FLORIDA CUT-CRYSTAL BEADS IN ONTARIO

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Faceted rock-crystal beads attributed to ca. 1550-1630 have been found at a number of North American archaeological sites, principally in the southeastern United Sates where they are generally termed Florida Cut-Crystal. Finds further to the north are rare. It was, therefore, of great interest to discover three different examples in the bead collections of two 17th-century Huron-Wendat sites in southern Ontario: Le Caron (BeGx-15) and Warminster (BdGv-1). The beads are investigated using a multi-disciplinary approach in an effort to determine how and where they were produced.

INTRODUCTION

European trade beads are ubiquitous on contact-period Iroquoian archaeological sites in Ontario, with those of glass being the most common. Beads of other materials, such as lathe-turned bone, are comparatively scarce. While stone beads presumed to have been produced by Indigenous peoples exist in small numbers, those made of hard minerals such as quartz are absent in the archaeological artifact inventories. It was therefore of more than passing interest to encounter three different forms of rock-crystal beads while examining legacy collections from a number of 17th-century Huron-Wendat sites in southern Ontario; especially so since the beads clearly belong to a group of lapidary beads found principally in the southeastern United States. The three beads were recovered from two sites: Warminster (BdGv-1) and Le Caron (BeGx-15).

THE SITES

The Warminster site is a Huron-Wendat village in eastern Huronia within the territory usually attributed to the Arendaronnon or Rock Nation (Heidenriech 1971). It has been famously debated as a possible location of the village of Cahaigué visited by Samuel de Champlain in 1615 (Fitzgerald 1986; Skyes 1983). The site was excavated as part of three different campaigns from the University of Toronto starting in 1946 and terminating in 1979. The settlement consisted of two palisaded sections with an ossuary in the center. The excavations from the settlement area recovered a total of 452 glass beads, the majority of them being white or cobalt blue varieties. On this basis, the villages can be safely assigned to Glass Bead Period II (ca. 1600-1625/30) (Fitzgerald et al. 1995). The single cut-crystal bead does not appear to be discussed in Skyes' (1983) analysis or inventory of beads, and it is likely that it was one of seven beads assigned to an "indeterminate" category. While the bead has a catalog number, provenience information is not available.

Located on the Penetang peninsula further to the west, Le Caron is also a Huron-Wendat village. It is considered to have been occupied by the Attignawantan or Bear Nation. Excavations at Le Caron were carried out in the 1970s under the auspices of Trent University field schools (Johnston and Jackson 1980). The fieldwork resulted in the partial exposure of five longhouses and a palisade. There is no evidence that the site consists of more than one section, but most of the site remains unexcavated. The glass bead assemblage consists of 447 beads, of which 57% are round red beads and 3% are red tubular beads (Evans 1998). Faceted 7-layer chevrons and several varieties of Nueva Cadiz beads are also present. Le Caron would have been occupied during Glass Bead Period IIIa (ca. 1625/30-1640) (Fitzgerald et al. 1995; Kenyon and Kenyon 1983). The two cut-crystal beads originated from the northeast midden, which lies outside the palisade. Slightly more than 15% of the glass beads from Le Caron were found in this midden (Evans 1998).

THE CUT-CRYSTAL BEADS

The three cut-crystal beads are all multi-faceted though they differ in both form and the number of facets. The Warminster specimen (WAR 706) is globular and exhibits 5 rows of 10 hexagonal facets each that encircle the bead for a total of 50 facets (Figure 1, a). The ends are ground flat. The perforation has a distinct taper which is atypical of the cut-crystal group, suggesting a different drill configuration and possibly a different source than the others. There are a couple of tiny chips out at the narrow end where the drill broke through. This reveals that the bead was faceted before the hole was drilled. The specimen is 8.4 mm long, 9.6 mm in diameter, and the perforation measures 2.1 mm at the intact wide end.

The two Le Caron beads have parallel-sided perforations drilled from one end that are a uniform 2.0-2.1 mm in diameter. The first example (J18bl-4) is oblate with five rows of facets (Figure 1, b). There are 21 diamond-shaped facets around the middle and 6 pentagonal ones at the ends for a total of 33. The ends are severely battered, suggesting that the bead had been shaped by pecking prior to the grinding of the facets (Francis 2002:113). Apparently it was not deemed necessary to polish the ends. There is a large chip out of one end. The bead is 6.1 mm long and 8.7 mm in diameter.

The second specimen (J18hl-30) is oblong with a hexagonal cross section (Figure 1, c). The surface exhibits 12 triangular facets. The ends are flat but exhibit a pebbled surface indicating that this bead had also been shaped by pecking. The bead measures 12.0 mm in length and 7.6 mm in diameter.

LA-ICP-MS ANALYSIS

The two Le Caron beads were included in a broader study of glass trade beads from early to mid-17th-century Wendat archaeological sites in Ontario (Walder and Hawkins 2018). Their composition was analyzed using Laser Ablation – Inductively Coupled Plasma – Mass Spectrometry (LA-ICP-MS) at the Elemental Analysis Facility of the Chicago Field Museum.[1] Both Le Caron beads were found to contain >99% silicon dioxide by weight, which is consistent with the makeup of quartz. Identifying the geologic source of the quartz based on its chemical composition is challenging, since trace elements are present in very small quantities. Variations in trace elements caused by geologic source environments of mineral formation have been identified for quartz, especially for the elements titanium (Ti) and aluminum (Al) (Rusk et al. 2011; Thomas et al. 2010). There are compositional differences between the two beads, with more trace elements recorded in higher quantities in LC J18h1-30 (LC 29) than in LC J18b1-4 (LC 28), which is 99.85% silicon dioxide (Table 1). Unfortunately, without a larger overall sample size, and samples from a variety of quartz sources used to produce 17th-century beads, it is not possible to determine if these compositional differences between the two beads indicate differences in sources of raw material or merely variations within a single geologic source.

This problem of intra-source variation relates to the "provenience postulate:" if the sources of raw material are to be distinguished, the compositional differences *within* a single source must be less than differences among sources (Price and Burton 2011:214). As discussed below, at the time that the Warminster and Le Caron sites were occupied, cut-crystal bead production may have been taking place in both Europe and Asia. Geologic sources of quartz used for beadmaking in those areas in the 17th century are not well documented archaeologically or historically. A way to identify possible compositional variations within single production batches of cut-crystal beads, which presumably might be produced in a workshop using material from the same source, would be to analyze the composition of beads with a known point of origin. For example, the Tortugas shipwreck, which sank in the Florida Keys in 1622, was a Spanish vessel carrying cargo for colonial trade (Stemm et al. 2013). Along with glass beads, cut-crystal beads were recovered from archaeological investigations, and the excavators propose that these beads were produced in Spain. Compositional analysis of cut-crystal beads from that assemblage could provide information on the range of variation in trace elements present in the quartz source used to produce those beads. Other samples of undetermined place of manufacture, such as those recovered in Ontario, could then be compared to the known quartz compositions.

SEM EXAMINATION OF PERFORATION CASTS

To further examine the production technology of the Ontario cut-crystal beads, casts of the perforations of all three Ontario specimens as well as three beads from a contemporary site in central Florida (Karklins 1974) were made using Mikrosil® (Kjell Carlsson, Sweden), a casting material designed for forensic applications. Once mixed, the Mikrosil was placed in a large-gauge syringe and injected directly into the perforation of each bead. The hardened cast was extracted using forceps and the excess trimmed off. A 12-mm carbon adhesive disk on an aluminum stud was used to attach each specimen perpendicular to the long access. As the adhesive disk was not sufficient for long-term mounting, white PVA glue was used to secure the cast. Each specimen was then coated in ca. 8-10 nm of gold using a Cressington Sputter Coater (Ted Pella, Inc. Redding, CA) to produce a conductive surface. The specimens were examined using a Cambridge Stereoscan 120 scanning electron microscope (SEM). The resulting images were captured in TIFF format.

The SEM images of the tapered Warminster bead's perforation reveal that it is decidedly conical. The perforation surface exhibits a number of distinct diagonal cracks, including some in a spiral configuration (Figure 2, a). The conical configuration resembles one described by Mark Kenoyer (1992:501) as having been produced using

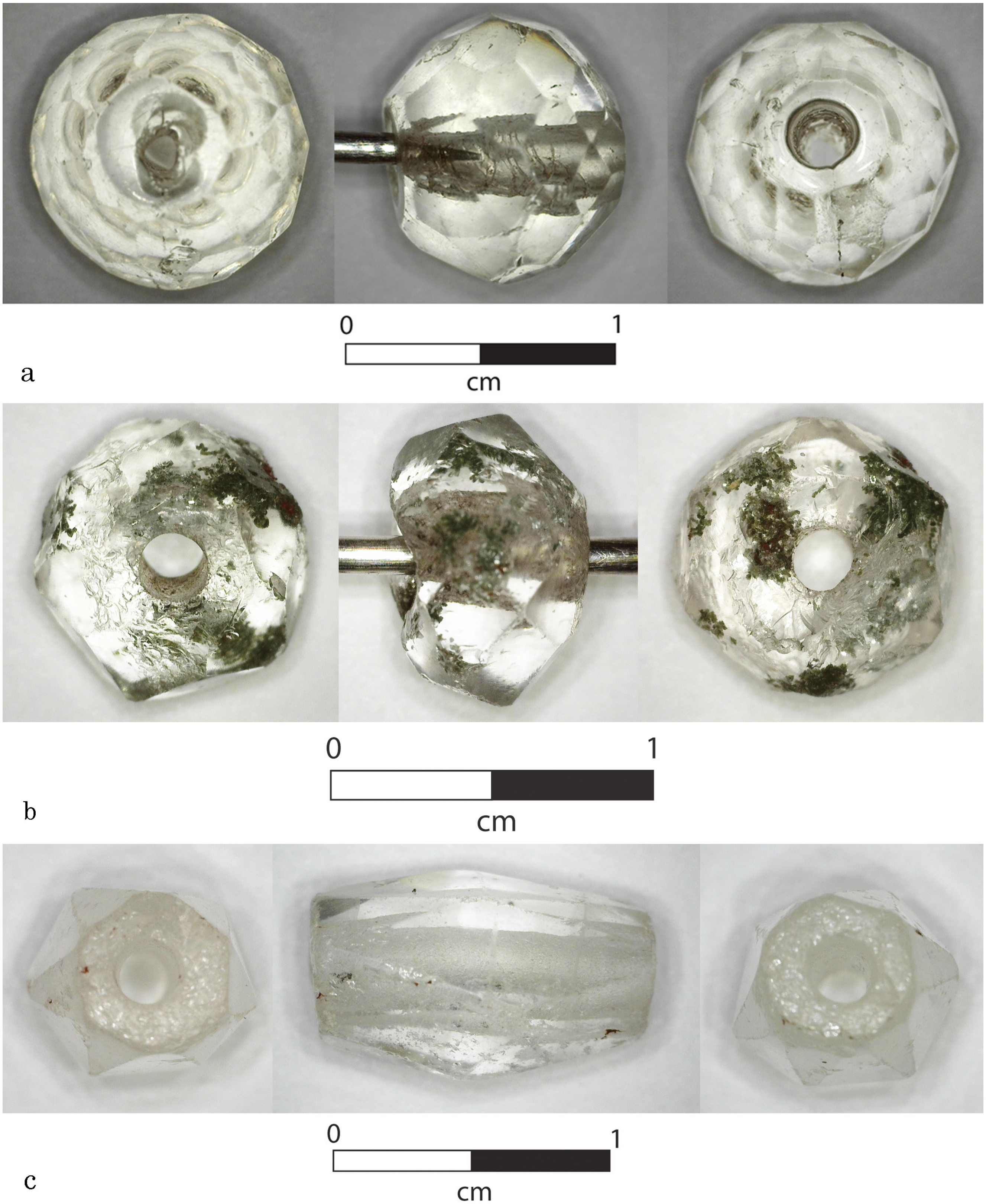

Figure 1. The Ontario Cut-Crystal beads: a) Warminster (WAR 706); b) oblate Le Caron (J18bl-4); c) oblong Le Caron (J18hl-30) (photos: Alicia Hawkins).

Table 1. Results of LA-ICP-MS Analyses of Two Ontario Cut-Crystal Beads.

ID	**SiO_2**	**Na**	**Mg**	**Al**	**P**	**K**	**Ca**	**Mn**	**Fe**	**Cu**	**Sn**	**Pb**
LC_28	99.85%	217	20	55	38	68	314	15	49	39	93	197
LC_29	99.01%	2734	586	347	174	775	1285	42	290	153	165	513
	Li	**Be**	**B**	**Sc**	**Ti**	**V**	**Cr**	**Ni**	**Co**	**Zn**	**As**	**Rb**
LC_28	3	0	0	4	16	0	3	1	1	1	8	1
LC_29	4	0	3	4	20	0	6	4	8	4	21	2
	Cs	**Ba**	**La**	**Ce**	**Pr**	**Ta**	**Au**	**Y**	**Bi**	**U**	**W**	**Mo**
LC_28	0	1	0	0	0	0	0	0	1	0	0	0
LC_29	0	3	0	0	0	0	0	0	4	0	0	0
	Sr	**Zr**	**Nb**	**Ag**	**In**	**Sb**	**Cs**	**Ba**	**La**	**Ce**	**Pr**	**Ta**
LC_28	0	0	0	0	0	0	0	1	0	0	0	0
LC_29	4	0	0	0	1	1	0	3	0	0	0	0
	Au	**Y**	**Bi**	**U**	**W**	**Mo**	**Nd**	**Sm**	**Eu**	**Gd**	**Tb**	**Dy**
LC_28	0	0	1	0	0	0	0	0	0	0	0	0
LC_29	0	0	4	0	0	0	0	0	0	0	0	0
	Ho	**Er**	**Tm**	**Yb**	**Lu**	**Hf**	**Th**	**Ho**				
LC_28	0	0	0	0	0	0	0	0				
LC_29	0	0	0	0	0	0	0	0				

Note: Silica is reported in weight percent of oxide; the other elements are reported in parts per million.

an unidentified type of drill with an abrasive, something that was not used in India or elsewhere in South Asia.

The parallel-sided perforation of the oblong Le Caron bead is covered with micro cracks and pits (Figure 2, b) which are a close match for one of the Florida Cut-Crystal beads (Figure 2, c) recovered from a burial mound in central Florida. The oblate specimen exhibits faint spiral grooves (Figure 2, d). Kenoyer (2017: pers. comm.) has opined that these perforations may have been made using double-diamond drills.

COMPARATIVE SITE DATA

The rock-crystal beads described above belong to a group of lapidary beads called Florida Cut Crystal. As the name suggests, sites yielding these beads are concentrated in Florida (Fairbanks 1968), but find sites are also located in coastal and interior Georgia (Blair et al. 2009; Worth 1988), Louisiana (Brain 1979), eastern Tennessee (Badger and Clayton 1985), coastal Virginia (Bushnell 1937; Lapham 2001), east-central New York (Rumrill 1991), and eastern Quebec (Turgeon 2001). There are few reported sites outside North America: three specimens were excavated in Paris (Turgeon 2001), several were found in a 16th-century midden at the Montmorin Castle in central France (Boudriot 1998), while the Diakhité burial site in Senegal, West Africa, yielded over a thousand examples (Opper and Opper 1989). It is not clear whether the paucity of quartz beads of the Florida Cut-Crystal group at European sites of the 16th-17th centuries reflects an actual scarcity of such beads, or just a lessened interest in sites and beads of the post-medieval period (A. Bonneau 2018: pers. comm.).

Fairbanks (1968:3) assigned the majority of the Florida specimens to the 16th and early 17th centuries. Marvin T. Smith (1983:155) subsequently revised the dates to 1550-1600, though the presence of substantial numbers of cut-crystal beads on the wrecks of three Spanish galleons which sank off Key West in 1622 (Francis 2009:118; Stemm et al. 2013:27) suggests that they were still a viable commodity

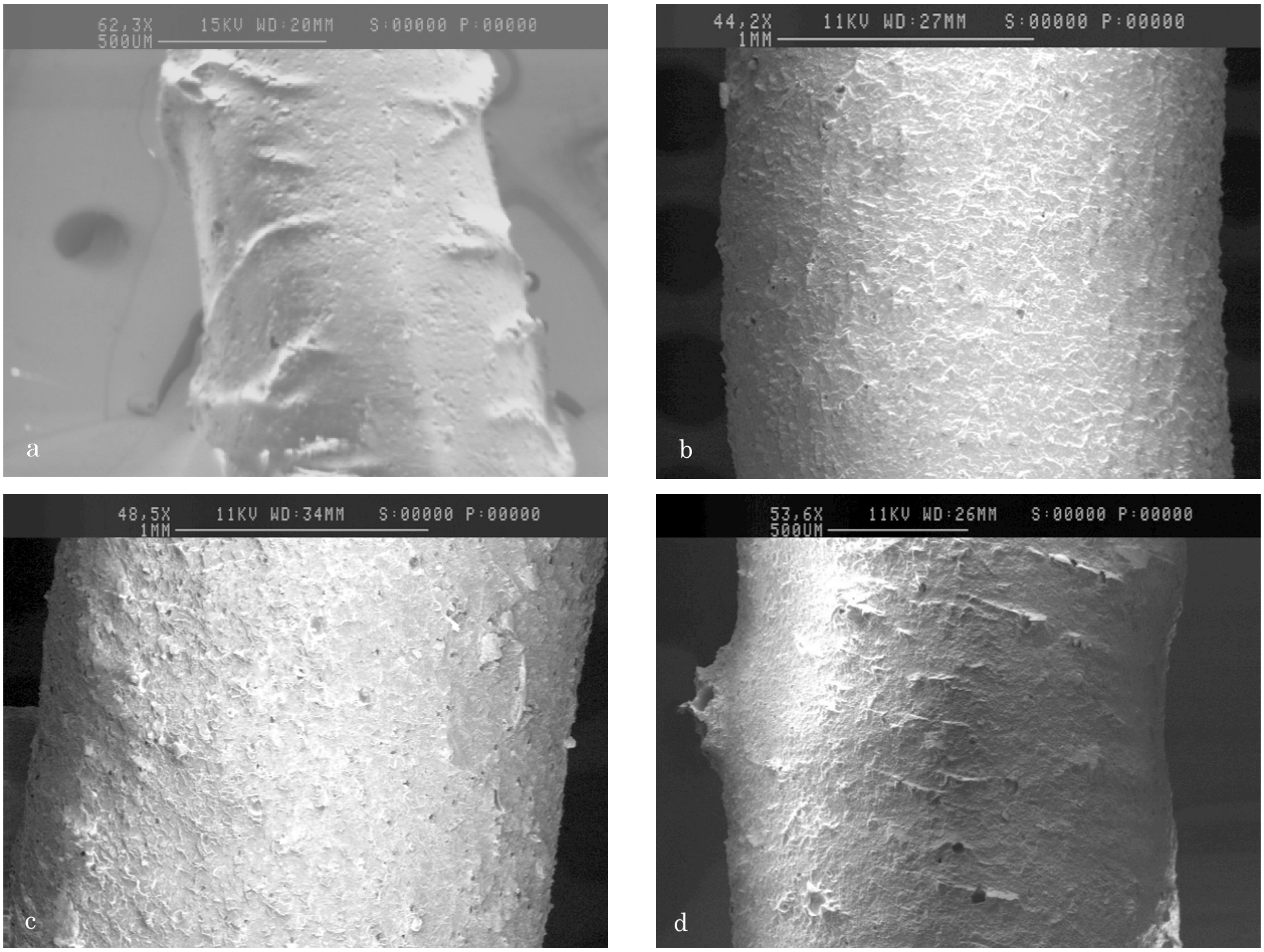

Figure 2. SEM images of bead perforation casts: a) Warminster; b) oblong Le Caron; c) Florida; and d) oblate Le Caron (photos: Scott Fairgrieve).

at that time, and likely even somewhat later. The Ontario specimens fit in comfortably at the tail end of this revised time frame.

It should, however, be mentioned that cut-crystal beads have also been recovered from late 17th- and 18th-century contexts in North America, including Mission San Luis Talimali, Florida, 1656-1704 (Mitchem 1993); the Trudeau site, Louisiana, 1731-1764 (Brain 1979); and Leedstown, Virginia, early 18th century (Francis 2009:122). In these instances it is unclear if the beads were still being circulated at the time or represent heirloom pieces. In the case of the beads found in Senegal, they clearly are heirlooms, being found with glass beads indicative of the 18th and first half of the 19th century (Opper and Opper 1989:18).

All three Ontario specimens have correlatives among the large and varied collection of Florida Cut-Crystal beads recovered from Mound Key in southwestern Florida which was occupied from ca. 1550 to 1763 (Wheeler 2000:89-91). The Warminster specimen is equivalent to Mound Key Style 5a, while the oblong Le Caron bead correlates with Style 2 and the oblate one is similar to Style 4, though with several more body facets.

SOURCING

The source of the cut-crystal beads remains problematic. Francis (2009:118) initially proposed India – long known as a source of stone beads – as the likely production center but later concluded that this was not likely due to the low quality of the stone and the rather primitive drilling technology. The technology used to drill the Warminster bead also refutes an Indian origin for at least that bead. Francis excluded Venice and Paris[2] – which also worked rock crystal into beads and other adornments – for the same reasons.

Considering that the beads were introduced into North America by the Spaniards, Spain might be a possibility, with the area around Castile being suggested by Francis (2009a:118; 2009b:180) as the likeliest place. Another potential source is the famous stone-bead emporium of Idar-Oberstein in west-central Germany which has been in operation since around A.D. 1500 (Frazier et al. 1998-1999:35). While it is best known for its agate beads, Idar-Oberstein also worked crystalline quartz to some degree. It is important to note that this industry employed bow-drills using abrasives with such skill that they were able to drill straight holes up to 20 cm in length from one end while other beadmaking centers generally drilled the hole from either end (Frazier et al. 1998-1999:44-45). This is certainly in keeping with the Le Caron beads. The Germans also utilized double-diamond drills, but it is not known if they were in use as early as the 16th-17th centuries. So, until conclusive historical, archaeological, and/or archaeometric data are forthcoming, the place (or places) where the cut-crystal beads were produced remains conjectural. That the Warminster bead and the Le Caron beads were drilled using two different techniques suggests that they may have come from two different production workshops, if not two different production centers.

CONCLUSION

Concentrated in the southeastern United States, Florida Cut-Crystal beads are scarce north of Virginia. Until now only two such find sites were known – one in eastern New York state (Rumrill 1991) and another on the Gulf of the St. Lawrence in eastern Quebec (Turgeon 2001). The Ontario beads bring the number of northern sites to four and the bead count to nine. While a study of these beads has provided information about how they were manufactured, it has yet to be determined where they were made, or what particular significance – if any – they had among the aboriginal population. Quartz crystals were believed to possess mystical powers by many Indigenous peoples (e.g., Hamell 1983; Hoffman 2004). With all their sparkling facets, were cut-crystal beads held in the same regard? In the Southeast they were generally distributed by the Spanish, though the French and British also traded them. In Ontario, the French are the likeliest source.

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ENDNOTES

1. For a technical summary of this minimally invasive analytical method, see Gratuze (2013).

2. Although three cut-crystal beads similar in form to those from Ontario were recovered from 16th-century contexts in Paris and a search of post-mortem records of Parisian beadmakers revealed that rock-crystal beads comprised 4.4% of the inventories, no evidence was found for their production in the workshops (Turgeon 2001). The inventories did list tools for the production of a variety of glass beads and lathe-turned beads of organic materials such as shell and bone, but no tools that could be attributed to the working of hard stone were listed.

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