

The following attributes are listed in descending order of their relative importance in the classification of glass beads.

Structure

The physical composition of a bead defines its structure. There are four structural categories (Stone 1974:88-89):

Simple – beads composed of a single undecorated layer of glass (includes flashed specimens).

Compound – beads composed of two or more undecorated layers of glass.

Complex – simple specimens with adventitious decoration.

Composite – compound specimens with adventitious decoration.

Shape

Although the shape nomenclature utilized by the Kidds is basically self-explanatory, a few comments will help elucidate some of the terms.

All **tubular** beads are assumed to have round cross-sections unless otherwise noted. If not, the specific cross-section shape should be appended (e.g., tubular-hexagonal). As they often grade imperceptibly into the circular group, tubular specimens may be segregated using the following criteria. A bead of any length is classified as tubular if it has broken or cut ends that have not been altered by heat rounding. If the ends have been rounded, a bead is tubular if its length exceeds twice its diameter. Tubular beads of types If and IIIf that have hexagonal-, heptagonal-, and octagonal-sectioned bodies whose corners have been removed by grinding are termed tubular, cornerless hexagonal/heptagonal/octagonal (whichever pertains). In certain cases, it is useful to note if the walls of a tubular bead are thin or thick in regard to the size of the perforation.

Circular specimens, shaped like little rings or tori, have lengths that are less than twice their diameter. As there is so much variability in the shape of heat-rounded drawn beads as well as some wound beads, the **round** category incorporates beads that are not only globular or spheroidal, but also oblate and barrel-shaped. The specific shape should be indicated. If there is shape overlap within a sample, the description should reflect this (e.g., round to barrel shaped). Some **oval** beads are somewhat barrel-shaped while others are shaped like olive pits. These forms should be identified; e.g., oval (olive-pit shaped).

The Kidds use the term **flat** to define those drawn beads that have been pressed flat parallel to the perforation while the glass was still viscid. As this does not reveal anything about the bead's pre-flattened shape, the term should be modified to include this information. For example, a flattened round bead would be recorded as "flat-round." **Doughnut-shaped** refers to those beads in the wound category that have extremely oblate bodies and large perforations, much like a typical lifesaver.

Other shapes are defined and illustrated in the Glass Bead Classification section of this guide. Should new forms be encountered, the use of Beck's (1928, 2001) system and terminology to designate them is recommended. Unfortunately, as multi-faceted specimens are not adequately covered in the latter, a few comments are appropriate. For beads with more than 21 facets, if the exact shape cannot be determined using Beck, it is suggested that the general form of the bead be given followed by the qualifier "faceted" (for example, round-faceted or elongate-faceted). To this should be appended a description of the type (cut or mold imparted), shape, number, and location of the various facets.

Decoration

Applied adornment encountered on beads found in the Americas falls into three major categories. **Overlaid:** appliques of glass or another material that either rest on or protrude noticeably from the surface of the bead (this includes painted decoration). **Inlaid:** embedded elements whose surfaces are either flush with or only slightly above the surface of the bead. **Internal:** decorative elements, such as colored cylinders, spiral bands, and metal foil, located within the body of the bead.

Beads may be decorated using multifarious techniques and decorative elements, the most common of which include the following. Aligned with the perforation, **stripes** may be simple (monochrome) or compound (polychrome), and straight (Figure 9, a) or spiral (Figure 9, b). In some cases straight lines intersect to form a **lattice** (Figure 9, c). **Rings** are lines that encircle a bead perpendicular to the perforation (Figure 9, d). **Wavy lines**, either simple or compound, are those that undulate around a bead (Figure 9, e). Also called "double wave," **interwoven lines** consist of

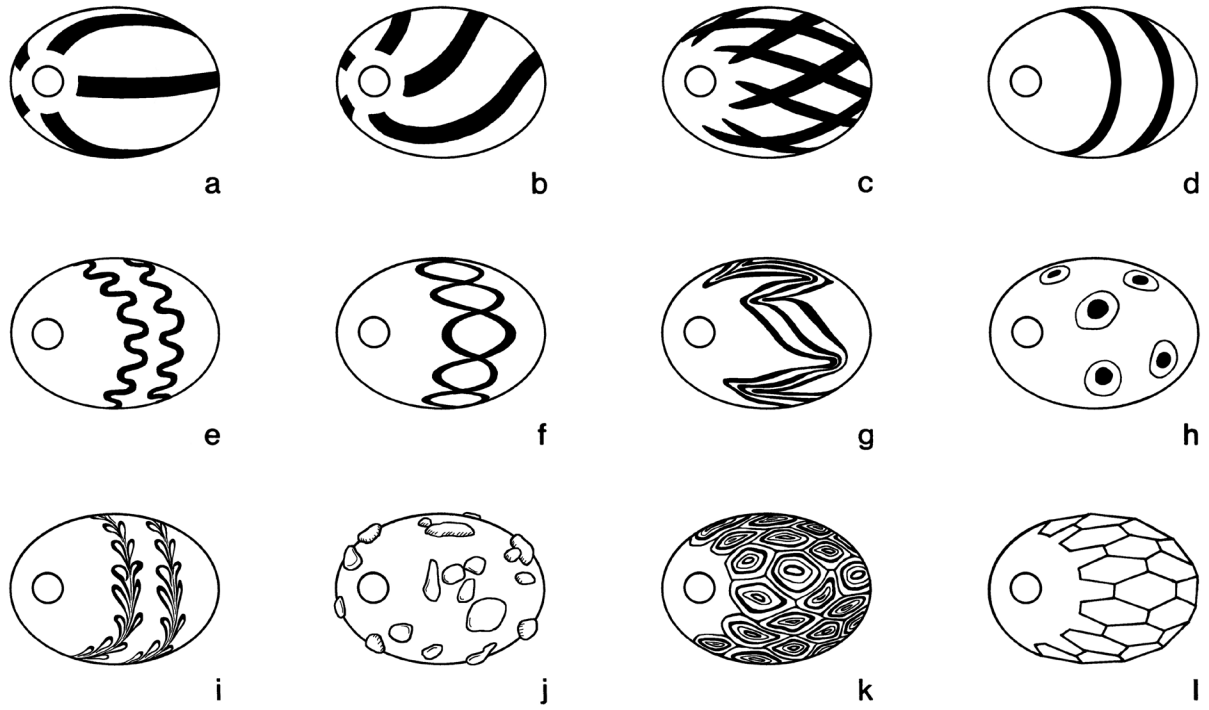

Figure 9. Some common forms of bead decoration: a, straight stripes; b, spiral stripes; c, lattice; d, rings; e, wavy lines; f, interwoven lines; g, combed designs; h, eyes; i, floral designs; j, crumb; k, mosaic; l, facets.

two intersecting wavy lines that encircle a bead (Figure 9, f). In the case of **combed designs**, a wire is drawn through freshly applied viscid rings or spiral stripes to produce a series of scallops, ogees, zigzags, or feather-like patterns (Figure 9, g). Specimens adorned with simple or compound dots are called **"eye beads"** (Figure 9, h). **Floral designs** include various designs in the form of simple or compound wreaths, flowers, blossoms, and plants whose appearance ranges from highly stylized to realistic (Figure 9, i). **Crumb** beads are made by embedding contrastingly colored crushed glass into the body of a bead while the glass is viscid and then fire polishing it to fuse the components; the crumbs may protrude from the surface or be flush with it (Figure 9, j). Wound **mosaic** beads consist of fused sections of fancy cane generally embedded in a glass core to create elaborate designs (Figure 9, k). **Facets** may be applied with the use of paddles or molds while the glass is soft or they may be ground after the glass has hardened (Figure 9, l). Other forms of decoration that may be encountered are described and illustrated in Beck (1928) and van der Sleen (1967).

Color

In the Kidds' system, colors are designated using the names and codes proposed in the *Color Harmony Manual* (Container Corporation of America 1958). As the latter is obscure and no longer produced, the equivalent codes in the better-known Munsell color notation system should be used instead. (The codes for the colors recorded by the Kidds are provided in Table 1 of the reprint of the Kidds' taxonomic system that accompanies this report; *see* p. 44).

Although some researchers have used the colored plates in Kidd and Kidd (1970) to identify the colors of their specimens, this practice is not endorsed. For one thing, the color rendition in the plates, especially that in the French edition and a subsequent reprint (Kidd and Kidd 1983:219-257), is not true enough to permit proper identification. For another, the list of recorded colors has dramatically increased since 1970 so that the plates provide far from adequate coverage.

The correct procedure is to compare the beads to the glossy finish chips in the *Munsell Book of Color* (Munsell Color 2010) or the smaller and less-expensive *Munsell Bead Color Book* (Munsell Color 2012) which lists all the colors encountered in archaeological and ethnographic materials in North America to date.

To properly determine the color of a bead, it must first be cleaned of all dirt. If the surface is eroded, dull, or lightly patinated, the specimen should be wet with water,

preferably deionized, or clean saliva to bring out the true color. Those covered with a thick patina need to be cleaned in a small area before being moistened if this will not harm the specimen. The bead should then be mounted on the tip of a teasing needle and compared to the Munsell chips against a white background in natural daylight or daylight-approximating fluorescent light. Incandescent and regular fluorescent lighting should be avoided as they impart an orange or a greenish hue to the glass, respectively. Also keep in mind that early morning and late afternoon sunlight may also affect color determination.

The color of opaque beads must obviously be ascertained using reflected light. In the case of translucent and transparent beads, transmitted light should be used with the reflected color being noted if it varies significantly (e.g., transparent reddish purple or green beads which appear black unless held up to a strong light). If the glass is dichroic (i.e., it has a distinctive golden or opalescent cast), this should also be noted. For multi-layered beads, record colors from the outside inward.

As there is a great deal of variation in the color of beads produced before about 1850, the range should be noted for a group of beads that comprise a variety with the modal hue being used to determine the specific variety.

To facilitate an ordered inventory, beads in each type category should be listed on the basis of their body color and decorative elements as arranged in the Munsell system. The neutral values (white, gray, black) come first, followed by red, yellowish red, yellow, greenish yellow, green, bluish green, blue, purplish blue, purple, and reddish purple.

Diaphaneity

The diaphaneity of beads is described using the terms opaque (op.), translucent (tsl.), and transparent (tsp.). Although the Kidds use "clear" in lieu of "transparent," the latter term is preferred as it is more descriptive and clear is generally taken as meaning "colorless." Simply defined, beads that are **opaque** are impenetrable to light except on the thinnest edges. **Translucent** specimens transmit light, yet diffuse it so that a pin inserted in the perforation appears only as a shadow when viewed through the body of the bead. **Transparent** beads are such that a pin in the perforation is clearly visible. Sometimes diaphaneity will vary slightly in an otherwise like batch of beads. In such an instance, list the range (e.g., tsl./op.). As the presence of numerous tiny bubbles will affect the diaphaneity of a bead, their presence should be noted.

Patination and Luster

Beads are often patinated and this feature may sometimes be the only clue to its relative age. The color and degree of the patination should be noted. Researchers should keep in mind that the patina on beads may be thin yet have an almost imperceptible yellowish (or other) tint that can change the color of, say, a bright blue bead to turquoise blue. Removing the patina from one or two specimens will usually reveal the true color.

Unpatinated beads will generally exhibit one the following types of luster. The two most common types are **shiny** (smooth and bright) and **dull** (not shiny). Others that may be encountered, especially on 19th- and 20th-century specimens, are **metallic** (having a metallic sheen), **iridized** (having an iridescent surface), **greasy** (having an oily appearance), **matte** (etched with acid), and **satin** (characterized by a fibrous structure).

Size

Although the five arbitrary size categories (very small, under 2 mm; small, 2-4 mm; medium, 4-6 mm; large, 6-10 mm; and very large, over 10 mm) proffered by the Kidds are useful in relating relative size, research conducted by Ross (1976:684-766, 1990) and Karklins (1983b:188) has revealed that they are too broad to be of any use in establishing historical size groups where the inter-size interval can be as little as 0.2 mm. Minimally, the range of each variety's least diameter and length should be recorded to the nearest tenth of a millimeter using vernier calipers. Least diameter is indicated as this dimension is the one that determines a bead's size as it passes through a series of screens during the sizing process at the factory. The pertinent dimensions for most beads are length (parallel to the perforation) and diameter (perpendicular to the perforation). In the case of flattened specimens, however, they are length (parallel to the perforation), width (perpendicular to the perforation), and thickness (perpendicular to the width). Where there is more than one specimen per variety, the size range should be recorded. When a large sample is present (say 100 or more specimens), means and modes should be computed as well as they may provide information about historic bead sizes.

While measuring the perforations of common "seed" beads has generally not been found to be useful, in some cases drawn tubular beads will be encountered where all the physical attributes are identical (i.e., shape, color, diaphaneity) but in one the walls are thin and the perforation very large whereas in the other, the opposite holds true. These are clearly not the same variety and should be described as

variants of a variety (e.g., Ia2 variant). Perforation size may also help segregate wound from mold-pressed beads; e.g. the holes of the latter may have very small diameters while those of wound beads are sometimes quite large.

Post-Production Modification

Beads were occasionally modified after they left the factory or workshop, generally on this side of the Atlantic. This includes grinding a bead to remove its exterior layer(s) or to modify its form, as well as intentional heating or accidental burning, processes that frequently alter a bead's diaphaneity, color, and shape. These characteristics should always be noted. In the case of grinding, an attempt should be made to determine the original form and color sequence of the bead (based on intact accompanying specimens or those in similar collections) and it should then be recorded as that variety with a note stating what alterations have been made.

HISTORICAL ARCHAEOLOGICAL INTERPRETATIONS

Chronology

Despite decades of research, no one has as yet worked out a comprehensive chronology for glass beads found on North or South American sites. Fortunately, there are several regional chronologies as well as a number of detailed reports which describe significant archaeological collections that will help researchers date their assemblages. For the New England area and the adjacent Atlantic provinces, James W. Bradley's (1983) summary of the beads of 16th-17th-century New England may be of use. Ontario lacks a comprehensive chronology, but for those working on 17th-century sites in the southeastern part of the province, the chronology prepared by Ian and Thomas Kenyon (1983) is a must. Walter Kenyon's (1982) report on Neutral beads is also recommended. Researchers in New York state have a large body of information to consult, including Bennett (1983), Pratt (1961), Rumrill (1991), and Wray (1973, 1983). Especially useful for Seneca beads of the late 16th and early 17th centuries are Sempowski and Saunders (2003) and Wray et al. (1987, 1991). Kent (1983, 1984) is a good source for Pennsylvania and several of the volumes in Fenstermaker's *Archaeological Research Booklet* series may also be of use (Fenstermaker 1974a, 1974b, 1977). Researchers in the Mid-Atlantic states will need to rely on Miller et al. (1983). For the Southeast and central Gulf Coast, there is the St. Catherines Island, Georgia, report by Blair, Pendleton, and Francis (2009), Pluckhan's (1996-1997) report on early historic Creek beads (Georgia), Deagan's (1987) study of the beads of Spanish Florida and the Caribbean, Smith's (1983) synopsis of Spanish-period beads, and Brain's (1979) study of the beads from the Tunica Treasure (Louisiana).

Quimby (1966) remains a solid source for the Great Lakes region and Stone (1974) and Mason (1986) should also be consulted. One of the best sources for the Midwest is Good (1972). An overview of Northern Plains and Upper Missouri beads is provided by Davis (1972), an abbreviated version of which appears in Davis (1973). The studies of the beads recovered from Fort Union, North Dakota, are especially useful (DeVore 1992; Ross 2000), and the Leavenworth site (South Dakota) report by Bass, Evans, and Jantz (1971) is also recommended. For the Southern Plains, see Good (1983), Harris and Harris (1967), and Sudbury (1976). They cover the period from 1700 to 1885.

Miller (1994) discusses Alaskan trade beads. As for the Northwest Coast, Quimby (1978) presents an overview of the state of the knowledge of beads in the Northwest, and Woodward (1965, 1970) provides generalized dates for some of the more common bead types. For comparative purposes, Ross' (1976, 1990) studies of the beads from Fort Vancouver (1829-1860), Washington, are essential. As for California, the typology compiled by Clement Meighan (n.d.) must be mentioned as it has been used widely by local researchers. Unfortunately, it is so far only in manuscript form and not readily available. Other reports that should prove helpful to researchers in California are Dietz (1976), Karklins (2009), Motz and Schulz (1980), and Van Bueren (1983).

More comparative information on beads from North American sites may be found by checking the indices in the two annotated bibliographies by Karklins and Sprague (1980, 1987). These are available online at <http://beadresearch.org/Pages/Bead_Bibliography.html>.

Researchers in Mexico should find DiPeso (1974, Vols. 3, 8) and Kelly (1992) of interest. For adjacent Belize, see Smith, Graham, and Pendergast (1994). Spanish Colonial beads from Peru are discussed in Donnan and Silton (2010), Liu and Harris (1982), and Smith and Good (1982).

In the Caribbean region, Deagan (1987) deals with Spanish material in general, Karklins and Barka (1989) cover St. Eustatius, Karklins (1998) discusses beads from Jamaica, and Handler and Lange (1978:274-281) record the beads found on a plantation site on Barbados.

A number of distinctive bead types are also good horizon markers. These include man-in-the-moon beads (Lorenzini

and Karklins 2000-2001), faceted mold-pressed beads (Ross 2003), drawn beads with polyhedral perforations (Ross 2005), drawn white-cored cornaline d'Aleppo beads (Billeck 2008), early eye beads (Smith 1982), Nueva Cadiz beads (Liu and Harris 1982), and wound pigeon egg beads (Engages 1984).

Origins

Although Venice/Murano and Bohemia produced the bulk of the glass beads that were exported to the New World, Holland, Germany, France, England, Spain, Russia, China, and likely some other nations also contributed their share (Kidd 1979; Liu 1975a). Unfortunately, there is no routine method for determining the country of origin for any given bead type. Although van der Sleen (1967:108) proposed that Dutch beads can be distinguished from those of Venetian origin on the basis of chemical composition (Dutch beads supposedly having a high potassium content compared with a high sodium content in Venetian specimens), this supposition was based on limited evidence and is not supported by more recent findings (Karklins 1983a:116). It also totally ignores the chemical make-up of beads manufactured in other countries which could also be high in either potassium or sodium, these being the two standard fluxes utilized in the production of glass.

Much has been done since van der Sleen's pioneering work to determine bead origins on the basis of chemical composition. Most notable are the long-term neutron activation studies conducted by Ron Hancock (Karklins et al. 2001, 2002) and summarized in Hancock (2005) and, more recently, the work undertaken by Burgess and Dussubieux (2007) employing Laser Ablation-Inductively Coupled Plasma-Mass Spectrometry (LA-ICP-MS). They have brought us closer to understanding bead chemistries over time and determining bead origins, but much more work is required before we have the full story. A major factor is the scarcity of comparative material from tightly dated European manufacturing sites. Aside from the beads recovered from 17th-century factory sites and factory wasters in Amsterdam (Gawronski et al. 2010; Karklins 1974, 1985a) and Middelburg (pers. observation) in The Netherlands and the mid-17th-century Hammersmith Embankment site (Egan 2007:5) outside London, England, there are no recorded assemblages of beads of like date from actual manufacturing sites in Europe that I know of and thus far it has been impossible to obtain samples of the Hammersmith beads for analysis. Excavations have also been conducted on manufacturing sites in Germany but the results have yet to be published. Similarly, excavations in and around Paris have produced beads (Dussubieux and Gratuze 2012; Turgeon 2001) that may be local products but this is by no means certain. Factory sample cards from the 19th and 20th centuries are plentiful and chemical analysis of the beads they hold could yield much useful data but such a project has yet to be undertaken. Clearly much more research is required before chemical analysis can resolve the question of bead origins.

It is, nevertheless, possible to determine the probable source of many bead types and varieties on the basis of historic sample cards, museum collections, and archaeological specimens from European manufacturing sites. While it is beyond the scope of this report to attempt a detailed account of what each country produced, the following summary will provide the reader with a basic understanding of each country's principal products and identify additional sources of information.

Venice/Murano

Venice and its factory island Murano were the main suppliers of glass beads to traders and explorers heading to the New World. It had no real competition until the rise of the Bohemian bead industry beginning in the 1860s (Francis 2008). The Venetians produced the bulk of the drawn embroidery beads that flowed into the Americas over the centuries but they are best known for the colorful array of fancy wound beads, including a vast array of mosaic or millefiori beads, that delighted people around the world and brought the Venetians great wealth (Karklins and Adams 1990). Examples of Venetian products may be seen in many museums and publications. Four well documented sources are the Giacomuzzi bead sample book and folders (Karklins 2002), the Frost trade bead collection (Illinois State Museum 2006), the sample book of 19th-century Venetian beads (Karklins 1982b, 1985c), and the J.F. Sick & Co. sample card collection (van Brakel 2006). A vast array of beautifully photographed Venetian beads may also be seen in the *Beads from the West African Trade Series* (Picard and Picard 1986a, b, 1987, 1988, 1991, 1993) and Panini (2008).

Bohemia

Centered on Jablonec nad Nisou (Gablonz in German) in the Czech Republic, the Bohemian bead industry is not as old as that of Venice/Murano but starting in the mid-19th century, it became a serious competitor for the world bead market. While there were major factories, much of the production work was done in small workshops in the surrounding mountains. Like the Venetians, the Bohemians churned out tons of embroidery beads, but are best known

for their faceted and polyhedral drawn, mold-pressed, blown, and Prosser-molded beads which were produced in an amazing range of forms and colors. The blown beads were especially suited for Christmas tree ornaments (Neuwirth 1995). Wound beads were also produced but only in limited quantities. The most comprehensive work on the industry is Neuwirth (1994, 2011) which not only discusses its history and technology, but provides a wealth of illustrative material. Other examples are illustrated in Picard and Picard (1989). To see actual examples, a visit to the Muzeum skla a bižuterie in Jablonec is a must. Some bead sample cards that exhibit blown beads that appear typically Bohemian bear the wording Made in Austria (Neuwirth 2011: Plates 48B-C, 50). These are actually Bohemian products, created when Bohemia was part of the Austro-Hungarian Empire between 1867 and 1918.

Holland

During the 17th century, several glasshouses in Holland undertook the manufacture of drawn glass beads. These were located in Amsterdam, Middelburg, Haarlem, and Rotterdam (Karklins 1983a; Francis 2009a). Although the products were well made and closely resembled Venetian beads, the Dutch seemingly could not compete with Venice and drawn bead production in Holland does not seem to have extended past 1698 (Karklins 1983a:113). Some of the products are discussed and illustrated in Karklins (1983a, 1985a), Gawronski (2010), and van der Made (1978). A chemical profile has been determined for them (Gawronski 2010:148; Hancock 2005; Karklins et al. 2001, 2002).

A distinctive assemblage of wound beads has been recovered from non-factory sites in Amsterdam (Karklins 1985d) as well as at Dutch sites around the world that date to the late 17th and 18th centuries; e.g., Karklins (1991), Karklins and Barka (1989), and Karklins and Schrire (1991). These include the distinctive, large to very large, pentagonal-faceted (WIIc), raspberry (WIId), melon (WIIe), and ridged-tube (WIIf) beads, as well as some very large round, oval, and doughnut-shaped varieties. In North America, many of these types are present in the 18th-century Tunica Treasure from Louisiana (Brain 1979). While it is tempting to conclude that they were made in Amsterdam, there is no archaeological evidence in the form of production debris or malformed beads there to support this and it is quite possible that these beads were obtained from Venice, Germany, or another source and were simply traded by the Dutch. It should also be kept in mind that some of these types were also produced during the 19th century and are definitely not Dutch. Chemical analysis may help solve this conundrum.

Germany

Nestled among the forested hills of Thuringia in east-central Germany, the town of Lauscha was already producing glassware at the end of the 16th century. The production of beads, however, did not begin until around 1750. The early beads appear to have been free-blown followed in the early 1800s by those blown (utilizing locally produced glass tubes) in two-piece molds composed of brass, porcelain, or slate. Gang molds were introduced around 1850, greatly increasing output. The beadmaking process was industrialized in 1862, when the beads created in individual workshops began to be finished in a factory setting. This greatly reduced costs and dramatically increased production (Busch 2000). Nevertheless, competition from the Bohemians who made much the same products, only better, hurt their business and it went into decline. To compensate, the Lauscha glassworkers turned to making technical glass, elegant tableware, and other such items, essentially leaving beadmaking to the Bohemians (Jargstorf 1995:83).

The principal products of the Lauscha beadmakers were silvered components for Christmas tree ornaments, faux pearls, and a myriad of colorful blown beads of sundry forms to be turned into necklaces and other adornments. A sample of the latter dating from the period 1850-1880 may be seen in Busch (2000:30). Many of the items made in Lauscha are very similar in appearance to those produced in Bohemia. Perhaps chemical analysis will provide a means of differentiating the two.

The mountainous Fichtelgebirge region of northern Bavaria was also a bead producer and production was apparently already underway there in the 15th century (Kenyon et al. 1996, 2009). What was made during the early period remains unknown but seems to have involved lampworking. In the 19th century, a principal product was a large bead (round, oval, or ring shaped) made using a technique not usually associated with European glass beadmaking: furnace winding, a process in which a worker removed a small gather of glass directly from a pot of molten glass with a pointed iron rod and formed it into the desired shape (Kenyon et al. 1996, 2009). Some mold-pressed beads were also produced during the latter part of the 19th century, and possibly drawn beads as well.

Following World War II, the Sudetenen Germans were expelled from Bohemia and this group included about 2,000 beadmakers. Many of them renewed their businesses at the edge of the city of Kaufbeuren in Bavaria and named the new community Neugablonz (New Gablonz). They continued to make what they had produced in Bohemia – principally mold-pressed beads, but also wound varieties. While

beadmaking has declined in Kaufbeuren-Neugablonz, it still continues (Wild Things Beads 2011).

The products of Germany were distributed worldwide. Some 19th-century examples are illustrated in Busch (2000) while several 20th-century varieties are illustrated in the J.F. Sick and Company catalog (1921: page 44).

France

Beadmakers in Paris and elsewhere in France were already involved in the production of draw, mold-pressed, and, to a lesser degree, wound beads in the 16th century. The former appear to have been shipped to North America in fairly large quantities (Turgeon 2001:68, 70). Faux pearls, blown at the lamp and then made to look like the real thing using a number of ingenious methods, became a French specialty starting in the 17th century (Opper and Opper 1996-1997). Unfortunately, aside from the few 16th-18th-century beads illustrated by Dussubieux and Gratuze (2012) and Turgeon (2001:59), some of which may be imports, very little is known about what bead varieties were manufactured in France during the two centuries that followed.

A significant product that began to be made around 1860 in Briare was the "tile" or Prosser-molded bead (Kaspers 2011; Opper and Opper 1991). Having greatly improved upon the process patented by the Prosser brothers in 1840, Jean Felix Bapterosses was able to dramatically increase production of this product. In 1870, some workers moved to Gablonz and thus began the Bohemian tile-bead industry. The Bapterosses factory continued to produce beads until 1962. A selection of its more recent products may be seen in Kaspers (2011).

During the 20th century, the Salvadori company in Vaulx-en-Velin produced drawn seed beads, many of which were used domestically to make ornate funerary wreaths (Opper and Opper 1991). It is visually near impossible to segregate them from the products of Venice and Bohemia.

England

Little is known about glass beadmaking in England and even what is known is a bit enigmatic. While several encyclopedias printed between 1860 and 1906 state that there was a major bead industry in Birmingham (Karklins 1987, 2009), there is no supportive evidence either in the form of documentation or actual beads. A thorough examination of the Birmingham city directories reveals that there was a "glass pincher" (lampworker) there as early as 1767 who is identified as a "necklace maker." By 1829, four glass beadmakers are listed in the directories, but it is uncertain if they actually produced beads or were just dealers selling imported goods. Glass beads cease to be mentioned after 1895 (Karklins 1987).

A small group of lampworkers also worked in the Bethnal Green and Shoreditch area of London up to about 1857. They made simple wound beads but, being "so careless and unpunctual," their business came to an end (Hartshorne 1897:106n). Such work also took place in Bedfordshire during the latter half of the 19th and early part of the 20th centuries (Springett and Springett 1987:14). It is likely that, due to the relatively crude nature of many of the beads mentioned above, most were used locally, many finding their way onto the spangles that were attached to lace bobbins by lacemakers in the East Midlands. Examples may be seen in Springett and Springett (1987).

The only evidence for the manufacture of drawn beads in England was that found at the mid-17th-century Hammersmith Embankment site (Egan 2007:5) outside London. The recovered wasters and finished beads (some are illustrated in the cited article) are very similar to both contemporary Venetian and Dutch beads. Whether any of these made it to North America remains unknown.

Spain

Researchers have for some time speculated that Spain may have produced beads but no concrete evidence to that effect has as yet been encountered. Based on an examination of a large collection of beads recovered from the 16th-17th-century site of Mission Santa Catalina de Gaule, Georgia, Francis (2009b) has postulated that a number of distinctive beads are likely to have been produced in Spain. These include small wound annular beads, several types of gilded wound beads (with and without incised decoration), and lampworked segmented beads, including gold-glass varieties. It is hoped that chemical analyses will corroborate these identifications and add additional types to the list of Spanish-made beads.

Russia

There are few details about glass beadmaking in Russia during the historic period. Farris (1992:2-3, 2009:24) reveals that there was a factory in St. Petersburg established by the renowned scientist M.V. Lomonosov which produced "fine glass beads" during at least the latter part of the 18th century. Another factory was established in Irkutsk, Siberia, in 1782 by a student of Lomanosov's and operated until the

1820s (Farris 1992:2-3, 2009:24). Among other items, the glassworks manufactured seed beads, likely specimens of which have been excavated in the area. They are primarily light blue in color and were fashioned from a low-quality glass using a local carbonate salt as the flux. Thus they have a milky appearance and exhibit leached surfaces (Farris 1992:2-3, 2009:24). Some of these beads may well have made it to Alaska and beyond.

There was also a thriving beadmaking and beadworking enterprise in the vicinity of Moscow during at least the last quarter of the 19th century but the indication is that the products were intended solely for the local market (*Pottery and Glassware Reporter* 1885).

China

Information on the types of glass beads imported from China is limited but the indication is that most, if not all, of them were wound, either at the lamp or at the furnace (Francis 2002:83). Examples that date to the 1850-1940 period may be seen in Burgess and Dussubieux (2007), Fenstermaker and Williams (1979), and Liu (1975). Francis (2002:83) typifies these late beads as being made of leadless, very bubbly glass of distinctive colors and with large perforations. Burgess and Dussubieux (2007) provide a chemical profile for the beads. An overview of the modern Chinese bead industry appears in Sprague and An (1990).

Function

Unless a bead is found in an archaeologically diagnostic context (e.g., sewn to clothing, situated at the neck of a burial, or strung on a rosary), it is extremely difficult to assign it a specific function. Although "little" beads (those under about 6 mm in diameter) were commonly used in embroidery and loom work, they were frequently also employed in the formation of necklaces, earrings, and nose and hair ornaments, as well as decorative inlays in aboriginal pottery and other items. Similarly, "big" beads (those over about 6 mm in diameter) are commonly thought of as necklace components but also served to adorn fringes, baskets, mats, vases, and other items. Thus to arrive at the real function of a bead, not only must its size be considered but also the cultural, historical, and archaeological contexts.

Insight into how the Native peoples of the Americas utilized beads may be found in Orchard (1929) and Karklins (1992). There are numerous publications that deal specifically with the beadwork of various cultural groups and a listing of some of the classic ones may be found by checking the two Karklins and Sprague (1980, 1987) bibliographies.

CONCLUSION

This guide was prepared to allow archaeologists and others to adequately and correctly classify and interpret their beads. Doing this will greatly facilitate inter-site comparison of bead assemblages and facilitate the preparation of regional chronologies that will help to date archaeological contexts. It will also facilitate the development of distributional charts for beads that may be characteristic of a certain period or cultural group. While far from perfect, the taxonomic system created by Kenneth and Martha Kidd and expanded herein remains the best one for the logical ordering of glass bead types, especially those in the drawn category. Those who do not wish to utilize the Kidds' variety numbers can still use the Kidd types to organize their bead inventory. Even if one uses an arbitrary Type or Variety system (i.e., Variety 1, Variety 2, etc.), it should be ordered using the Kidd system as this will make comparative studies much easier. Appending the Kidd type code to the arbitrary type number would be very beneficial; e.g., Variety 1 (Kidd Ia1). In any event, the important thing is to describe beads in a way that will convey as much information as possible to others. Sharp color images of the beads are a must and will generally make up for any deficiencies in their description.

ENDNOTES

1. This guide is a greatly expanded and updated version of the one first published in 1982 by Parks Canada and reprinted in 1985 (Karklins 1982a, 1985b). New types have been added to each manufacturing category with a corresponding schematic drawing being incorporated into the appropriate figure. The interpretive section relating to origins has been fleshed out and the chronology section has not only had numerous references added but the scope has been increased to cover all the Americas and the Caribbean.

2. The mold-pressed classification system has been simplified from that presented in the previous guides with the result that the codes for some types have changed (cf., Karklins 1982a, 1985b)

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A WAMPUM-INLAID MUSKET FROM THE 1690 PHIPS' SHIPWRECK

Charles Bradley and Karlis Karklins

In August of 1690, a fleet of ships under the command of Sir William Phips set sail from Boston to attack Quebec City during the second year of King William's War. The campaign failed and, as the fleet retreated, a number of vessels were wrecked in the St. Lawrence during a violent storm. The remains of one of these was discovered by a diver in a cove at l'Anse aux Bouleaux, Quebec, in 1994. Believed to be the Elizabeth and Mary*, the wreck yielded numerous artifacts, including a wide array of weaponry. Among the long arms was a musket whose stock was decorated on either side with two crosses created by inserting wampum into holes drilled into the wood. Likely the property of a Praying Indian, this unique weapon is described in detail and comparisons made to other contemporary Native American objects decorated in a similar manner.*

THE HISTORY

The summer of 1690 marked the second year of the War of the League of Augsburg, known in the English colonies as King William's War. With neither France nor England eager to commit troops and resources, colonial defense depended heavily on the local militias which, with the aid of indigenous allies, harassed and raided outlying settlements in sporadic, unconventional warfare throughout a wide and exposed wilderness frontier. In late summer, the English colonists embarked on a major campaign to carry the conflict into the heart of New France. The expedition consisted of a land and sea force that planned to act in a two-prong movement. The land element, coming from Albany and led by John Winthrop, was to advance through the Lake Champlain corridor and attack Montreal. While some of the troops did manage to reach their objective, the action had negligible impact and the land campaign was aborted early in the campaign.

The sea force, headed by Sir William Phips and consisting of a fleet of four warships and thirty transports crammed with 2,200 New England militia, left Nantasket, Massachusetts, for the Gulf of St. Lawrence on August 10. The plan was to descend the St. Lawrence River and besiege Quebec, the French colonial capital, from the west. The expedition lasted more than two months, the slow progress attributed to bad weather, a lack of adequate charts for navigating the river, as well as time spent foraging and pillaging along the frontier of New France. Arriving before Quebec in mid-October, Phips realized that Winthrop had failed in his objective and its implications on the overall strategy. After a brief engagement on the north shore of the St. Charles River, Phips abandoned the campaign on Quebec. Losses to smallpox and "camp fever" took an alarming toll among the expedition's members. Violent weather drove many of the ships off course and a least four were wrecked on the poorly charted St. Lawrence River (Bradley, Dunning, and Gusset 2003:151).

THE ARCHAEOLOGY

The remains of one of the wrecked ships came to light on Christmas Eve, 1994, when a diver, Marc Tremblay, was servicing mooring lines at his cottage at l'Anse aux Bouleaux, a small community located in Baie Trinite on the North Shore of the St. Lawrence between Baie Comeau and Sept Isles, Quebec. During his dive, M. Tremblay discovered what appeared to be a significant deposit of early historic artifacts in approximately three meters of water. As an experienced scuba diver and long-time member of a local dive association dedicated to the preservation of the area's submerged heritage, he immediately realized the importance of the discovery situated only 100 meters from the shoreline and informed government authorities of the find. From 1996 to 1997, the Parks Canada Archaeological Service, in collaboration with the Quebec Ministry of Culture (le centre de conservation du Québec) and the local volunteer association, le Groupe de préservation des vestiges subaquatiques de Manicouagan, conducted the archaeological investigation of the vessel.

The dive team uncovered remains of a section of the hull as well as a variety of domestic items and weaponry, the bulk of which is attributable to the late17th and early 18th centuries. Historical research in the legal archives of New England suggests that this vessel is likely the *Elizabeth*

and Mary, a 45-ton colonial-built bark which was one of the ships in Phips' fleet (Pointe-à-Callière 2000:14-15, 20-21). It was last seen on November 3, 1690, as it headed home. The transport disappeared without a trace and neither the crew nor the militia contingent on board from Dorchester, Massachusetts, were heard from again.

As would be expected of a ship on a military mission, the wreck produced a varied collection of armaments including swords, pistols, long arms, and ammunition. Like most of the other recovered artifacts, the weapons represent a range of privately owned possessions brought on board by the New England militia force that the vessel was transporting. The diverse assemblage of weapons and accoutrements dramatically exhibit individuality as well as social/military status characteristic of British colonial militia organization of the period.

THE WAMPUM-INLAID MUSKET

Among the weapons recovered from the *Elizabeth and Mary* is a unique musket (57M14N2-37) whose stock is decorated with inset wampum (Plate XA). With the exception of the barrel which was not retrieved, no major metal components were found in association. The relatively intact stock, represented by the butt end, wrist, and a portion of the forestock, measures 68.6 cm overall (Figure 1). Such a light, functional stock style was a popular choice within the context of the North American frontier. The rust-colored bird's-eye graining of the stock indicates it is made of maple (A. Bergeron, CCQ, 2006: pers. comm.) which appears to have enjoyed some favor among 17th-century British gunsmiths (Akehurst 1970:20). Although pleasing in appearance, the popularity of this wood was short-lived owing to its brittle nature which made it unsuitable for the stresses imposed upon a gun stock. Nonetheless, maple continued to be a popular choice for stocks among colonial craftsmen in North America (Mullins 2008:73). The crescent-shaped butt configuration is a typical 17th-century stock style.

The precise identification of the lock mechanism that was associated with this firearm remains obscure owing to the lack of any metal components and the damage sustained by the upper portion of the lock cavity. What remains of the rectangular cavity is reminiscent of a seared matchlock, or possibly an early English flintlock ignition system. Holes indicate that two screws held the lock plate in place. Another four holes on the underside delineate the shape of the trigger guard, one nail forward of the guard bow and the remaining three securing the considerable tail. The bottom-mounted breech plug screw, extending from forward of the trigger guard through the area of the lockplate to secure the breech plug tang, further affirms a 17th-century provenance. Breech plug screws with an opposite (breech plug tang to trigger guard) orientation are considered to be characteristic of 18th-century manufacture. No butt plate was employed with this weapon.

Either side of the butt stock exhibits two crosses composed of wampum beads friction-fitted into the wood on end. The rear cross on the right side measures 79 mm x 79 mm and consists of 17 wampum (Figure 2). The smaller cross measures 33 mm x 40 mm and is composed of 9 wampum. The crosses on the opposite side (Figure 3) are slightly smaller (63 mm x 74 mm and 28 mm x 36 mm, respectively) but composed of the same number of beads. In addition, a 100-mm-long row of wampum is similarly set into the lower edge of the butt stock beneath the crosses (Figure 4; Plate XB). It is formed by eight non-contiguous beads and a 5.9-mm-diameter lead plug situated between the third and fourth beads from the rear. The wampum is 3.6 mm - 4.2 mm in diameter and a single loose but incomplete specimen was about 4.8 mm long. The probable original length is estimated to have been around 6.5 mm.

Figure 1. The Phip's wreck musket stock with the cross patterns of inset wampum after conservation (photo: George Vandervlugt, Parks Canada).

Figure 2. The wampum crosses on the right side of the musket stock (photo: George Vandervlugt, Parks Canada).

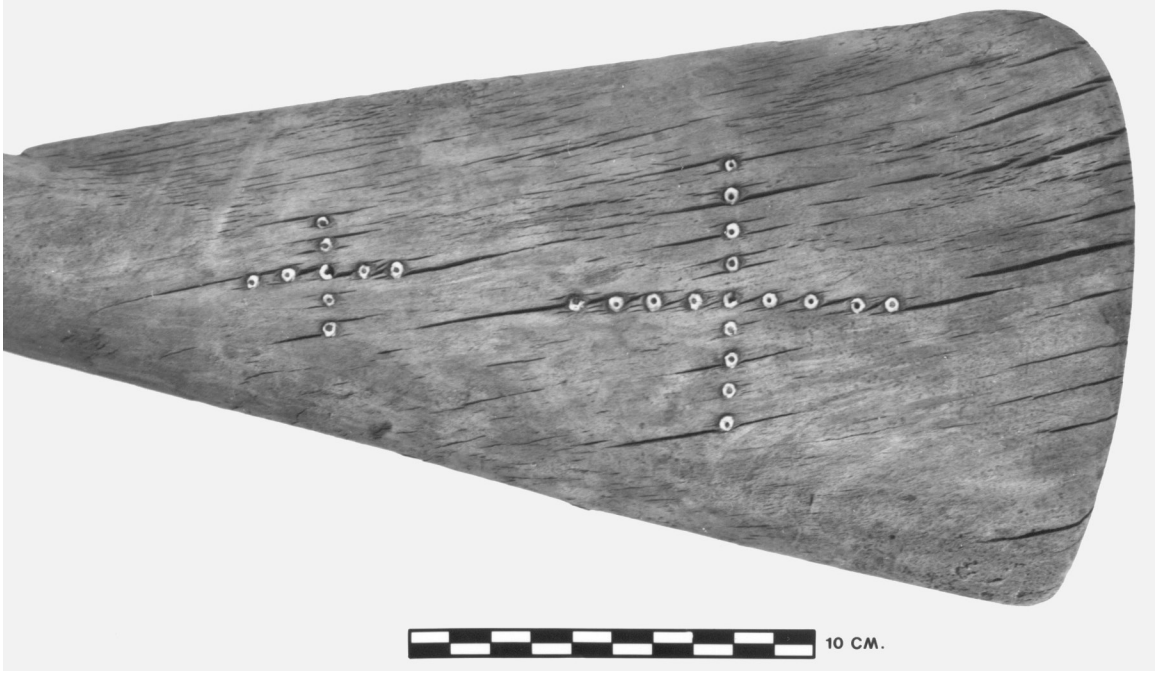

Figure 3. The crosses on the left side of the musket stock (photo: George Vandervlugt, Parks Canada).

COMPARATIVE MATERIAL

The authors know of only one other European firearm that is similarly decorated with inlaid beads. This one, however, is from the last quarter of the 18th century and the inlays consist of colored glass beads (O'Connor 1980:73, 78-79). Measuring 156 cm (61.4 in.) overall, the piece is a better-quality flintlock Northwest trade gun with a cast-brass serpent sideplate. The lockplate bears the engraved name WILSON and LONDON is engraved on the top

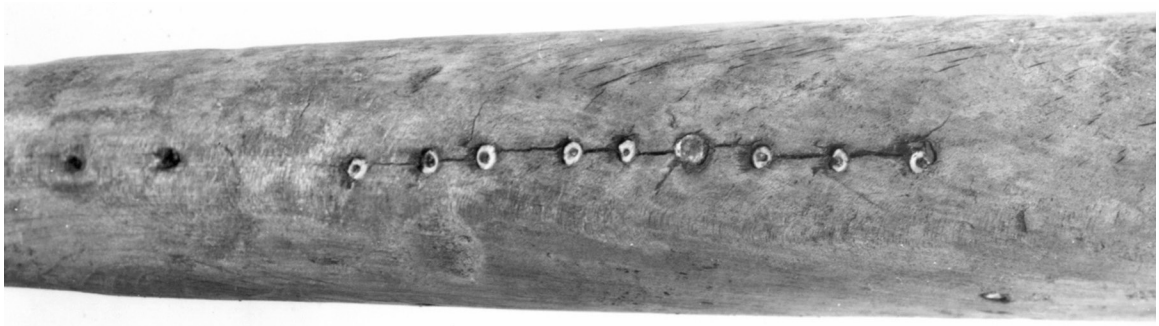

Figure 4. The row of wampum set into the lower edge of the stock (photo: George Vandervlugt, Parks Canada).

facet of the barrel just forward of the lock. The butt stock of European walnut exhibits initials and a date formed by forcing 147 glass beads into the wood. GG6 appears on the right side of the butt (Figure 5) while the date 1777 is on the other (Figure 6). An intermittent row of beads outlines the butt plate tang. The color of the beads is not specified but the majority appear to be white. The attributes of the gun are in keeping with the 1777 date. Unfortunately, nothing is known about the cultural affiliation of the person who did the inlay work.

While there is a lack of evidence for wampum inlays in other firearms, such inlays were relatively common on 17th-century weapons, such as war clubs and tomahawks, made by the Native peoples inhabiting the Eastern Woodlands of North America. A splendid example of the former is in the Eugene and Clare Thaw Collection of American Indian Art at the Fenimore Art Museum in Cooperstown, New York (Meachum 2005). The wooden sword club is 61 cm (24 in.) long and elaborately decorated with carved images and various shell and metal inlays (Plate XC). One side of the blade portrays a tattooed human face with shell eyes and outlined with metal strips set in edgeways. The other side exhibits a snapping turtle and two headless bodies, probably representing slain enemies, again outlined with metal strips. A carved wolf's head adorns the pommel. The back of the blade is flat and decorated with various inlays. A zigzag series of metal strips runs down the center of the spine at the handle end while what were likely shell inlays adorned the opposite end. In-between these two end elements is a linear series of 29 white wampum beads alternatingly set in lengthwise and on end. This piece has a solid provenance, having been acquired during King Philip's War which took place in southern New England during 1675-1676, and pitted the local Algonquian Indians against the English colonists who were continuously encroaching on their territory. The club was likely taken from one of the Indians who took part in the fighting.

A ball-headed war club reputedly owned by King Philip (known to his people as Metacom, he was the sachem of the Wampanoag Indians and leader of the Algonquin confederacy that made war on the colonists) is decorated with several rows of white and purple wampum, each bead set in an individually carved longitudinal hole (Salwen 1978:171, Figure 6; Volmar 2010). There are two rows along the back of the club but most of the inlay is now missing. A row of wampum also extends along either contiguous side of the shaft, about 44 pieces per side, and one side also exhibits a second partial row. The wampum is evenly spaced and inlaid perpendicular to the axis of the club. One side is additionally decorated with a linear series of small, triangular horn inlays, all but two of which are missing. The club is 56 cm (22 in.) long. King Philip died in battle in 1676, so if this is his club, it is coeval with the sword club described above.

Another ball-headed club collected before 1676 is attributed to the Mohawk (Feder 1971:76, Figure 85; National Anthropological Archives n.d.). The ball end is in the form of a human head while the distal end of the haft is in the form of a human leg from the knee down (Figure 7). To the rear of the head, and possibly representing hair, are several contiguous rows of white and purple wampum set end to end. These are not inlaid in the wood but are apparently held in place by gum. A row of wampum beads set side by side extends across the forehead from ear to ear and may represent a forehead band. In this instance, the wampum is set in a flat-bottomed groove cut into the wood.

Two tomahawks believed to predate 1650, and variously attributed to New Sweden, New Netherland, or the Iroquois, have their hafts covered with contiguous rows of white and purple wampum set end to end in the same manner as on the Mohawk club described above (Brasser 1978:87, Figure 6). Set in gum, the wampum was ground flat after the gum hardened. In the one case, the wampum apparently covered the entire haft and consisted of whole beads. In the other, the beads were split longitudinally and encased the haft except for a short section near the distal end which served as a handhold. In addition to the wampum, one tomahawk was also adorned with small pieces of bone, eight black

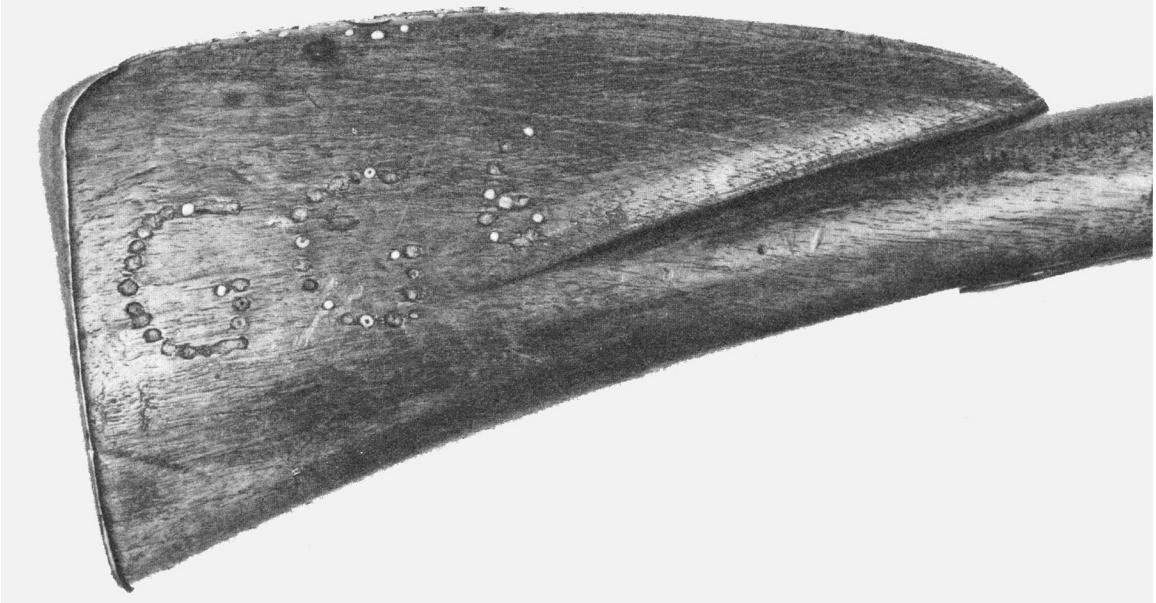

Figure 5. The right side of the stock of a Northwest trade gun exhibiting the initials GG6 composed of inlaid glass beads (courtesy: T.M. Hamilton and Pioneer Press, a Division of Dixie Gun Works, Inc.).

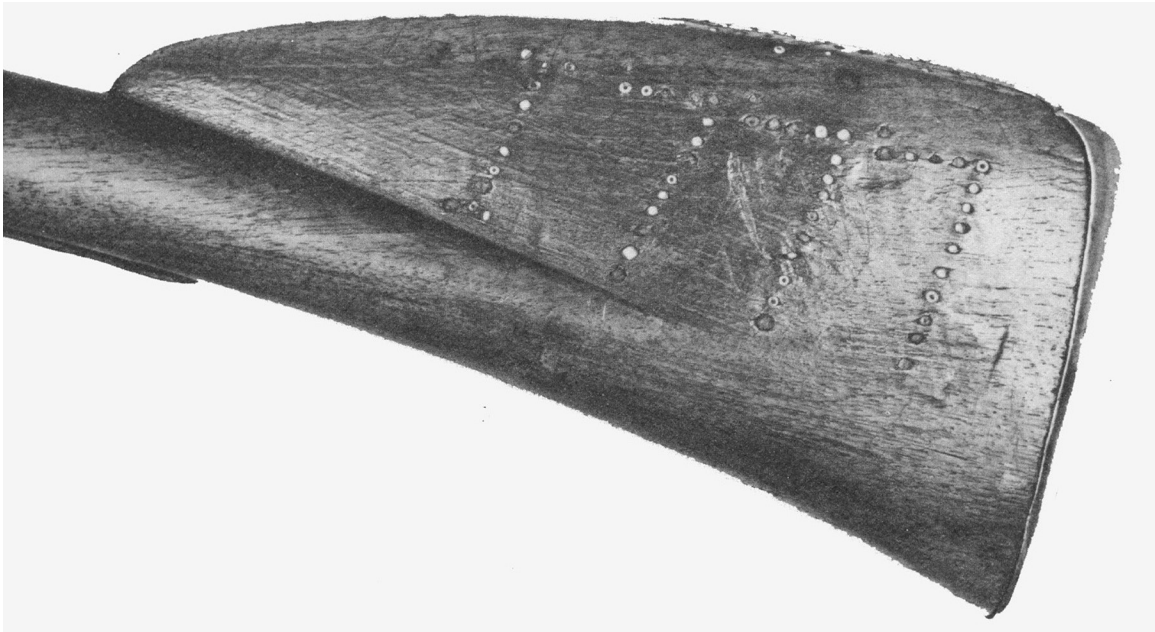

Figure 6. The opposite side of the trade gun stock with glass beads inlaid to form the date 1777 (courtesy: T.M. Hamilton and Pioneer Press, a Division of Dixie Gun Works, Inc.).

glass seed beads, and three tubular red glass beads. The one with the handhold was also inlaid with pieces of shell and four split polychrome glass beads with green surfaces. The tomahawks are 44.4-47.0 cm (17.5-18.5 in.) long.

A presumably later ball-headed club inlaid with glass seed beads in various linear patterns (Plate XD) is in the Oldman Collection at the British Museum (Am1949,22.148). The opaque white beads are set into the wood on end as in the Northwest trade gun described above. In addition to the bead inlay, the club is decorated with triangular chip carving that includes a scene of a Thunderbird striking a man with lightning. The piece is undocumented but its form is similar to a 17th-century club at the Bibliotheque Saint Genevieve

Figure 7. Ball-headed club (right), collected before 1676 and attributed to the Mohawk, decorated with wampum set in gum (Smithsonian Institution, National Anthropological Archives, Neg. No. 962-H-1-2).

in Paris. The fact that the Oldman club is smaller and inlaid with glass beads and not wampum suggests it might date to the 18th century and be of Huron origin (British Museum 2010). The club is 54 cm (21.3 in.) long.

Wooden bowls were also occasionally inlaid with wampum by the Native people. Willoughby (1908:428-429, Pl. XXVII) describes a Mohegan specimen about 28 cm (11 in.) in diameter whose semi-circular handle exhibits an L-shaped configuration of white wampum (Figure 8). The beads are set side-by-side in carved grooves. The L is interpreted by Willoughby (1908:428-429) as standing for the initial of Lucy Tantaquidgeon, an early owner of the bowl and sister of the noted Mohegan minister and missionary Samson Occom (1723-1792). The bowl probably dates to the first half of the 18th century. Willoughby (1908:429) also mentions another bowl of Pequot or Mohegan origin that exhibits "a zone of wampum inlay upon the outer side."

A 17th-century Pequot burl bowl with minimal wampum bead inlay is in the collections of the Mashantucket Pequot Museum and Research Center (Stephen Cook 2010: pers. comm.). The bowl has two pieces of white wampum inset vertically in the upper interior rim.

CONCLUSION

It is clear from the foregoing that inlays of wampum, later replaced by glass beads, were a fairly common form of adornment among the Algonquian and Iroquoian peoples of the Eastern Woodlands. Popular for decorating various native weapons, it does not take a great stretch of the imagination to see wampum applied to the wooden components of European firearms. The indication is, therefore, that the inlaid firearm from the Phip's wreck was either owned by an aboriginal member of the war party sent to attack Quebec or was obtained from such a person. In fact, several documents relating to the campaign of 1690 mention Native people comprising the militia obligations of many of the villages of Massachusetts (Watkins 1898:28, 77, 81). Identified as Praying Indians, two such men, Isaac Cop[p]s and William [Robeson], were reported to have been in the Dorchester contingent (Watkins 1898:42). The unique wampum-inlaid musket found at l'Anse aux Bouleaux could well have belonged to one of them.

Figure 8. Wooden Mohegan bowl with an L-shaped wampum inlay, ca. 1700-1750 (Willoughby 1908: Plate XXVII).

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BOOK REVIEWS

The History of Beads: From 100,000 B.C. to the Present, Revised and Expanded Edition.

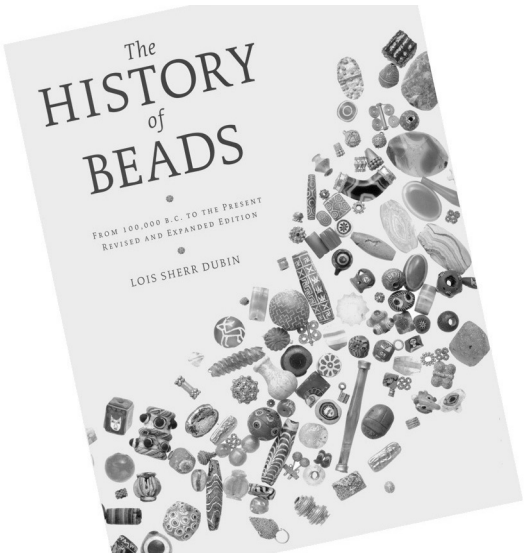
Lois Sherr Dubin. Abrams, 115 West 18th Street, New York, NY 10011. 2009. 396 pp., 475 color figs., foldout timeline, index. ISBN 978-0-8109-5174-7. $75.00 (hard cover).

The Worldwide History of Beads.

Lois Sherr Dubin. Thames and Hudson, 181A High Holborn, London WC1V 7QX. 2010. 396 pp., 475 color figs., foldout timeline, index. ISBN 978-0-500-51500-6. £39.95 (hard cover).

This book, with the title *The History of Beads: From 30,000 B.C. to the Present* and 364 pages in length, came out in 1987, published by Thames and Hudson in the UK and by Abrams in the USA. A "Concise Edition" came out in 1995, published by Thames and Hudson; this was a paperback costing £12.95, with 136 pages and the important pioneering Timeline. Now, some 23 years later, a second, revised edition has come out. The title for the North American edition is *The History of Beads: From 100,000 B.C. to the Present, Revised and Expanded Edition*, while the UK edition is simply entitled *The Worldwide History of Beads*. Aside from spelling differences (American vs. British), the text is identical in both.

The new edition is 30 pages longer than the first but, until we get to page 317 and the chapter on "Contemporary: Europe and North America," the pagination and the chapter headings are the same within both editions. The subject matter is treated partly by theme and partly by chronology or region. We start with "Introduction" and "The Beginnings" before going on to "Antiquity: From Neolithic times to the Roman Empire" and "Europe: The Late Roman Empire to the Renaissance." The following three chapters deal with "Prayer Beads," "The World of Islam," and "The Age of European Expansion." Seven chapters follow that deal with beads on a regional framework: "Africa," "The Far East: China, Korea, and Japan," "India," "Central Asia," "Southeast Asia and the South Pacific," "Middle and South America," and "North America." After that, Lois Dubin takes up special themes with "The Special Beads: Amber and Pearls," "The Magical Eye Bead," and "Contemporary: Europe and North America," the last chapter focusing on the great explosion of craft beadmaking that began in the latter part of the 20th century. Bead shapes, the Timeline chart with its key and glossary, notes, and a bibliography make up the rest of the book. The notes, incidentally, often give important information that got omitted from the main body of text, as well as references.



The most obvious change in the second edition lies in the maps that come with each chapter; these are now in color, and consequently are much easier to follow. Indeed, an increased use of color is evident in that 70 illustrations in grayscale were replaced with images in color, and 200 new photographs were taken for the new edition. The author is well served in both editions by photographer Kiyoshi Togashi whose pictures are of a consistently high quality. It is a bonus for the serious bead reader that Dubin is meticulous in giving dimensions in all her captions. Most captions are close to the illustration concerned but there are many cases where one has to flip pages backwards or forwards to read them and a caption may even be split over two pages. Those on pages 247-250 are an extreme example of this.

There are some errors to point out. On pages 79, 82, and 85, the Tibetan double thunderbolt *dorje* is misspelt *djore*, an error that is repeated from the first edition. The double-page spread of beads traded in Africa is given

as being in the collection of the British Museum at the Museum of Mankind, London, although the Museum of Mankind as a separate entity closed in 1997. There is a case of proofreading carelessness on p. 258 where the caption for fig. 267a is given as a drawing of a pattern on a bead; this was present in the first edition, absent in the second. The caption should have read "Detail of birdman rock carvings." In my view, the line detail drawing in the first edition is more informative than the photographic image that was retained. Photographic images are often inferior to line drawings, as can be seen by comparing the bead forms illustrated in Horace Beck's classic publication with those on pp. 362-363. In the chapter on amber and pearl, there is still no mention of the Dominican Republic, a major source of amber.

In Africa, my area of special interest, there are surprising gaps and errors. When it comes to ancient beads, the map facing p. 20 shows the sites of Grotte des Pigeons, Haua Fteah, and Enkapune, but does not show that of Blombos Cave in South Africa, which has even older beads, although the name of the site is squeezed into the extreme bottom left of the Timeline. The site of Mapungubwe in South Africa is incorrectly listed as a tribe in the Index, with no mention of the "garden roller" beads or the connection with the Indo-Pacific bead trade from eastern India and further east except in a footnote that gives no credit to Claire Davison's work on bead analysis or the work of Peter Francis, Jr. There is no mention of the finely worked straw beads made in Mali as an alternative to filigree gold, though the Timeline shows (incorrectly) such a bead as made in Ashanti, Ghana (no. 1246). It might have been worth mentioning the great development of beadmaking and beadworking as a means of generating cash among women, especially in eastern and southern Africa.

Throughout the second edition, there was an effort to adhere to the pagination of the first edition. The final section, "Contemporary: Europe and North America," was much expanded (from 14 pages to 45) and rightly so in view of the great number of artists creating glass beads and beadwork. Beads made of plastic, especially polymer clay (Fimo), are featured; also paper as shown in the picture of a group of women in Oaxaca, Mexico (p. 325). Unsurprisingly, nearly all of the examples illustrated originate in North America and a great many pictures illustrate seed beads used to form ornaments of great complexity, which might put them outside the scope of a book on beads.

There are quite a few small typos throughout the text and captions. In the Bibliography there seems to be no consistency in listing book titles, which may or may not be italicized. More titles originate in North America than Europe, which is normal for a book produced in the USA, but causes some surprising omissions.

To sum up, even with its omissions and irritating captions and typos, the first edition was a landmark publication in the field of bead studies and the revised edition with enhanced illustrations and Timeline is worth adding to the bookshelf.

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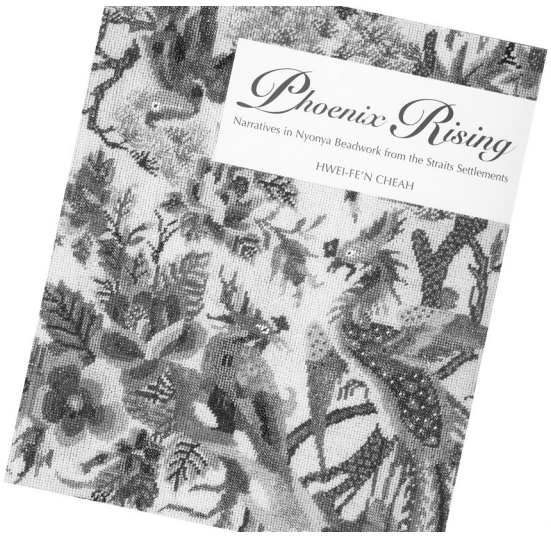
Phoenix Rising: Narratives in Nyonya Beadwork from the Straits Settlements.

Hwei-Fe'n Cheah. NUS Press, National University of Singapore, AS3-01-02, 3 Arts Link, Singapore 117569. 2010. xvi + 384 pp., 206 color figs., 22 B&W figs., glossary, index. ISBN 978-9971-69-468-5. $55.00US (paper cover).

Hwei-Fe'n Cheah has written extensively on the beadwork and embroidery of the Nyonyas of the Straits Settlements and Netherlands Indies. *Phoenix Rising* is the culmination of these efforts to build a picture of Nyonya fiber arts and to place that work in a larger cultural context, both regional and worldwide. She builds on earlier work by Ho Wing Meng and Eng-Lee Seok Chee.



Cheah sees her book as having three interlocking parts, each examining one significant aspect of Nyonya beadwork. "I refer to these as narratives to acknowledge that each is a partial and reconstructed history of Nyonya beadwork retold through a particular lens: its social role, its development through time and space, and its significance in the present" (p. 17).

One important aspect of her book is the creation of a chronology of Nyonya beadwork. For this she finds inspiration in M.A. Dhaky who worked toward a dating system for Indian embroideries. Pieces with known provenance and articles inscribed with dates were used by him as "anchors" and, characterized by the types of motifs and chromatic range of beads used at different periods, he came up with a fairly well-defined chronological trend, leavened with the knowledge that beads and motifs can be reused at later times. Cheah followed a similar path, focussing on pieces with good provenance, museum accession dates, and analysis of newspaper used as backing. She notes that imagery changed over time, and the types of beads used, variations in cloth backings and needlework cloth, slipper styles, and changes in wedding customs all contributed to what she felt was a reasonable chronology reflected in the captions of the figures in her chronology chapter.

Nyonya beadwork uses tiny glass seed beads, generally less than 1.5 mm, and can be incredibly detailed. In early pieces, animals and flowers swarm in profusion in pieces both embroidered and netted. While the origin of netting in Nyonya beadwork is uncertain, it is beautifully worked and impressively detailed for a technique that doesn't easily lend itself to curved and ornate lines. Other pieces are embroidered on velvet and often coupled with metallic threads and sequins. Familiar Chinese design elements such as dragons, peonies, phoenixes, and sometimes figures from Chinese astrology all tumble together in densely clustered tableaux.

The early part of the 20th century is represented by a mingling of traditional styles and, increasingly, new designs and the use of petit-point stitch. As women began wearing lighter colors, so too did lighter colors become more predominant in beadwork backgrounds. Netted and couched-stitch beadwork gradually fell out of favor and petit-point became more dominant. Roses displaced the peony and Western needlework images like dogs and flower girls began appearing, followed in the 1930s by cartoon characters. Wedding fashion changed sufficiently so that elaborately beaded wedding gear was no longer in style. With beadwork uncoupled from heavily symbolic design elements, European designs and those of popular culture surged in popularity. In the 1950s, as the Straits and Southeast Asia recovered from the economic devastation of World War II, in which many Peranakans lost much of their wealth in tribute to the Japanese, women became an essential part of the work force, completing the trend toward making beadwork a hobby, not a lifestyle, and freeing women from the isolation of the home where needlework flourished.

Phoenix Rising relays detailed information about the manufacture of rocailles, charlottes, hex-cuts, and faceted or knurled metal seed beads and corrects Ho Wing Meng's bead terminology error; i.e., having referred to seed beads with a single facet as being caused by "accidental effects of the polishing" (*see* Ho 1987:45). On the issue of cultural influences, Cheah notes there are disagreements, Ho seeing a Minangkabau influence on wedding ornaments, while both Eng-Lee and Joo Ee Khoo associate Nyonya beadwork with that of Europeans. She acknowledges Valerie Hector's ongoing studies of the beadwork of mainland China and how elements from that work might also have influenced Nyonya designs.

Regarding beadwork techniques, while the images of pieces in progress in the chapter "Toward a Chronology of Nyonya Beadwork" are clear and useful and the image of the netted beadwork laid over a drawing of flowers increases one's respect for the skill of the Nyonyas who transformed flat line drawings on paper into colorful pictorial netted beadwork, I would like to have seen an appendix of beadwork diagrams and text, showing the stringing used to make the netted works, especially given that in her review of Ho's book, Cheah (2008:85) herself takes issue with his technical descriptions, noting their unclear threading patterns and lack of relevance to Malay and Chinese pieces she had examined. While it can be difficult to know for certain how pieces are constructed, careful noting of the placement of knots, observation of how the threads move over beads at the edges of pieces, the use of a loupe and strong light to determine passage of thread visible through transparent beads, and a painstaking following of threads through a piece, coupled most importantly with actually working the technical description with beads and thread to see if one's theories are correct, can oftentimes make sense of method and allow for reasonably accurate transcription.

My greatest concern is Cheah's use of the term "lane stitch," described as "where two or more beads are fastened to the fabric base with a single stitch." The term lane stitch refers most commonly to American Indian beadwork of the Northern Plains and Columbia River Plateau and is a stitch in which a number of beads (more than two) are strung before the carrying thread returns through the ground and the overall effect is one of numerous rows of beads at least four to ten beads in length, *all parallel to each other with straight edges*, hence use of the word "lane" to define the stitch. The predecessor term for this was "lazy" or "lazy

squaw" stitch, the negative connotations of which prompted the suggested renaming to "lane stitch" by Bill Holm. An illustration of the "lazy stitch" shows equally numbered beads in rows with even edges (Orchard 1975:151), which style of beading does not appear to be present in Peranakan beadwork. Cheah's source material (Van Horn 2006:60) shows a number of parallel rows of four beads, which groups of rows are worked at 90° angles to each other to create a basket-weave pattern, an unusual use of the lane stitch. Examination of a photograph sent to me by Cheah upon query does not show an appreciable number of parallel rows of similar length and, instead, shows a stitch perhaps best described as a random fill-in stitch. In any case, it is not lane stitch and it's unfortunate that this term is now associated in print with Nyonya beadwork.

Phoenix Rising is lavishly illustrated with over 200 photographs showing a diversity of forms from slippers, wallets, purses, belts, and ceremonial accouterments such as headdresses, collars, handkerchiefs (*sapu tangan*), and shoulder pieces (*sangkot bahu*) to items associated with the wedding chamber such as mattress panels, mirror covers, pillow ends, and curtain ties. Several period photographs show people wearing many of the items pictured in the book and often they are named individuals, rather than anonymous stand-ins for the larger culture, increasing the sense of the personal that Cheah's book warmly conveys with its frequent reference to oral and family histories. Her exploration of the nature of the bead trade in and around the Straits is enlightening and her dissection of Peranakan Chinese culture, its place at the heart of 19th-century international trade in Southeast Asia, and our peek into the daily lives of its women who left no written histories of their own is engrossing. *Phoenix Rising*'s flaws are few and the contribution Cheah makes to the study of this material is extensive, both broad and deep.

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Heidi Munan and Freya Martin (eds.). Crafthub, No. 96 Main Bazaar, First Floor, 93000 Kuching, Sarawak, Malaysia. 2010. i-vi + 120 pp., 48 color figs., 17 B&W figs. $40.00 postpaid (paper cover). To order, contact crafthub@gmail.com

This publication contains the papers presented at the Borneo International Beads Conference held in Miri, Sarawak, Malaysia, 9-10 October 2010. The *Journal* was available at the conference and the organizers need to be congratulated for the photos as well as the speedy production of the *Journal*. In fact, they should be congratulated on the overall excellence of their first International Conference.

The presentations can be divided into three main categories:

1. Improving the quality (and, in turn, marketability) of local beadmaking;

2. Bead culture, past and present, in Borneo; and

3. Bead culture in Southeast Asia outside Borneo.

Improving the Quality of Local Beadmaking

The article by Nor Azmah Ad Kadir et al. focuses on the technical development of the ceramic bead industry in Lawas, Sarawak. The Ministry of Rural and Regional Development under the One Village One Product programme enabled a group of local villagers, living near a good source of local clay, to improve the quality of their clay beads and glazing as well as to increase their production capacity.

Yekti Kusmartono, the author of "Jatim Beads: From Trash to Treasure," writes about the skills of Indonesian glass beadmakers who use recycled glass to make very good copies of Venetian and other beads valued by the people of Borneo. As a result, there is now a thriving cottage industry in East Java and Yekti has developed a fashion bead-stringing group which produces elegant necklaces and earrings.

Reita Rahim tells how, in spite of misfortune (loss of land) and the arrival of cheap plastic and glass beads, the indigenous minorities, the Orang Asal of Peninsular Malaysia and the Rungus of Kudat, Sabah, have revived the making and selling of organic beads. This is partly due to eco-conscious buyers wishing to buy natural products uncontaminated by chemicals and a wish to buy from fair-trade sellers. Ms Rahim began The Indigenous Peoples' Stall (Gerai OA) in 2004 to aid Orang Asal communities in revitalizing and marketing their craft heritage. Through interviews with elders and craftspeople, she has documented the traditional knowledge of what powers an organic bead might have. Valuable information, including tables, tells us of the various seeds, stems, roots, shells, bones, teeth, and tusks that are, or have been, used to make beads. The Orang Asal people have a great love of ornamentation. They have started to include plastic, bought or recycled, as well as other materials into their ornamentation.

Bead Culture, Past and Present, in Borneo

"Bead Culture Today" by Heidi Munan, one of the principal bead experts of Sarawak, provides a condensed history of the origins and value of heirloom beads. As a long-time resident of Sarawak, her local knowledge adds interest to her stories and her hopes for future bead industries.

The paper by Eileen Paya Foong and Terry Justin Dit, entitled "Importance of Preserving Memories," tells a fascinating personal story about important old beads owned by one Dayak family. It is an historical look at marriage practices and slavery in Kayan and Kenyah communities.

Ipoi Datan, an archaeologist and Director of the Sarawak Museum, presents an overview of sites in Sarawak where beads have been found. Good descriptions of the types of bead excavated, including beads from animal bone and teeth, are given but the writer assumes the reader understands concepts like "late Neolithic" but the use of calendar years may have been easier for non-archaeologists.

Together, these articles provide a great overview of the beads of Sarawak.

Bead Culture in Southeast Asia Outside Borneo

Cheah Hwei-Fe'n, an Australian academic, has written about the Chinese influence on Nyonya beadwork. Various techniques used to produce the amazingly colourful household articles made from small seed beads are described. A discussion of the design influences in various areas shows the possibility of western influence. It is disappointing that there is not more discussion of the size of the beads used as I think some were very small and may have been the same beads used in European beaded bags of the 19th century. Finally, the article describes the changes happening in present-day Nyonya beading.

David B. Baradas's article "Bead Culture of the Philippines" alone makes the *Journal* worth purchasing. One of the important trading influences was the mining of gold in the Philippines and many gold beads have been found in archaeological sites. The indigenous bead culture of northern Luzon, especially of the Kalingas (but also the Gaddang, Isneg, Ifugao, Bontocs, and Illonongot), is described in great detail from past to present. A similar description of the mountain people of Mindanao tells us about the different religions, languages, and uses of beads in these cultures. The description of western research in the Philippines also is very informative.

Jamey Allen, who has international expertise in glass and other beads, covers the larger area of Island Southeast Asia. He discusses the difficulties in dating beads, the history of glass in these regions, and the value of specific beads to the people of particular areas: Formosa, Java/Indonesia, the Philippines, and Palau. The appendix on origins of heirloom beads is particularly informative.

Overall, participants of the Borneo International Beads Conference came away with a much better understanding of

the bead culture of Borneo and the broader Southeast Asian region. The *Journal* captures this information and makes it available as a foundation for future researchers.

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Journal: Borneo International Beads Conference 2011.

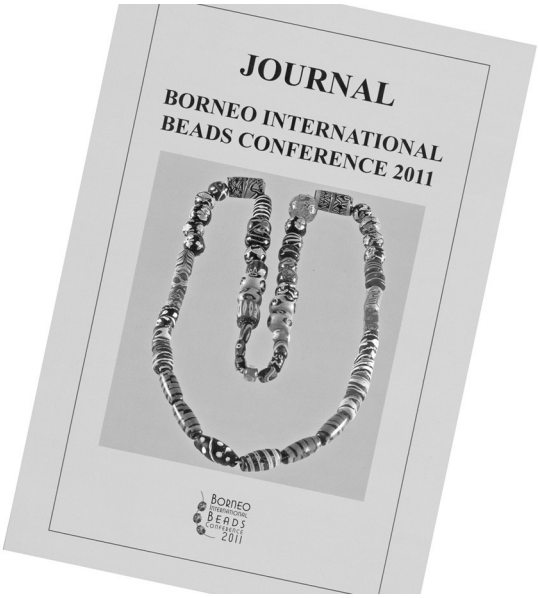
Heidi Munan and Freya Martin (eds.). Crafthub, No. 96 Main Bazaar, First Floor, 93000 Kuching, Sarawak, Malaysia. 2011. i-vi + 196 pp., 80 color figs., 32 B&W figs. $40.00 postpaid (paper cover). To order, contact crafthub@gmail.com

One might expect a bead conference held in Borneo to concentrate on Borneo or, at most, Southeast Asia, but 40% of the talks at the Borneo International Beads Conference 2011 held in Kuching, Sarawak, Malaysia, concerned beads and beadwork of the rest of the world. Many talks described beads and beadwork and their use and meaning in the context of the particular cultural group under discussion. This is a necessary first step as many of these groups are not widely known outside their country. Some talks also analyzed political and philosophical reasons for the interest or lack of interest and the understanding of beads and beadwork of indigenous cultures and how and why that is beginning to change. If this volume is read through and taken as a whole, one comes away with an intense appreciation of people's boundless ability to express abstract ideas in the physical world with beautiful objects. Peter Francis had it right: "It is all about the people." The following articles comprise the *Journal*.

The Significance of Beads in Kayan-Kenyah Customary Law (Adet Kayan-Kenyah 1994), by Henry Anyi Ajang and Anthonius L. Sindang

The authors present an excellent introduction to beads and their use among the Kayan and Kenyah peoples of Sarawak. They migrated from Kalimantan to Sarawak in the 18th century. Beads came from the Chinese and Bruneian Malays traveling up river to their lands to trade. Beads were scarce and so were valuable, being kept as heirlooms passed down the matrilineal line.

The use of beads and other items in social and ritual activities was an oral tradition for centuries and is complex and precise. The traditions were codified in 1994 as the Adet Kayan-Kenyah (Kayan-Kenyah Customary Law). The Kayan/Kenyah people have three social strata. The authors list what gifts are required for engagements and marriage according to the class of the individuals. Two tables list the types of beads and other items that must be offered to the offended party for breaches of taboos such as adultery or incest.



Rapid development in Sarawak often means cemeteries are affected and the deceased must be exhumed and reburied. This is a spiritually dangerous job for the diggers. The 1994 Adet has codified the restitutional articles that must be provided to each digger which include a bead bracelet made with very specific beads. These strengthen the person's spirit and protect it from misfortune.

Beaded Wedding Baskets of Southwestern Sumatra, by Peggy and Arthur Astarita

Beautifully beaded covered baskets are used in weddings and ceremonies celebrating rites of passage in southwestern Sumatra to present gifts to the celebrant. Dowry items are carried in these baskets in a procession to the ceremony site. The gift is removed, the basket returned to the owner and carefully stored until needed again. Unfortunately it is likely these baskets are no longer made and their use in ceremonies is less common than in the past.

Varying in size, the baskets are constructed of woven rattan and covered with cloth with beads stitched through the fabric and rattan. Additional embellishments include cowrie shells and occasional metal medallions. Corner stops of Rudraksha seeds seat the top into the bottom of the basket. The basket is then coated with a tree sap which imparts a patina, creates a tight feel, and protects the materials from wear. When not in use, the basket is wrapped in a *tampan*, a sacred cloth made with four colors for spiritual protection, and stored in a plain rattan basket. Baskets are passed down in the family.

Other beaded items were also made and used in ceremonies: curtain tie backs for the wedding bed, food covers, pedicure pillows, stuffed hanging decorations, umbrellas, slippers, and banners, all of similar construction as the baskets.

Art on a String from Arnhem Land, by Louise Hamby

The women of Australia's Arnhem Land have been making necklaces for centuries and continue to do so not only because it is a continuation of tradition and provides some economic benefit for their families, but because they enjoy it. Hamby presents reasons why necklaces made from organic materials have been neglected on many levels by non-Aboriginals which include a lack of exposure of threaded objects to a wide audience and a general ignorance of Aboriginal material culture. Another factor is a lack of identification of the maker when sold in the marketplace and their products are often lumped in a basket in a shop. This is beginning to change and art advisors in Aboriginal art centers are starting to label each piece. Furthermore, there have been many exhibitions of Aboriginal art throughout Australia since the late 1980s and Hamby provides a good review of these. She also discusses the individual artists and their particular style of necklaces.

In constructing necklaces for personal use, the string is hand spun from various materials such as plant and bark fiber, possum fur, human hair, and yarn. It is labor intensive. For necklaces to be sold, nylon fishing line is used as it is readily available, often with manufactured clasps. Large seeds, grass stems, shells, shark vertebrae, and feathers were and are used. Metal sewing needles allow much smaller seeds to be used as it is impossible to make holes or thread these seeds without them.

Melanau Bead Culture, by Hat Bin Hoklai

The small portion of the Melanau population which is pagan, the Melanau Likou, continues the traditional use of the beads that were once ubiquitous among all Melanau. Beads provided protection from malevolent spirits and supernatural powers, denoted wealth and status within the community, and also served to adorn sun hats and the hems of dresses. Most Melanau are now Muslim and the use of beads has been greatly restricted.

It is during weddings that beads are still commonly used by all Melanau. Banded agate and blue Vaseline glass beads are tied onto the wrist of the bride by the mother-in-law and worn for three days. The number of beads varies according to the rank of the bride. Once a child was born, it was given a wristlet of beads to protect it from spiritual dangers. Later it wore a wristlet of light blue beads to maintain health. The village midwife would regularly massage a nursing mother and her baby with a locally made ointment to prevent postpartum depression, arthritis, and migraines. This had to be paid for with brass beads, never money.

After a death, immediate family wear blue beads on their wrist for protection. The deceased has yellow beads tied around the head to set the mouth in a seemly position. Beads were formerly used as grave gifts but this is now rarely done to thwart grave robbers.

Ornaments of the Dead among the Nagas, by Alok Kumar Kanungo

The origin of the Naga and their migration to the Naga Hills in northeastern India and neighboring Myanmar is not yet fully understood. It has been proposed that they may have ancient connections with Australia, Papua New Guinea, and Southeast Asia because they share some similar cultural practices such as death rituals and platform burials. The author believes that, despite intense cultural pressures from Sanskritization and Westernization, customs associated with death are extremely slow to change because death carries high emotional value and is tied to deeply held afterlife beliefs. The study of death rituals, burial practices, and grave goods may identify persisting ancient traditions that might help determine the origins of the Naga.

Head and body ornaments, often very elaborate, are worn by all Naga groups. The particular style of jewelry worn is earned (it is not just decoration) and is a marker of status. It is not known how beads entered Nagaland prior to contact with missionaries in the 19th century. Nowadays beads come from other parts of India. The main components are shell (conch and cowrie), glass beads of varying sizes, carnelian, brass, boar's tusks, and bone.

Curiously little has been studied about ornaments buried with the Naga. Nineteenth-century ethnographers describe burial practices in some detail but do not mention any

ornaments. Burial sites dating from 4460 B.C. to ca. A.D. 1650 have produced only a few copper wristlets. Kanungo proposes several possibilities to account for the fact that the Naga, all of whom wear large amounts of beads and ornaments, include few with their dead. Perhaps, since beads and carnelians are trade items coming very long distances, it was only in the mid-19th century when Westerners arrived that these materials became available in any quantity. For the Naga groups where only the skull of the deceased was kept after a platform burial decomposed, the head ornaments did accompany the skull when it was stored in a ceramic vessel. The body ornaments may have been taken away at the time the skull was removed. Women's ornaments are typically inherited by daughters so they would not form grave goods.

Something for Everyone: Haudenosaunee Souvenir Beadwork, by Karlis Karklins

The Haudenosaunee, the Six Nations Iroquois of upstate New York, United States, and southern Ontario, Canada, have been using glass beads since the late 1500s. Initially used to embellish their own clothing and possessions, towards the end of the 18th century the Haudenosaunee began to use beads to produce various souvenir items, a tradition that continues to the present day. The beadwork was traditionally made by women and appealed primarily to women. It was sold at major tourist attractions such as Niagara Falls as well as fairs and other events in the region. These souvenirs were popular and prized. It is estimated that some 200,000 pieces have been produced over the past two centuries. Their popularity declined during the Depression and after World War II but recently there has been a resurgence of interest in them by both Haudenosaunee beadworkers and beadwork collectors around the world.

Haudenosaunee beadwork is unique in that the decoration is raised or bows above the surface. The six major categories of Haudenosaunee souvenir beadwork are pincushions, wall hangings, three-dimensional purses, flat purses, garments, and miscellaneous items. The pincushions are made of cloth and stuffed with various materials. There are 15 forms with the most common being hearts and lobed hearts. Wall hangings have a foundation of cardboard or thick paper covered with cloth. Picture frames, horseshoes, and wall pockets for brushes, matches, scissors, ties, watches, and letters are common. The purses and pouches are in two styles: three dimensional and flat. The latter, in several forms, have a black velvet covering reinforced with cardboard or newspaper and are ornamented on both sides with ornate beaded floral designs. Moccasins and several forms of caps comprise the garments group while the miscellaneous category includes such objects as card cases, mats, valences, and emeries in the form of strawberries.

Beads and Heritage: Sarawak Museum Beads Collection, by Tazudin Mohtar

The Sarawak Museum, founded in 1891, is one of the finest natural history and ethnography museums in Southeast Asia. The museum is overseen by the Sarawak Museum Department which is responsible for the protection and preservation of Sarawak's diverse ethnic heritage. The core of the museum's bead and beadwork collection is comprised of the items acquired by Hugh Brooke Low during the latter part of the 19th century and by the Reverend Hudson Southwell in the 1960s. The materials reveal the diversity of the indigenous cultures and help us understand the character of Sarawak.

"Blue Beads to Trade with the Natives:" A Case Study, by Heidi Munan

Blue beads have long had wide appeal among various cultures, including those of Borneo. The reason for this popularity is uncertain but it is likely that the first beads brought for trade to people far from the source of production were blue. Centuries later beads in many colors became available but the oldest, original, or venerable beads are blue. Along with ceramics and textiles, stone and glass beads were brought to Borneo by Arabian, European, and Chinese traders.

The production of beads for export in China probably began during the Song Dynasty (960-1279). In 1372, sea trade was forbidden outside China and craftsmen, likely including beadmakers, left China and emigrated to ports in Southeast Asia to set up workshops. In 1608, an East India Company employee wrote about blue glass beads made by Chinese artisans in West Java specifically for export to Sukadana, then an important trading center on the southwest coast of Borneo. Another East India Company employee wrote of a Chinese beadmaker producing beads in Sukadana. Glass or beadmaking sites in Southeast Asia are difficult to locate and identify as they could have been small; a hearth, bellows, and a thatched roof would suffice. Once abandoned, the jungle would quickly reclaim them.

A distinctive blue barrel bead is found universally in Borneo but not equally valued by all groups nor are they concerned where the beads came from. Each variant of the blue barrel has a name and ranking. It is likely the preponderance of blue barrel heirloom beads were made by

Chinese artisans in West Java specifically for the Borneo market. Most blue barrel beads in Borneo are made of lead glass. Chemical analysis may be of limited use to pinpoint the origin of the beads as they were made of any recyclable material at hand. A bead may have been made in West Java or Borneo, but the glass could have come from almost anywhere.

Speaking with New Voices: South African Beadwork, the Global Market, and Reinvention of Culture, by Eleanor Preston-Whyte

This article discusses the evolution of Zulu beadwork production and marketing from the 1960s to the present. Other native crafts parallel this evolution. Since apartheid ended there has been a resurgence of pride among the Zulu in their material culture and they wear and use traditional costumes and beadwork proudly. As one man said: "Traditional Zulu dress identifies me as a good South African."

Beadwork in complex design and color combinations was and continues to be made for their personal use and indicates social status and life stage. In KwaZulu-Natal, however, with its high unemployment rates, the production of beadwork for sale provides important income. Two groups transport the beadwork from rural homesteads to market: itinerant local traders and agents of craft development projects. The itinerant traders buy crafts directly from the artisans and sell them to permanent stall holders at markets along main roads. Their aim is to make a profit. Craft development projects are run by missionaries or philanthropic organizations with the aim to better the lives of artisans' families. In their own way, both middlemen bring important advice to the artisans on adapting wares for the ever-changing tourist market.

Work sold in South Africa at roadside markets developed from one or two thatched-roof stalls on the main coastal roads with local sellers offering food and crafts to locals and travelers into permanent buildings with parking lots at large intersections. Currently on offer are small pieces of jewelry, including Zulu love letters, and dolls which might be Ndebele as well as imitation KwaZulu-Natal beadwork made in China.

High-quality beadwork is sold at the African Arts Centre in Durban. In the past each piece was vetted by the Centre's staff, providing a learning experience for the maker both artistically and technically. One beadworker, Sizakhele Mchunu, began a new genre of bead sculpture: beaded figures depicting everyday life. The idea spread to other beadworkers and has evolved such that artists are identified and the sculptures sold to collectors.

Karoh: A Sacred and Secular Symbol of Identity among the Lotud, by Patricia Regis and Judeth John Baptist

The Lotud live north of Kota Kinabalu, the capital of Sabah, the northern Malaysian state on Borneo. Many are now Christian and Muslim, but a significant number continue ancestral traditions. The Lotud believe beads were brought from Brunei by their ancestors. Beads have mystical powers and each piece of jewelry possesses a specific supernatural guardian. The power increases over time and when the beads are worn, it is infused into the wearer. Beads express the Lotud's concept of health, wealth, status, and beauty. For those who perform religious rituals they also establish a "transformative link between the secular and spiritual realms and bring the person into the presence of the supreme deities." Beads also comprise bride wealth, adorn traditional attire, and serve as currency or collateral and also as capital assets that are passed on as inheritance. They are also used to settle disputes or provide restitution and to invoke supreme deities during certain ceremonies.

Of the three major varieties of strung bead assemblages, the *karoh* is the most esteemed and culturally linked with the Lotud. Often multi stranded, the *karoh* incorporate various small colored glass beads, carnelians, and two or more silver or gilded cones called *ki'uluh* ("possesses a head"). The cones are embossed or engraved and named after the maker. They are strung next to a round bead at the wide end and small silver or gilded rings at the narrow one. The cone is hollow and has a wood or beeswax core to maintain the shape.

Final Thoughts

These proceedings will be of interest and are highly recommended to researchers, collectors, and aficionados of beads and beadwork, but the articles are likely too specialized and detailed for the casual reader. Inevitably in these types of publications, more maps and photographs are desirable. As a bead may have different names in different parts of the world, where several types of beads are named, be it in English or Bahasa Malaysian, it would be most helpful to have labeled photographs of the beads. For example, the name of the "pyjama bead" common in Borneo unfortunately does not conjure in the mind a multicolored, longitudinally striped, black bead. Together with the 2010 proceedings and in anticipation of those of the 2013 conference, an important body of information is being

built up on the place of beads in Southeast Asian and other indigenous cultures and on the pressures in these cultures that are causing change in their use.

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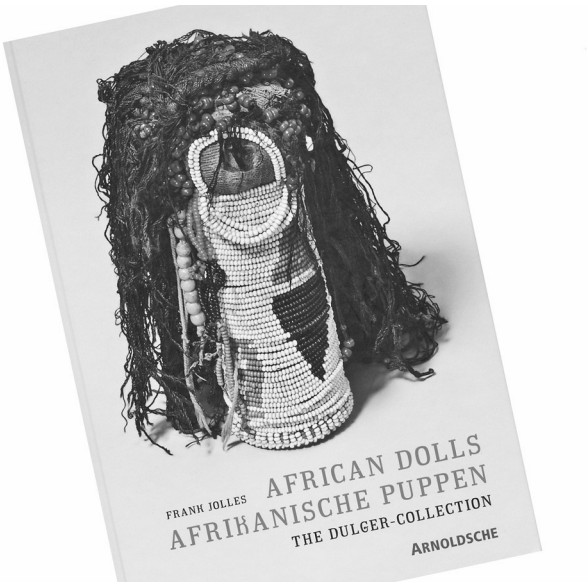
African Dolls/Afrikanische Puppen: The Dulger-Collection.

Frank Jolles. Arnoldsche Art Publishers, Liststrasse 9, D-70180 Stuttgart, Germany. 2010. 176 pp., 166 color figs., 5 B&W figs. ISBN 978-3-89790-336-4. $70.00 (hard cover).

This bilingual (English and German) book examines in detail 93 Zulu dolls that date to the second half of the 20th century. They were all collected by the author, Frank Jolles, in the 1980s and now form the Dulger-Collection housed in the J. & E. von Portheim Foundation ethnographic museum in Heidelberg, Germany. The oldest dolls in the collection are traditional ones that were used by Zulu girls during courtship; the remainder were made for sale in the tourist trade. Professor Jolles traces the roots of the dolls and their evolution into trade objects along with the historical, social, and economic conditions that led to their development.



The book begins with an introduction by Stefan Eisenhofer in which he provides the background to the collection and its path to the Dulger-Collection. Jolles then explains how the political situation in apartheid South Africa (in which men moved to the cities to work, leaving women and children in rural areas in relative poverty) led to the commercialization of crafts as a means for rural women to generate income. He also tracks changes the doll makers made to create figures that would appeal to buyers who were mainly urban whites and tourists from abroad. For example, eyes were added whereas traditional doll's faces were featureless. Advice of culture brokers led some women to the making of bead sculptures which were meant for display and were entirely divorced from the cultural roots of their makers. Other women, such as those from KwaLatha, Keate's Drift (a map forms the inside cover of the book), determined that customers were interested in Zulu history, culture, and society so the dolls they made were based on traditional models and carried content. As Jolles collected he interviewed the makers and recorded full information about each figure or group of interacting figures (for example an *isangoma* [diviner] and her apprentice). As Jolles points out (p. 20): "To a greater or lesser extent, all of the dolls in this collection participate in interactive social relationships." Details incorporated in the figures identify their sex, clan, age, marital status, and social relationships.

Jolles next examines the historical function of dolls in Zulu society beginning with clay dolls that fall into two categories: those for (and made by) boys, which are mainly toy cattle, and human figures made for girls by their mothers. He then moves on to discuss dolls made of cloth and beads, including explanations of possible meanings of some of the beaded patterns. He notes how the first changes that moved away from traditional courtship dolls occurred in headdress styles and the addition of eyes. The next developments included adding legs, arms, and various items of clothing along with miniaturized beadwork pieces, thus transforming the dolls from the abstract symbolic forms of courtship dolls to realistic figures which sometimes were constructed in sizes far larger than the traditional prototypes. Eventually some accurately detailed figures, which Jolles calls "character dolls," were actual depictions of particular people.

The plates section is made up of a full page image of each doll or group of dolls. They are grouped by type: traditional courtship dolls; maize-cob based rag dolls made by young girls as toys; cob cattle; clay dolls; transitional dolls which still retain basic features of the traditional courtship dolls; transitional developed dolls which still

retain some traditional features; and "character dolls," independent creations depicting people from Zulu society without reference to courtship dolls. It is followed by what may be the most useful section of the book for researchers. It provides full descriptions of each doll including information Jolles gathered while collecting the dolls and is filled with a wealth of detail about Zulu dress, beadwork, and behavior. An appendix adds further information about these subjects. Observant Zulu beadwork enthusiasts working on identifying pieces from this period and region will be able to use the descriptive section of the text to identify some beadwork styles and the areas they came from. For example, the traditional doll in Plate 36 is described as having an "*umemulo* ['coming of age ceremony'] hairstyle called *ufezela*, 'scorpion,' on account of the similarity to the curved tail of the scorpion.… The red, white and black beadwork motif and white apron with pointed chrome studs suggest an origin in the Upper Umvoti district just south of Msinga" (p. 133).

This book is a highly valuable resource for researchers interested in mid- to late-20th-century Zulu dolls from the Tugela region along with associated dress, customs, and beadwork.

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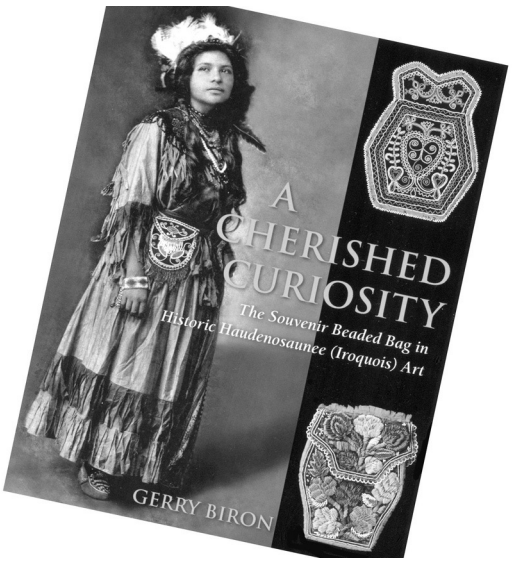
Cherished Curiosity.

Gerry Biron. Self published, P.O. Box 250, Saxtons River, VT 05154-0250. 2012. i-vii + 184 pp., 158 color figs. ISBN 978-0-9785414-1-5. $34.95 (cloth).

For years, in times when the focus of attention was firmly placed on Native American beadwork arts of the Great Plains and other cultural areas, the attractively designed beadwork purses made in the North American Northeast went largely unappreciated and were widely dismissed as kitsch "souvenir art," devoid of any great ethnographic or even artistic value. Not only were these purses vastly underappreciated, they were also very much misunderstood, being routinely dated by authors, museums, collectors, and auction houses as several decades later than their actual date of manufacture by the various Haudenosaunee (Iroquois) groups of New York state and eastern Canada. To a large extent, some of the myths and misinformation have persisted. Gerry Biron's new book, *A Cherished Curiosity*, goes a long way to setting the record straight.



Divided into five main chapters and lavishly illustrated in full color with examples of early Haudenosaunee purses and related ephemera from Biron's own private collection, the book is beautifully designed and visually appealing.

The opening chapter provides an introduction to the emerging tourist market, and European or Euro-American demand for exotic souvenirs of travels in the American Northeast, discussing the establishment of Niagara Falls as a locus for the sale of a whole range of Indian-made curios expressly designed for the non-Native market. To the honeymooners and other visitors to the falls, these objects were at once exotic and fashionable, giving rise to a fascination for anything "Indian." Reacting to this demand, a number of repositories of Indian goods sprang up, especially following the opening of the Erie Canal in 1825, an event which gave rise to a population surge in western New York state and opening regions further west to settlement.

The chapter is illustrated with a number of interesting period views of stores such as Mason's Indian Bazaar, the Six Nations Indian Store, and Dean's Metamora Indian Depot, all purveyors of beadwork and decorated bark articles at Niagara Falls for the early tourist market.

The second chapter examines traditional design motifs found on the earliest Haudenosaunee purses, including the double-curve, celestial dome (sky dome), heart motif, and other recurrent imagery inspired by indigenous cosmology and flora.

Chapter Three examines the so-called "Classic period" of Haudenosaunee souvenir purses, produced from around 1800 until the 1840s. Beginning with purses beaded on hide and evolving into versions made using trade materials such as woolen cloth and silk ribbon edging, these earliest purses were applied with a range of designs from the Haudenosaunee repertoire, typically including diamonds, sun symbols, double-curves, and zigzags on a background of red, black, or navy woolen cloth. A few documented examples are illustrated, including an example from the collections of New York State Museum, collected by Dennis Doyle from an Indian in Albany, New York, in 1807.

As Haudenosaunee beadworkers became more and more experienced and more savvy in terms of the marketing of their artwork, their beadwork designs became increasingly sophisticated. Some specimens produced during the late Classic period employ larger areas of solid beadwork decoration in their designs. Also presented in this chapter are unusual hybrid purses combining Huron-Wendat style moosehair embroidery with Haudenosaunee style beadwork, reflecting the complex cultural interaction between different neighboring nations in the 19th century, amongst other mitigating factors.

In Chapter Four, the author analyzes the factors that led to the adoption, from the late 1840s and for a few decades thereafter, of polychrome floral designs on purses and other fancy articles of beadwork. This transition from predominantly indigenous imagery to European-influenced floral forms may have been prompted by the 19th-century fashion for Berlin woolwork and beaded versions thereof, whereby two-tone shading was employed to create a three-dimensional effect. Paper patterns were placed beneath the beadwork to serve as templates and heighten the iridescent effect of the more translucent bead colors. Of the tens of thousands of these floral-decorated purses that must have been made, each one was unique in terms of design, a tribute to the inventiveness of their makers.

Instrumental in the development of the Haudenosaunee floral beadwork style was a young Tonawanda Seneca woman named Caroline Parker. A highly accomplished needleworker, Caroline produced a number of pieces collected in 1849 by Lewis Henry Morgan for the eventual New York State Museum in Albany. Several pieces in the distinctive "Parker" style she almost certainly played a part in developing are illustrated in this section of the book.

The mid-19th century trend for ladies' purses as a fashion accessory is brought to life by the inclusion of early portraits and other photographic material featuring European or Euro-American ladies in contemporary dress, holding their highly prized Indian beadwork purses. At the end of this chapter Biron studies Tuscarora novelties in the raised beadwork technique, including box-shaped fist purses amongst other styles of bag, many of which are inscribed "Niagara Falls" in beads. Also showcased is the work of one modern-day sewer, Rosemary Rickard-Hill, who continues the Tuscarora beadworking tradition to the present day.

Chapter Five goes on to examine the distinctive early style of purses made by the Mohawks in the vicinity of Montreal, Quebec, an active 19th-century center of commerce. Exhibiting a keen flair for enterprise, the Mohawks of Kahnawake especially took advantage of their location and went on to produce large quantities of raised beadwork for the commercial market, many of the pieces bearing novel inscriptions designed to appeal to European buyers.

Also described here is the small community of Akwesasne Mohawks engaged in the production of raised beadwork souvenirs in the Greenwich Village area of New York City around the turn of the 19th century, led by Chief Dibo (Longfeather). This Mohawk colony, numbering approximately 40 individuals, went virtually unreported until, in 1900, a local newspaper article revealed their presence and creative activity.

Finally, in an appendix, the author takes a look at the host of Indian "medicine shows," Wild West shows, Indian entertainers, and fraternal organizations such as the Improved Order of Redmen, and the role they all played in the development and marketing of Haudenosaunee raised beadwork.

Gerry Biron is an artist, collector, researcher, and author of *Made of Thunder, Made of Glass*, which also treats the subject of northeastern Native beadwork. His latest book is a well-designed hard-cover publication, with an attractive dust jacket featuring the Seneca woman Goldie Jamison Conklin wearing a beaded purse with stylized curvilinear designs.

Readers with an interest in northeastern beadwork in particular or indigenous arts in general will certainly want to add a copy of this volume to their bookshelves. As the print run is relatively small – only 1,500 copies – be sure to grab a copy while stocks last. I can guarantee you will not be disappointed!

A Cherished Curiosity represents the culmination of many years of dedicated interest in northeastern Native souvenir art and reflects the author's devotion to his subject. It also highlights the artistic beauty and historic complexity of Haudenosaunee beadwork made for the souvenir trade. No longer can their souvenir beadwork unashamedly be relegated to the category of mass-produced kitsch,

commoditized tourist craftwork. We have now moved on to a greater level of understanding of this culturally precious, aesthetically delightful, and most deeply cherished of curiosities.

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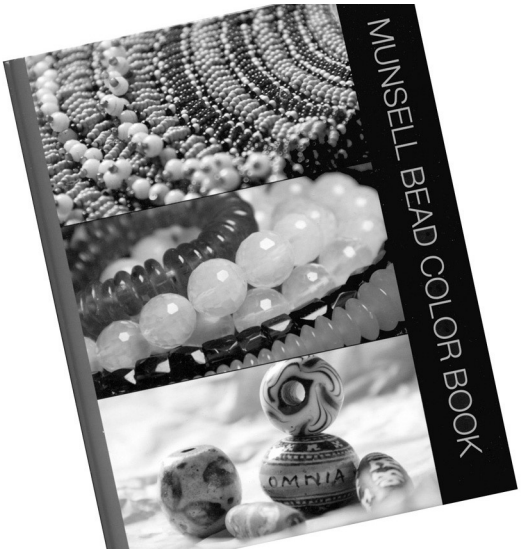
Munsell Bead Color Book.

Munsell Color. X-rite, 4300 44th Street, Grand Rapids, MI 49512. 2012. Ring binder, 5 pp., 5 color chip pages. Item no. M50145B. $157.00 (hard cover).

A.H. Munsell (1858-1918) was a painter and professor of art who is best known for having devised and developed the color notation system that bears his name. After his death, his son and other interested experts further developed and refined the system, and a number of publications are available under the Munsell name, including the *Munsell Soil Color Chart* which is used by geologists, archaeologists, and others. Other charts, dealing with rock, food, and plant colors have been printed, and the latest of these is the *Munsell Bead Color Book*, created in response to the needs of the many researchers in the world of bead studies.



The full *Munsell Book of Color* book costs US$945, so this smaller book represents a considerable saving in both dollars and bulk. Prepared with the assistance of the Society of Bead Researchers and its officers Alice Scherer, Karlis Karklins, and Laurie Burgess, it comes as a colorful ring binder measuring 8 by 6.5 in., with five loose-leaf pages of explanatory text and diagrams in black and white plus five pages of color chips with their names and codes on five facing pages. There are 176 glossy color chips which represent the colors that have thus far been recorded by North American archaeologists. The colors are arranged in spectral order, starting with the reds and ending with neutral values (white, gray, and black). When denoting colors, the Munsell code should be included after the name as some names apply to two Munsell color chips.

The color names are not drawn from the Inter-Society Color Council–National Bureau of Standards system as stated on p. 4, but from the 1950 *Descriptive Color Names Dictionary* produced by the Container Corporation of America, Chicago. The color chip pages have a circular hole 10 mm in diameter below each chip, a useful feature that facilitates the determination of the color of beads incorporated into beadwork or some other fabric. There are guidelines regarding the best light to view the beads, notes on cleaning dirty or patinated beads, and information about how to determine whether the glass is opaque, translucent, or transparent.

The introductory pages end with an explanation, including two diagrams, of the Munsell notation system: hue (color, listed in the order of spectrum colors), value (depth of color), and chroma (Greek for color and a measure of color purity). The inside front cover has a color image of the chroma scale of values above a color wheel of the hues which may make it easier for a beginner to understand the Munsell color system.

The *Munsell Bead Color Book* will prove useful to all who need to accurately record bead colors, whether they are archaeologists, ethnologists, museologists, or collectors. Munsell Color and the Society of Bead Researchers are to be congratulated on their initiative in creating this useful research tool and making it available to a worldwide audience.

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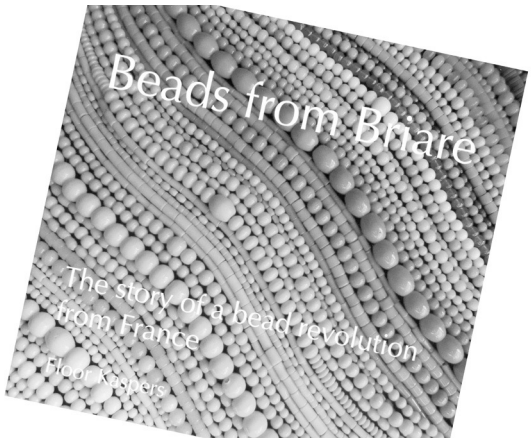
Beads from Briare.

Floor Kaspers. Marblings Publishing, Amsterdam. 2011. 74 pp., 6 B&W figs., 78 color figs. ISBN 978-9-49131-100-0. $22.95 (paper cover); $1.99 (Ebook, Apple iPad format http://www.blurb.com/bookstore/detail/2602875as)

At the beginning of *Beads from Briare: The Story of a Bead Revolution from France*, the author points out:

> Most people tend to think of the intricate millefiori beads from Venice, or the drop shaped colourful beads from Bohemia, when they think of trade beads. However, when you look at the volume of beads that was made, plain beads made up the greatest part of them.... And it was exactly with these beads, that the French entrepreneur Jean-Luc Bapterosses made his success (pp. 10-11).

This book is successful because it not only delves into a subject which is not well know but also because the author has relied on her own observations rather than only citing other published research. The beads produced by Bapterosses in Briare, France, interest us because they appear in quantity among many types of beads in the African trade and elsewhere, and when Floor Kaspers became interested in them and first visited Briare in 2010 (the location of the Bapterosses factory and museum), she was allowed to visit the factory dump site. Here she found a wide array of discarded items including buttons, beads, tiles, and broken or malformed products which she categorized and which gave her a good idea of the factory's output, possibly dating back to as early as the mid-19th century, when Bapterosses set up production in Briare.



Beginning with the patent history, the book summarizes the unique chemistry and technology that created the "revolution" mentioned in the book's subtitle. This explains the slightly raised "band" around the center of many of the beads that makes them so identifiable, in their most common form. And indeed the bead's unique placement between glass and ceramic adds to its interest.

Chapter 1 summarizes the scope of beads as trade items and their geographical range. The next chapter outlines the techniques used to produce most glass beads, both individually and in quantity (this helps us to better understand why certain beads cannot have been made by the Prosser method). Chapter 3 focuses specifically on "Prosser" beads which were made by a particular technique wherein finely ground ingredients moistened with milk were compressed in molds and then placed in furnaces to fuse the components. The author lists the characteristics that define a "Prosser" bead.

In Chapter 4 – which concerns the beads made at the Bapterosses factory in Briare – Floor Kaspers cites various documents including technical patents, eyewitness accounts, photos, postcards, and factory and company trade records, and presents a useful timeline for the company from 1813 to 1996. The company museum in Briare holds a collection of its products, though whoever did the displays was not the most informed scholar so not all the exhibits are reliably catalogued, and some items are wrongly ascribed. The author is diplomatic rather than critical on this matter.

Chapter 5 examines and lists the wide range of opaque beads Bapterosses developed and produced, from cylinders and spheres to pendant shapes resembling popular beads of other materials, coral, twigs, ovals, variegated layered colors resembling agate-like stripes, interlocking zigzag shapes, and a garish form with an oily-looking luster finish. Some beads exhibit colored designs applied to the surface prior to being fired. Chapter 6 concentrates on industrial rivalry with competitors in Bohemia and includes images of a number of sample cards from these companies which help us recognize how rapidly beadmaking methods were copied elsewhere.

Beads from Briare is well written and the paper version is a handy size with quality photographs mostly in beautiful color. It is also available in an EBook format for a very affordable price, a great trend which we hope is continued by other authors. The book is recommend to everyone who wants to know more about Prosser – or more correctly – Bapterosses beads.

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INFORMATION FOR AUTHORS

1. Papers submitted for publication must be 1.5-spaced, justified left, with 1 in. margins. Submissions should not exceed 40 pages including references cited and image captions. The hard copy should be accompanied by the text as an e-mail attachment or on a CD in Word for Windows 6.0 or later (.doc) or Rich Text File (.rtf).

2. All manuscripts must be prepared with the following internal organization and specifications:
   a. First Page: place title and author's name(s) at top of the page.
   b. Abstract: an informative abstract of 150 words or less is to comprise the first paragraph.
   c. Acknowledgements: these are to be placed at the end of the article, before the references cited.
   d. Author's Affiliation: place author's name, affiliation, and address adjacent to the right margin immediately following the references cited.
   e. Tables: each table must have a short title and be typed 1.5-spaced on a separate page. Do not embed tables or illustrations in the body of the report.
   f. Figure Captions: list the captions for black and white illustrations (Figures) sequentially on a separate page using Arabic numerals; color illustrations (Plates) should be listed separately using Roman numerals.

3. Number all pages consecutively from the title page through the references cited and figure and plate captions.

4. All headings should be situated three (3) spaces below the preceding text and flush with the left margin.
   a. **PRIMARY HEADINGS** are to be capitalized and bold.
   b. **Secondary Headings** are to be typed using bold upper and lower case letters.
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   d. Quaternary Headings are to be in regular (not bold) upper and lower case letters.

5. Reference citations and the references cited should follow the style of *Historical Archaeology* <http://www.sha.org/publications/documents/SHA%20Style%20Guide-Dec%202006.pdf> (pp. 22-38).

6. Illustrations:
   a. All drawings and photographs should be of publishable quality, with color and B&W images having sharp focus and contrast.
   b. Black and white images must be submitted as high-resolution (300 dpi or higher) scans or digital images (.jpg or .tif files).
   c. Color illustrations should be submitted as high-resolution (300 dpi or higher) scans or digital images (.jpg or .tif files).
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   e. When several items are shown in a single frame, each object is to be designated by a lower case letter, and the caption should include references to these letters.
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8. If review remarks are such that substantial changes are required before a manuscript is acceptable for publication, the revised paper will be re-reviewed by the original reviewer prior to its final acceptance.

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

Plate IA. *Tani:* **Top:** Small Tani melon beads. D: 10 mm; L: 6.5 mm. **Bottom:** Large melon beads. D: 20-22 mm; L: 18-20 mm (all photos by author unless otherwise indicated).

Plate IB. *Tani:* Apa Tani woman with bamboo nose plugs and facial tattoo examining antique heirloom beads. Apa Tani women only wear their heirloom beads at festivals.

Plate IC. *Tani:* Apa Tani *nyibo* (priest) chanting at an animal sacrifice, wearing a much valued antique necklace of conch beads, as well as a band of cowrie shells.

Plate ID. *Tani:* **Top:** Much-worn Venetian black eye beads in a Tani heirloom necklace. **Bottom:** Wound "dogtooth" beads with melon-like lobes.

Plate IIA. *Tani:* Glass melon beads, Yuan dynasty (1271-1368), China (Kwan 2001:82). The bottom specimens are 14-27 mm in diameter and 11-19 mm in length (Kwan 2001:368).

Plate IIB. *Tani:* **Top:** Possible Yuan-dynasty lobed glass beads on the Kunming antiquities market, Yunnan, China. **Bottom:** Tani "moon" beads showing horseshoe-shaped marks on the surface.

Plate IIC. *Tani:* **Top:** More-recent (19th or early 20th century) wound blue glass beads valued by the Tanis. **Bottom:** Opaque blue beads worn by *chamm* dancers at the Tawang monastery in Arunachal Pradesh, India.

Plate IID. *Tani:* **Top:** *Chamm* dancer dressing, Torgya festival, Tawang monastery. **Bottom:** Blue glass beads worn bandolier-style by monks at the *chamm* dance.

Plate IIIA. *Tani:* **Top:** Akha heirloom beads, Chiang Mai, Northern Thailand. Lower beads: possibly late 19th or early 20th century; upper beads: probably much more recent (1990s?). **Bottom:** Blue wound beads in Kachin heirloom necklaces, Putao, northern Burma.

Plate IIIB. *Tani:* **Top:** Fake antique conch shell beads, Harmuti market, Assam. **Bottom:** Fake Tani melon beads before (bottom) and after (top) ageing.

Plate IIIC. *Tani:* **Top:** Bead sellers at Harmuti market, Assam. **Bottom:** New Venetian feather beads and Peking glass beads, Harmuti market.

Plate IIID. *Tani:* Jamuna Prasad Shah, son of Kailash Shah, with a customer at the Harmuti market.

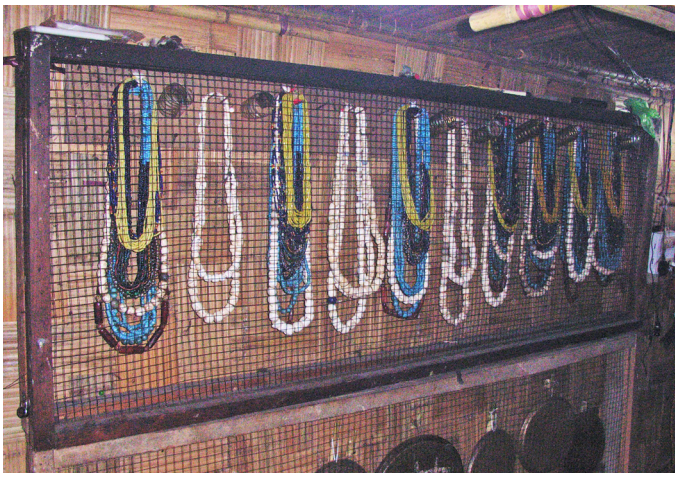


Plate IVA. *Tani:* **Top:** Clan wives with their heirloom beads during the *murung* festival, Apa Tani valley. **Bottom:** The clan women's heirloom necklaces after being secured. The metal trays displayed beneath them are also valued by the Tanis.

Plate IVB. *Tani:* A valuable assemblage of antique Tani heirloom beads.

Plate IVC. *Paris:* Selected beads from the Jardins du Carousel site: a, 102.049 (30)B; b, 106.001 (59)A; c, 106.001 (59)B; d, 106.001 (59)D; e, 106.001 (59)C; f, 106.036 (61).

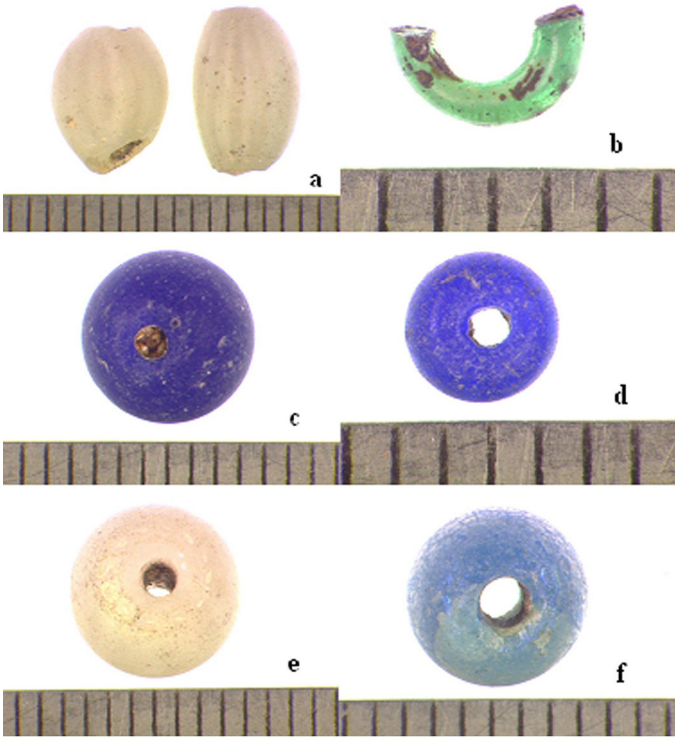


Plate IVD. *Paris:* Beads from the Cours Napoléon site: a, 2068 (1261); b, 3208 (4684); c, 3411 (4383); d, 5051 (1046); e, 5076 (1197); f, 5080 (2710); g, 5113 (1347); h, 7576 (11598); i, 13420 (16859); j, 26037 (15067); k, 30024 (16.438); l, 44076 (22709).

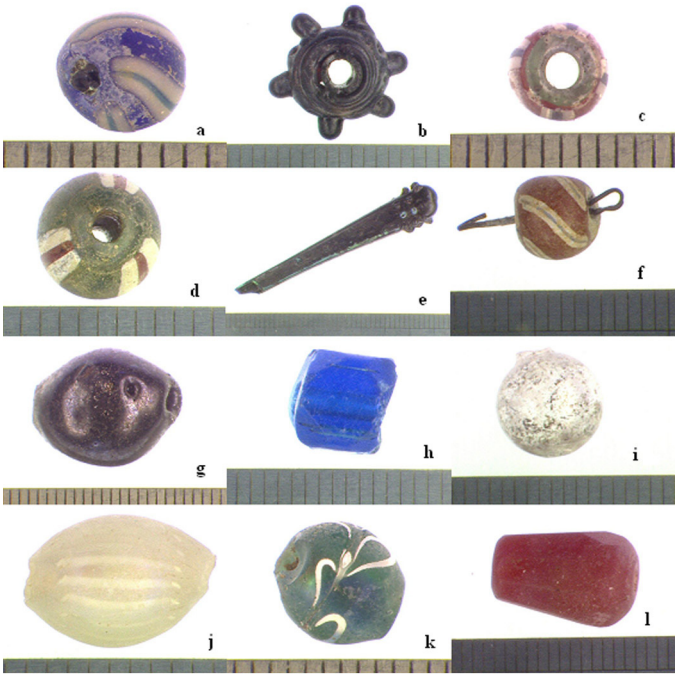
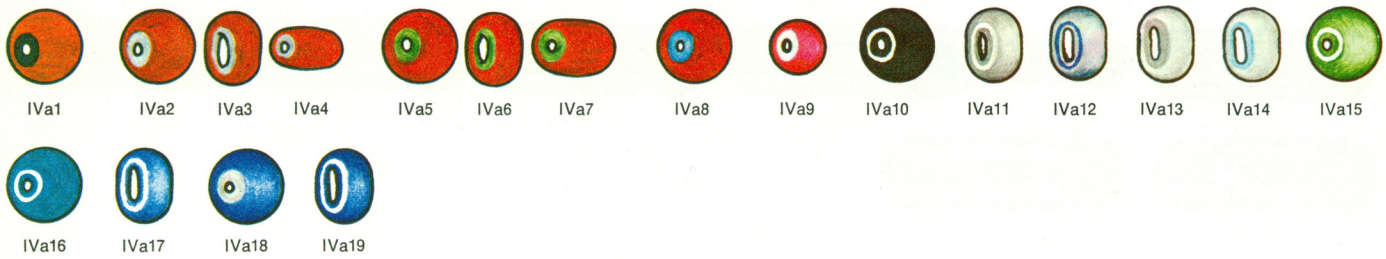


Plate V. *Kidd and Kidd:* Class I drawn bead varieties.

Plate VI. *Kidd and Kidd:* Class II drawn bead varieties.

Plate VII. *Kidd and Kidd:* Class II and III drawn bead varieties.



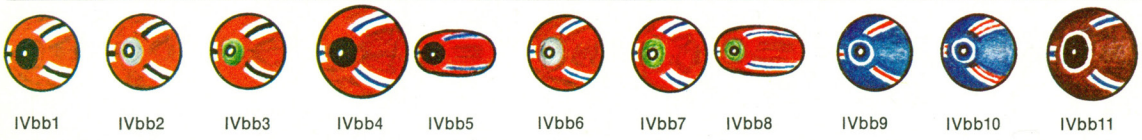


Plate VIII. *Kidd and Kidd:* Class IV drawn bead varieties.

Plate IX. *Kidd and Kidd:* Class W wound bead varieties.

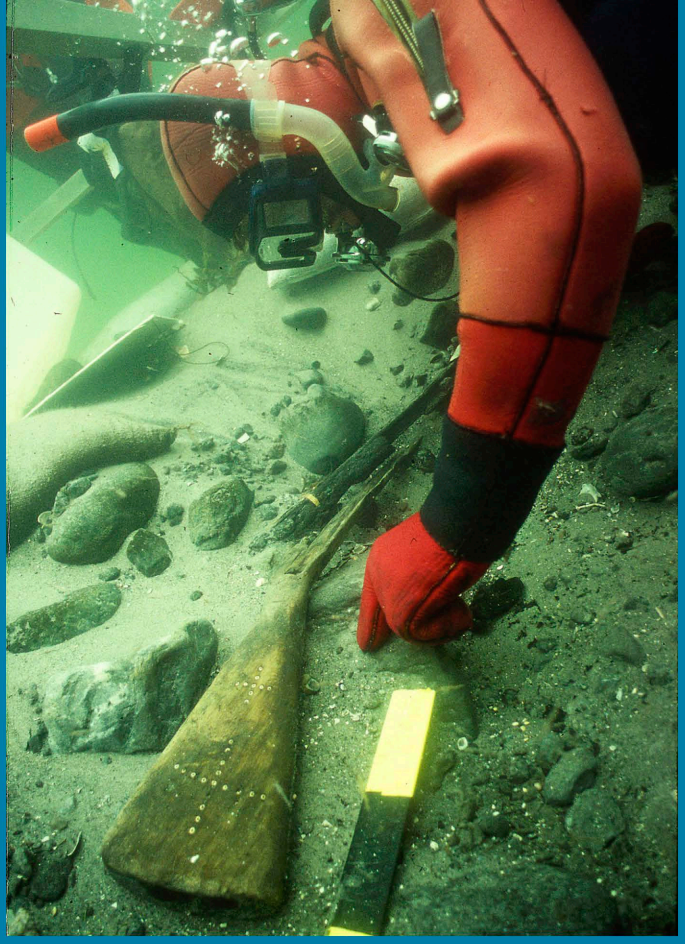


Plate XA. *Phip's wreck:* The wampum-inlaid musket in situ on the 1690 Phip's wreck (photo: Peter Waddell, Parks Canada).

Plate XB. *Phip's wreck:* The crosses and the row of wampum in the lower edge of the stock after conservation (photo: George Vandervlugt, Parks Canada).

Plate XC. *Phip's wreck:* Wooden sword club inlaid with wampum, shell ovals, and metal strips collected during King Philip's War (1675-1676) (Thaw Collection, Fenimore Art Museum, Cooperstown, NY; photo: Richard Walker).

Plate XD. *Phip's wreck:* War club made of wood, lead, and glass beads; possibly Huron, 18th century (© The Trustees of the British Museum; AN308422001).