THE BEADS OF ST. CATHERINES ISLAND

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This monograph is the fifth in the series entitled
The Archaeology of Mission Santa Catalina de Guale

ANTHROPOLOGICAL PAPERS OF
THE AMERICAN MUSEUM OF NATURAL HISTORY
Number 89, 312 pages, 35 figures, 12 plates, 7 tables
Issued April 1, 2009

ISBN 0065-9452

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PART III. BEAD MANUFACTURE AND ORIGINS

ON THE COVER: In May 1984, Bishop Raymond Lessard of Savannah visited the archaeological site of Mission Santa Catalina de Guale (on St. Catherines Island, Georgia) to say requiem prayers in a service dedicated to reconsecrate the destroyed Franciscan church, abandoned three centuries before. National Geographic assigned Bill Ballenberg to photograph the ceremony and some of the more photogenic artifacts excavated there. After sorting through the nearly 70,000 glass beads recovered from Mission Santa Catalina, Ballenberg assembled the visual grouping of beads that appears on the cover of this volume. Across the front cover winds an original strand of the ubiquitous Ichucknee blue bubble glass beads (Type 18); excavations recovered more than 5200 of this type. Several cobalt blue *rocailles* (Type 6) are also included in the strand. A second strand consists of cobalt blue beads (Types 20 and 30), originally strung with small gold foil beads as spacers (Types 98, 100, and 107). Near the top are several of the many varieties of gilded beads recovered (Types 99–107). Near the bottom are scattered a few of the surprising blown black beads (Type 119) with greenish yellow dots added to the surface. These blown beads are unique to St. Catherines Island.

COVER DESIGN: Kevin Havener.

ABSTRACT

This volume examines the almost 70,000 individual beads recovered during extensive archaeological excavations on St. Catherines Island (Georgia)—primarily from Mission Santa Catalina de Guale. Founded in the 16th century, this site was the capital and administrative center of the province of Guale in Spanish Florida for the better part of a century. This volume describes and classifies this extraordinary bead assemblage, putting the entire collection into a worldwide perspective. Part I describes the global origins of beadmaking and provides an overview of previous studies of bead manufacture. Particular attention is paid to the beads of the Spanish colonial empire, the source of most trade beads recovered on the Island. Part II presents a history of archaeological research on St. Catherines Island, a long-term perspective of the aboriginal people who lived there, and the details of archaeological work at Mission Santa Catalina de Guale. It also presents a comprehensive catalog of the St. Catherines Island bead assemblage. Part III discusses the Santa Catalina bead assemblage from a global perspective, specifically examining presumed centers of origin and the diverse manufacturing techniques employed by various glassmaking guilds in Europe. Part IV concludes with a consideration of the bead assemblage within the cultural matrix of 16th- and 17th-century Mission Santa Catalina de Guale.

A PERSONAL PREFACE
Lorann S. A. Pendleton and Elliot H. Blair

Assembling this volume has taken a quarter century, involving literally dozens of people and multiple stages of analysis. Very early in the excavation at Mission Santa Catalina de Guale, we realized that the mission cemetery contained an unusually large and well preserved assemblage of grave goods, especially the almost 70,000 trade beads described in this volume. The state of preservation was extraordinary, as excavators could literally see necklaces and embroidered clothing associated with the burials. To record and recover these bead assemblages, we tried some innovative and unusual recovery methods.

David Hurst Thomas and Clark Spencer Larsen conferred extensively on this issue as the church excavations continued, eventually deciding that when the bioarchaeology crew removed the human remains, they would attempt to leave associated grave goods in place whenever possible. In this protocol, the archaeology crew followed up on the material culture, recording and sometimes even reconstructing the original patterning of the grave associations.

After the human remains had been removed, Lorann Pendleton took over the excavation of grave goods, with the specific aim of reconstructing the necklaces and embroidery by literally restringing the beads in their original context. By restringing the beads, we could record the patterning in which individual beads were used by their owners, perhaps providing a glimpse into the ideational realm of Guale behavior. What beads did each individual choose? What patterns were strung? Were there parallels between individuals? Did the composite beaded artifacts encode status differentiation? We could only address such questions if the original context of beads and ornaments was preserved when removed from each burial. When a necklace or embroidered cloth was uncovered, Pendleton would string a long, thin beading needle, following the lined-up bead holes, and letting the needle define the in situ associations. In this way the patterns themselves were revealed and recorded intact, rather than "made-up" by the excavators. These patterns are described in Chapter 15.

We conducted a pilot study of the St. Catherines Island beads in 1987, analyzing a sample of 409 beads from the Quad IV excavation area. This small sample included beads recovered from the *cocina,* the *convento,* and the Guale *pueblo* (Peter, n.d.); no beads from the cemetery were included in the pilot project. This initial analysis followed the standard Kidd and Kidd (1970) protocols.

As the excavations proceeded (and as block lifts were dissected in the laboratory) the St. Catherines Island bead assemblage grew in size, to its present total of 69,325 individual beads. It was clear that sample size alone had created an analytical problem. Was the Kidd and Kidd (1970) system workable with such a large collection? How should we describe the individual beads? How should we group the beads into analytical types? How should individual beads be provenienced? How do we analyze the multi-bead constructions (such as necklaces and beaded fabric)? What do these association and patterns mean in human terms?

We solicited the advice of our colleagues, even trekking samples of the beads to Society for American Archaeology meetings, Southeastern Archaeological Conferences, and Society for Historical Archaeology meetings. As we showed them to numerous interested parties, it became clear that the St. Catherines bead collection was unusual, containing many rare (even unique) specimens.

Drawing on the lessons learned in the 1987 pilot study, we undertook a second pilot study in 1996. Rather than using the Kidd and Kidd size designations (e.g., very small, under 2 mm; small, 2–4 mm; medium, 4–6 mm), we decided to precisely measure a sample of beads from the cemetery, then create a histogram of observed size ranges, hoping that this process would reveal the natural (intrinsic) size breaks within the St. Catherines bead assemblage; this procedure is described in detail in chapter 4 of this volume. The second pilot study also determined material, basic method of manufacture, construction, shape, color, diaphaneity, decoration, and type name (where applicable), according to the following protocols. Material, manufacture, construction, and shape were determined following examination under a microscope. Fine-grained color distinctions were determined following a rough sort of the beads into broad color groups. The sample was then divided, with one person analyzing each color group. We did this to minimize inconsistency within each color range. The National Bureau of Standards (NBS) color chart (we later converted to Munsell colors), was used to describe the fine-grained color distinctions.

We then used these estimated size ranges and color groups to sort the entire bead assemblage from Mission Santa Catalina. This task took several years to complete, and we became increasingly dissatisfied with this approach. Lois Dubin made numerous suggestions, based on her own extensive experience with glass trade beads (Dubin, 1987). We eventually decided to contact Peter Francis, Jr., asking for opinions based on his long-term study of trade beads around the world (e.g., Francis, 1979a, 1979b, 1979c, 1981b, 1982a, 1982b, 1986a, 1986c, 1987d, 1988, 1990, 1999b, 2002). After considerable discussion, Peter Francis agreed to join our research team, pursuing a research strategy that emphasized variability in bead manufacturing technology. This is the analytical approach adopted in the remainder of this monograph. The untimely death of Peter Francis (in 2002), well before the manuscript was completed, disrupted the analytical process for years. We have subsequently completed the analysis of the St. Catherines Island bead assemblage, following the analytical protocols established by the late Peter Francis, and incorporating his original manuscript wherever possible. We sincerely hope that this monograph meets his high standards.

During consultations with Peter Francis, it became clear that our provisional typology (derived during the second pilot study) was heavily weighted toward subtle morphological distinctions in shape, size, and color. Francis argued that these minute distinctions failed to address the most important variability evident within the St. Catherines Island bead assemblage. Instead, he emphasized that glass beadmaking during the 16th and 17th centuries was a very imprecise process, creating considerable variation in color, shape, and size (see Francis, chap. 6, this volume). The result was that morphological variability alone does not adequately reflect the actual process of bead manufacture. Francis criticized the fine-grained distinctions involved in our provisional typology, noting, as an example, that "Types 1, 2 and 3 are bugles. Type 1 is distinguished from the other two by color. Type 2 and 3 are distinguished because in one case the ends were [slightly] reheated and in the other, not. This is splitting, three types for 20 beads" (Francis, personal commun.). Peter Francis suggested that we resort the entire bead assemblage, with particular attention paid to methods of manufacture (such as drawn beads finished by the *a speo* method). By adopting these procedures, Francis believed it possible to discuss the St. Catherines assemblage in terms of specific beadmaking guilds and the origins of various manufacturing technologies.

Francis also criticized the size ranges and histograms generated in the second pilot study, especially the 4.76–7.99 mm diameter range. Most of the beads manufactured by the Venetian *Margareteri* guild—the makers of seed beads—fall into the very bottom portion of this size range. This arbitrary cut-off point gave the false impression that many of these Venetian seed beads approached 8 mm in diameter, which is clearly not the case in the St. Catherines Island bead assemblage (see Francis, chap. 6, this volume).

Relying upon the input and collaboration of Peter Francis, Part III of this monograph took form, interpreting the bead assemblage primarily in terms of manufacturing technology, inferred geographic origins, and implied distribution through time. In conversations with Francis, Thomas expressed certain concerns about this somewhat unorthodox, spatiotemporal classification system. After Peter's death, when the draft manuscript was sent out for review, Marvin Smith and Karlis Karklins had similar concerns about the organization of this monograph. In particular, Karklins observed that without specific chemical analyses, it is difficult (or impossible) to attribute conclusively specific bead types to individual manufacturing centers (2006, personal commun.). We have taken these criticisms to heart and attempted some preliminary analyses of the glass chemical compositions, but these studies remain quite tentative and incomplete.

In other words, this monograph is a composite, combining parts of our initial, fine-grained descriptive analysis with Francis's inferences regarding bead-manufacturing technology and trade networks of the 16th and 17th centuries. We have edited Peter Francis's contributions with a light hand; although many of his observations seem somewhat tangential, we felt strongly that his original text should be preserved where possible. The coauthored chapters have been more extensively rewritten, with significant portions added after Peter's death.

This volume is organized into four parts. Part I (chaps. 1 and 2) provides a general overview of global bead studies, with particular emphasis on the beads of the Spanish colonial empire.

Part II (chaps. 3 and 4) presents a history of archaeological research on St. Catherines Island, a long-term perspective of the aboriginal people who lived there, and the details of archaeological work at Mission Santa Catalina de Guale. It also presents a comprehensive catalog of the St. Catherines Island bead assemblage, organized into a typology based initially on morphological analysis, amplified by Peter Francis's concern with manufacture and trade patterns. The typology is subdivided by:

(1) Material (e.g., glass, metal, jet, shell)
(2) Method of manufacture (e.g., drawn, wound, blown)
(3) Construction (e.g., simple, compound, complex)
(4) Finishing method (e.g., bugle, *a ferrazzo, a speo*)

Within each subdivision, we have itemized individual types. For instance (returning to the bugles discussed above) we have retained Types 1, 2, and 3, as individual types but with all three types grouped within the glass, drawn, simple, bugle subdivision. Types 4 through 16 include the various forms of glass, drawn, simple, *a ferrazzo* finished beads. The entire catalog follows this sequence of individual types, clustered within overarching groupings. Appendix 3 augments the data presented in chapter 4, providing smaller attribute subdivisions within each type—particularly based on fine-grained distinctions in size, color, number of facets, and so forth. While we acknowledge Francis's concern about the utility and meaning of some of these distinctions, we feel it important to provide these detailed descriptions. We have modified the various size ranges generated during the initial pilot study: Beads greater than 5.35 mm in length were further subdivided into 2 mm increments, beginning with 7.1 mm (e.g., 11.1–13.0, 13.1–15.0). These additional increments are based on actual, bead-by-bead measurements (rather than the size-class method used in the pilot study). Although we have retained the 4.76–7.99 mm diameter range, once again we stress that this category it is not representative of the actual upper size limit of the *a ferrazzo* finished beads.

Part III (chaps. 5 through 14) discusses the Santa Catalina bead assemblage from a global perspective, specifically examining presumed centers of origin and manufacturing. Much of this discussion dovetails neatly with the Part II typology, and we note the relevant type numbers from chapter 4 throughout. But, once again, we must emphasize the degree to which these conclusions remain preliminary (and, in places, hypothetical). It seems entirely possible that individual beads of a single type derive from different manufacturing centers (see Francis, chaps. 7 and 8, this volume).

Part IV (chaps. 15–17) concludes with a consideration of the bead assemblage within the cultural matrix of Mission Santa Catalina de Guale.

ACKNOWLEDGMENTS

We gratefully acknowledge the generous support of the Edward John Noble and St. Catherines Island foundations. We especially thank Mrs. June Noble Larkin and Mr. Frank Y. Larkin for their friendship and their appreciation for long-term research. Thanks also go to Mr. Noble Smith (Executive Director, Edward John Noble Foundation), Mr. David Smith (President emeritus, St. Catherines Island Foundation), Mr. Jeremy Smith (President of the St. Catherines Island Foundation), and the late Mr. Brad Smith (Chairman of the St. Catherines Island Foundation) for their commitment to the Island and its research potential.

Special thanks also go to Mr. Royce Hayes (Superintendent of St. Catherines Island) and his staff for their unflagging effort to make science "easy" on St. Catherines.

Analyzing St. Catherines' huge bead collection necessarily involved many individuals working long hours to analyze, sort, measure, and type the 70,000 trade beads discussed here. We gratefully thank the American Museum of Natural History personnel for sticking with this task, especially Ms. Rachel Bernstein, Ms. Karyn DeDufour, Ms. Madeline del Toro Cherney, Dr. Walter Elvers, Chelsea Graham, Dr. Rachel Goddard Griffin, Ms. Debra Peter Gurerro, Ms. Camille Licate, Ms. Alexandra Machinist, Ms. Kathleen Ogden, Mr. Eric Powell, Ms. Ariel Quezada, Mr. Phil Rafield, Mr. Anibal Rodriguez, Mr. Matthew Sanger, Dr. Jason Sherman, Ms. Molly Trauten, Mr. Lee Ullman, Ms. Sari Uricheck, Dr. Cheryl White, and Shan San Wu.

We consulted with several knowledgeable professionals during the course of this analysis including: Mr. Jamey Allen, Dr. Kathleen Deagan, Ms. Lois Dubin, Dr. Karlis Karklins, Dr. Jeffrey Mitchem, and Dr. Marvin Smith. Karklins, Mitchem, and Smith also reviewed earlier drafts of this manuscript and we thank them for their cogent comments.

PART I
BEADS IN SOCIETY

BEADS IN SOCIETY: INTRODUCTION

Peter Francis, Jr.

Beads are small, highly portable, and often made of durable materials. Those who made and used beads commonly prized them highly. Beads are one of the world's earliest art forms, and among the few genres to leave substantial evidence of itself (e.g., Balme and Morse, 2006; Henshilwood et al., 2004; Holden, 2004). Beads are universal.

This is why beads are important clues for understanding past human endeavors. Beads reflect behaviors that influenced people's lives: the economic, the technological, the social, and the ideational. We study beads, not for their own sake, but for what they can tell us about the people who made, traded, used, and ultimately disposed of them.

Some of the world's most desolate and/or isolated regions were apparently first explored to find bead materials. The manufacture of beads reflects the development of many technologies including metallurgy, rotary drilling, ground stone tools, and ceramics (particularly glass and faience). In a real sense, beads are the perfect little trade item, meaning that ancient communication can be tracked through their study. Since beads also serve social roles and ideational roles (as amulets or talismans and as decoration) they offer new paths for understanding those aspects of culture most commonly concealed from the archaeologist. Their disposal—whether in a grave, an offering, a cache, rubbish heap, trap, or just scattered around a site—encodes information about past activities.

CHAPTER 1
HISTORY OF BEAD STUDIES

Lorann S. A. Pendleton and Peter Francis, Jr.

Although beads play an important role in society, it is difficult to find substantial information on beads in a library. While there are numerous reports on beads, most are short and concentrate on the bead assemblage from a single site. Many recent books on beads address the collector or hobbyist, rarely approaching their study from an overarching, global perspective.

THE ORIGIN OF BEAD STUDIES

Research into beads developed along with the interest of antiquarians as they evolved into archaeologists. The first papers on beads concentrated on particular types, beginning with the "great chevron debate" starting in the 1860s. This period culminated at the end of the 19th century with G. P. Rouffaer's (1899) monumental paper mistakenly attempting to equate the Mutisalah heirloom bead group of eastern Indonesia with the Aggrey beads of West Africa. This exceptionally long article (267 pages) summarizes global bead research and shows that it was a mere patchwork of independent studies, few of which had any depth.

Scientific archaeology evolved at the beginning of the 20th century, as did more serious bead research. The leading early researchers were the Englishmen William Orchard (1975) and A. J. Arkell (1936), the Swede Gustavus Eisen (1916), the German Thea Elisabeth Haevernick,[1] and most importantly, the Englishman Horace C. Beck.[2] With his first paper, Beck (1928) outlined the basics of bead studies. While his classification system has largely been ignored, he fixed or coined some 450 bead terms still in use. Beck had by far the widest global reach of these pioneers (Francis, 1997d: 13–20), but not being an academic, never ventured beyond description and technology.[3]

The Second World War, the Cold War, and the pangs of decolonization made bead research on a global scale more difficult. Increased academic specialization produced more papers on beads, but they tended to be isolates and not part of a growing pattern of knowledge. Only two people, Alaistar Lamb[4] and W.G.N. van der Sleen (1973) attempted anything like a global history of beads. Other interests cut Lamb's work short. Van der Sleen produced a slim volume on the history of beads, but it did not live up to the potential for understanding human behavior.

At the end of the 20th century, there was much more interest in beads than had existed before. There are many sources for the collector, hobbyist, or artisan, including bead societies, bead guilds, and popular books and periodicals. There are also a few serious, even academically inclined, bead-related institutions and publications; however, research of the type discussed at the beginning of this section is still not common. This work is intended as a contribution to such studies.

The reason the potential of bead studies has not been realized is deceptively simple. It is because of the very success of beads. They have served humankind for a very long time, are made from virtually any solid material, and move around the globe with ease. At any given archaeological site or within any given ethnographic group there can be, and most often are, an enormous number of beads made from a variety of materials coming from every point on the compass.

This produces an ironic situation. While bead research is about as recondite a specialization as one can name, the bead researcher should be a generalist with a grasp of the method, theory, and facts of many disciplines and a global understanding of cultures. Beads at one place cannot be properly understood without knowing about beads from almost everywhere else. Nor can they be evaluated without an understanding of the nature of the materials from which they were made and the techniques used to form them into beads. This is especially true at a site such as Santa Catalina de Guale. Although St. Catherines Island was on the margin of a peripheral Spanish colony, it still participated in the global network Spain had constructed at its height of power.

Two words are crucial in defining good bead research: humanistic and scientific. Beads do not exist outside human experience and cannot be understood appropriately without an understanding of the history and behavior of the people involved in making, trading, using, and ultimately disposing of them. They also cannot be studied suitably without collecting and collating data, forming and testing hypotheses, and building toward a unified theory. Beads are small, yet often very important to people who deal with them. Research into them deserves the application of the scientific method.

This book seeks to reach two audiences: a general and a specialized one. For anyone interested in the story of trade beads in America, and particularly in the Spanish trade, the length of occupation of Santa Catalina and the wealth of its bead assemblage provide considerable material to discuss many of the wider issues of the bead trade in the New World and beyond. The discussion of some sections covering a great many beads is often shorter than those discussing a few beads. This seeming imbalance is because some beads are widely known and published, while others are unique.

THE NAMES OF BEADS

People love to name things. Beads are no exception. The problem of bead nomenclature is one that has been discussed for a long time. The discussion here deals with the names of beads by relying heavily on the concept of bead types. The concept of "type" in archaeology has been defined as a "collection of objects with the same functions, material and form" (Gorodzov, 1933: 100) and "a statement of somewhat variable attributes which can be observed to occur together in the majority of cases" (Deetz, 1967: 51). Krieger (1944: 278) explicitly mandated that, "a type, when satisfactorily blocked out, must be named (not numbered or lettered) and described."

Names are not static. They change with time and perception. The same item (though not the same type) can have several names. Is that animal a dog, a collie, "*Canis familiaris,*" or "Shep"?

Names are important. Naming something gives one power over that that thing, at least to visualize and classify it. Naming is important in any scientific work in order to communicate what one is discussing. This is not the forum to propose a universal nomenclature system for beads, but the reader does deserve to know on what basis various names for beads are used in this work.

Beads are not living objects and do not evolve from one another, although the perception of bead types evolving may reflect reality in some cases. The largest class of beads to which this might be applied is drawn beads, as Kidd and Kidd (1970) have demonstrated. Beads are made of many materials and formed by many techniques, and thus are more closely analogous to minerals, facing many of the same problems of nomenclature.

In an earlier paper Francis (1981a) suggested that names of beads or bead types be: (a) as universally recognized as possible, (b) unique, using a name only once, (c) precise, not using a name for several types, and (d) as descriptive as possible. To these we would add the following:

1. Priority: In the biological sciences, the right of priority is strictly observed. People make beads. Therefore, the first person with a right to name a bead is the beadmaker. It would be best for us to use the name given to the bead from this source wherever possible, as we do here for various seed beads, for example. However, when there is a name well embedded in English and the bead literature it may be foolish or impossible to change it. A case in point is the chevron, a type with many variations. The Venetian beadmakers have always called it *rosetta,* but this was unknown to English-speaking writers for some time. The name "chevron" is deeply embedded in the English literature and used by many non-English writers as well. It may not even be the best name for the bead; *star bead* is more descriptive, but "chevron" is universally recognized.

2. Do No Harm: Avoid giving a type a name that would associate it with a place, person, or culture with which it has little or no connection. This is unfortunately rampant in the modern American bead trade. Few types in this work have

received such names, but two that have are Seven Oaks Gilded molded and Cornaline d'Aleppo.

3. Defer to Authority: Horace Beck's (1928) paper on bead classification and nomenclature was the first attempt to regularize bead names. His classification system has not been widely adopted, but several hundred bead names he presented are commonly used by researchers. For example, the attempt by van der Sleen (1973: 101; bead 81) to rename Beck's (1928: 17) "twisted square" as "pentagon bead" was fruitless. In cases of doubt, Beck is preferred as the authority. Many types have, of course, been discovered since his paper was first read in 1926, and they need new names.

4. Appropriately Descriptive: There may be bead types with given names that have priority but are unacceptable because the name does not stand up to scrutiny. One such bead discussed in this volume is "Seven Oaks Gilded Molded," a name coined by Goggin (n.d.: 32–33; see also chap. 10, this volume). Since the beads were not molded and have been found at many sites in addition to Seven Oaks the name is neither appropriate nor descriptive and is amended herein to "Incised Gilded."

A situation particularly in the Spanish colonial sites concerns beads named after archaeological sites. The pioneer in the field of Spanish colonial beads was John Goggin. While his published works on beads were sparse in a few short site reports (Karklins and Sprague 1987: 21), his vision has led to the widespread photocopying and consulting of his unfinished manuscript on the topic (Goggin, n.d.). He also assembled a large type collection, currently housed at the Florida Museum of Natural History.

Goggin followed a practice common in archaeology of naming artifacts he found after the place where they were first encountered. While this is widespread in some archaeological contexts, it had not previously been applied in the (admittedly small) field of bead research. In fact, the only other example that comes to mind is Haevernick's (1965) "Nuzi bead," but that bead was not only found at the site; it was also made there. We must agree with Karklins (1999, personal commun.) that this practice may be fine for locally produced ceramics or stone tools, but may make less sense for exotic, imported items such as trade beads.

In sum, we need to develop bead type names that are unique to the type, descriptive, and capable of being universally understood. We should seek these names in the published literature. Inappropriate names developed after Beck's paper, and types not yet named need new names. If we have to coin new names, they should be logical ones.

NOTES

1. For a discussion on Thea Elisabeth Haevernick's influence on subsequent bead research in Europe see the web page http://www.thebeadsite.com/WO-BR.html.

2. Both Orchard and Eisen immigrated to the United States and did their most important bead research there.

3. The one exception would be "Beads and Magic" (Beck, 1936). However, his only child, Flora Westlake (1988, personal commun.) actually wrote the text from the material her father provided.

4. Lamb wrote a number of papers on beads in Southeast Asia when he was working in Malaysia (see the references in Francis, 2002) and several papers on the subject in West Africa when he worked in Ghana (e.g., Lamb and York, 1972; Lamb, 1976). He also prepared the manuscript of a book on beads in Africa for the Corning Museum of Glass, which was lost in a flood. His interests in beads were much wider than these two areas, including work in Iran, India, Czechoslovakia, and elsewhere (Alaistar Lamb, 1978, personal commun.).

CHAPTER 2
BEADS IN THE SPANISH COLONIAL EMPIRE

Peter Francis, Jr.

The Spaniards of the late 16th and early 17th centuries, especially those in the Americas, were not much interested in beads. The principal use they had for beads was for rosaries. The materials for these prayer strands were usually precious, including some stones, coral, pearls, amber, and above all jet. When the Spanish dealt in glass beads in their colonies, the beads were destined for the native people, not the expatriates.

Before the coming of the Spanish, there had been a rich tradition of beadmaking in the Americas, particularly in the civilizations that had developed in Mesoamerica and in the Andes. The pattern of trade was to funnel bead materials (turquoise, *spondylus* shell, mother of pearl, jade, and precious metals) from their sources to the center of the empires. There they were worked by a large number of specialists into beads and other forms of jewelry and either retained at the capitals or distributed outwards.

The Spanish put an abrupt halt to this pattern. They overthrew the established order by defeating the reigning monarchs at their capital cities. From then on, the trade in beads would continue to radiate from central locations, but the Spanish would import the beads themselves first.

The Spanish also imposed their system of guilds (*gremios*) onto the population, but apparently there was no bead guild. The important silver guild (there was a silversmith with Cortés at the conquest of Mexico), for example, employed many local workers, but they could never rise to the position of a master or an officer of the guild (Anderson, 1941). It was not until after the *gremios* were abolished following the Mexican revolution of 1910 that individuals could take up whatever form of labor they desired. The dozen or more small-scale bead industries that exist now in Mexico are all, with one exception,[1] only a generation or so old and have no connection with pre-Conquest industries (Francis, 1987b; 1987d).

A glass factory was founded in Puebla in 1542 and other factories opened elsewhere later. There has been a suggestion that certain pendants, used as heirloom beads in the village of San Pedro Quiatoni, Oaxaca (Johnson, 1975a: 13), may have been made there. The site of the first glasshouse in Puebla is now inaccessible, as modern buildings stand there today. Despite some literature about these pendants, their origin remains unclear. Even if they had been made in Mexico, they were never plentiful and their original use may not have been as pendants[2] (Francis, 1987b).

What became *La Florida* was not, of course, part of a Mesoamerican empire. Although the aboriginal beadmaking tradition in the Southeast did not employ precious materials, indigenous beadmaking survived the coming of the Spanish (chap. 12, this volume). But the vast majority of the excavated bead assemblage from St. Catherines Island consists of glass beads imported by the Spanish, just as they imported similar beads for all their American holdings.

THE TRADE IN BEADS

The term “trade” generally conjures up a picture involving commerce of some sort, including barter. It may also refer to gifting without any reciprocity expected.

In a study of the opening of the bead trade in early colonial America (Francis, 1986c: 33-36), it was seen that the trade usually opened with gifting and developed into bartering. But this development had many nuances and multiple motives behind the original gifting (including respect for the new people being met and dispelling aggressiveness).

Barrientos' narrative of Menéndez de Avilés' excursion into Guale country is the first report we have of the area and its people (García et al., 1902: 102–129). On three occasions (García et al., 1902: 125, 127–128) crosses were given away. The motive is recorded as being religious, for they were given to "those Indians who wanted to become Christians." These crosses were most likely small, metal pendants and it is questionable whether the Guale were more interested in imbibing Christian doctrine or in receiving the shiny gewgaws.

One can assume that, as missions were established, the friars were responsible for importing and distributing beads and the rest of the exotic items received from the far reaches of the Spanish Empire and beyond (likely including Havana and/or Mexico City). Records exist of the triennial convoys that supplied New Mexico from Mexico City, with cargo that included rosaries. No such records have survived for the outfitting of La Florida (Bushnell, 1994: 114).

Certainly, rosaries circulated in Guale territory. In the early 1690s Spanish officers, including Juan de Pueyo, who visited Guale and Mocama, conducted tours of the provinces of La Florida. They ordered all the *caciques* to make sure that all their people had large crosses at their doors and smaller ones at the heads of their beds and that they "recite the Ave Maria and say their rosaries daily before these crosses" (Bushnell, 1994: 97).

The missionaries gave a great many beads to the Guale and it is likely that they used beads in the form of rosaries themselves (see below). In this study, we evaluate the bead assemblage from St. Catherines Island, attempting to trace the origin and distribution of these beads.

CARGO BOUND FOR THE NEW WORLD

An ideal source of historical information about the trade of beads into America would be the cargo lists of Spanish ships bound for the colonies. Such information can, indeed, prove enlightening, but there are several pitfalls involved in using this seemingly bountiful data.

The most important publication of such data is by Kelly (1992: 141–154). Her information was based largely on copies of selected materials done for John Goggin, who had died some years before. An unknown person or persons copied material for Goggin on ceramics and beads from the *Casa de Contratación* (House of Trade) of the *Archivo General de Indias* in Seville. To this material Kelly added some details by asking Angela Flores de Rodrígues to do more searching in the *Casa de Contratación* and from work done in Santo Domingo by Enrique Otte.

Kelly, who was most interested in the period of conquest in Mexico, was disappointed by both the Goggin material and that gathered by Flores de Rodrígues because it was so scanty for the early years of the 16th century, with very little data predating 1583 (Kelly, 1992: 141, 144).[3] A few references documented shipments before and immediately after the fall of Tenochtitlán (later Mexico City), but a "gap" or "lacuna" persists until 1583. Kelly had hired Flores de Rodrígues to fill this gap, but to no avail.

Ironically, Torre Revello (1943) had already published this "gap" several decades previously in an article describing the merchandise shipped from Spain to the Americas between 1534 and 1586. This short paper lacks the details presented by Kelly, but is enlightening because it lists far more European suppliers than Goggin or Kelly; the footnotes are also particularly instructive.

Torre Revello (1943: 773–774) pointed out that between 1504 and 1555 no fewer than 205 vessels were dispatched to America from Seville and authorized ports in the Canaries, but only 33 manifests have survived from these shipments. A fire at the *Casa de Contratación* in 1606 was responsible for the loss of much of the existing archive (Torre Revello, 1943: 774, n. 3). It is also notable that nine Spanish ports (other than Seville) were licensed to trade with the Americas between 1529 and 1573; such trade was stopped due to widespread corruption (Torre Revello, 1943: 773–774, n. 2).

For present purposes, the lack of detailed information from earlier ship manifests is not as disturbing as the paucity of information relating to the 17th century. One does not expect trade in the 16th century to function in the exact same way as that of the 17th century, but there are likely many similarities. Fortunately, the most detailed information now available for this period coincides with the founding of Mission Santa Catalina de Guale, and we can draw some conclusions from that.

ORIGIN OF THE BEADS: CARGO LISTS

John Goggin of the University of Florida was the pioneer bead researcher in Spanish colonial sites in Florida and around the Caribbean. While acknowledging the importance of Venice and the glassmaking island of Murano, Goggin (n.d.: 7) believed that "the bulk of the beads found in New World Spanish sites were in fact made in Spain, very likely Andalucia." He noted that cargo lists of ships sailing from Spain to the New World had occasional references to beads from Italy, Venice, Flanders, France, and Germany, but felt that beads with no origin specified were most likely from Spain.

Goggin's opinion influenced several ensuing discussions about the origins of beads, especially the Nueva Cádiz bead (chap. 7, this volume). But on the whole, subsequent investigators working in the American Southeast have acknowledged that most of the glass trade beads in the region were made in Venice. In this volume, I resurrect Goggin's idea to some extent. He thought that the Spanish glass industry must have produced beads, and I agree that a number of beads from St. Catherines Island, particularly the gilded and segmented types, were almost certainly Spanish productions (chap. 10, this volume). Working mostly with Goggin's material, Isabel Kelly (1992: 203–204, 271) agreed that most of the beads in the cargo lists had come from Spain. To Goggin's list of non-Spanish origin she added only Paris, Portugal, and Tabor.

Kelly (1992: 204) discussed the latter source in some detail, but she did not mention the material of the rosaries from Tabor (also spelled Tavor[4]). She did point out that there was a Tabor in modern Israel as well as in Bohemia (Czech Republic), and suggested that if the numerous garnets were from Bohemia, that might strengthen the idea that the Bohemian Tabor was meant. The Tabor in Israel is a small village at the base of Mount Tabor, today called Kafar Tavor and associated with Deborah in Judges 4:6. The Bohemian Tabor lies to the south of Prague. While no beads were listed in the ship manifests as coming from Bohemia, other goods were, such as knives (Torre Revello, 1943: 777). It is likely that the famous Bohemian garnets were involved in the New World trade; the molded ruby red glass beads discussed in chapter 11 could hardly be from elsewhere. Thus, the Tabor rosaries mentioned in the shipping manifests are more likely to be from Bohemia than from the Levant, with which Spain had almost no contact at the time.

Torre Revello (1943) also lists material sources (not restricted to beads) from England, Bohemia, Belgium (Goggin had mentioned Flanders), Holland, and India, and also specifies several individual cities in Belgium, France, Italy, and particularly Spain. Two items from Peru, one from India, and perhaps one from Alexandria were also mentioned. Two items were called "Moorish," either meaning that they were made in that style or that they were from Morocco. The list of the origins of beads, however, was not expanded; the only source noted was France and perhaps crystal from Venice.

It is clear that the Spanish acquired goods bound for the Americas from all over Europe and even beyond. Places of origin were not always mentioned in the ship manifests, but this absence does not automatically mean that a given item was from Spain. In fact, Spanish provinces and cities are often mentioned in conjunction with many items, including Alcón, Alijarfe, Almuñecar, Avila, Biscayne, Ciudad Real, Cordova, Granada, Jaén, Jerez, Ocaña, Segovia, Seville, Toledo, Valencia, Vergara, and Villalba.

Often, when a place is specified, the product is well known from that source. In some cases, the origin seems to be specified to differentiate it from similar products from elsewhere. Most items on the manifests have no place of origin specified, but one cannot argue from silence that all items are necessarily Spanish.

WEALTH AT MISSION SANTA CATALINA DE GUALE

Whatever the origin of the beads recovered on St. Catherines Island, there are certainly a great many of them (nearly 70,000), including several hundred gilded beads. The number of beads, bronze bell fragments, jewelry, glass crosses, and other artifacts far outnumber the quantities found anywhere in La Florida, including St. Augustine (the provincial capital), or, indeed, virtually anywhere in Spanish America (Thomas, 1990). This is even more surprising given the fact that St. Catherines Island was the farthest outpost on a sparsely traveled route in the poorest Spanish possession in the Americas. While it was true that St. Catherines Island was considered fertile and productive and one of the most important providers of food for St. Augustine (Bushnell, 1994: 165, 170; Worth, 1995: 32), the *presidio* had little to offer St. Catherines in repayment. As noted above, very few beads in the cargo lists were destined for Havana, much less St. Augustine.

In her broad summary of beads in Spanish colonial sites, Deagan (1987: 177) notes that "The bead assemblage from seventeenth-century Spanish colonial contexts is quite small…." She did note that in the late 16th and first half of the 17th century that beads were more common on mission sites than in Spanish towns, due, no doubt to the "stylistic austerity" that ruled in Spain from ca. 1580 to 1650 (Deagan, 1987: 157–158), a temporal interval that spans the primary period of occupation at Mission Santa Catalina de Guale.

Perhaps the best parallel to the St. Catherines Island settlement is Mission San Luis de Talimali, the Franciscan capital of the Apalachee Province (in Tallahassee, Florida) (Shapiro and McEwan, 1992; Shapiro and Vernon, 1992; McEwan and Larsen, 1996; Mitchem, 1991a, 1991b, 1992, 1993b, 1995; Smith, 1992a). Mission San Luis was established in 1656, then destroyed and abandoned in 1704. This means that San Luis was occupied only for about half as much time as the St. Catherines Island mission, but the two sites overlap by about a quarter century. San Luis is undergoing extensive archaeological and analytical work.

The bead assemblage from San Luis is the largest ever analyzed from a Spanish mission site in the state of Florida (Smith, 1992a: 107) and whereas the final report has not been published, the bead frequencies have been reported from different parts of the site: 152 from the Council House (Smith, 1992a); 35 from the c*onvento* (Mitchem, 1992: 241), 1400 beads, pendants, and other forms of human adornment from a very rich trash pit in the Spanish village area (Mitchem, 1991b: 310); and nearly 2000 beads and pendants from the cemetery (Mitchem, 1995: 9). Although the entire cemetery has not been excavated, and the analyses have not been completed, the total number of beads and pendants does not seem to exceed 4000.

That contrasts with the 70,000 beads reported here from Mission Santa Catalina de Guale. Even if one doubles the number of beads from San Luis (to make up for its shorter occupational span), the two quantities still differ greatly.

How do we account for the huge quantities of trade materials at Mission Santa Catalina de Guale? Did the wealth evident on St. Catherines Island derive from sources other than those officially sanctioned by the Spanish crown? If so, how does this skew the data from St. Catherines Island? Would beads other than those brought through sanctioned channels have reached St. Catherines Island through other channels? Does this account for the unique beads from the site?

THE ROSARY

Since Mission Santa Catalina de Guale was a Roman Catholic establishment, we must entertain the possibility that many of these beads were parts of rosaries, the Roman Catholic version of a prayer strand.

The idea of counting a cycle of devotions with beads derives ultimately from the Hindu *japa mala* ("talking chaplet"). The concept passed from Hinduism to Buddhism and later to Islam, finally being introduced into Christianity. Prayer beads were in use (at least in England) by the early 15th century.[5] On 13 July, 1495 Pope Alexander VI, who was largely responsible for Spanish America, granted an indulgence bull to the Rosary Confraternity, the first of many bulls in which rosaries were given official, hallowed status (Hinnebusch, 1967).

The earliest rosaries derived from the practice of reciting the Psalter, the 150 psalms. Because illiterate lay people could not perform this pious act, the custom arose in the 12th century of reciting 150 *Paternosters* (the Lord's Prayer or "Our Father"), often divided into three groups of fifty, as are the 150 Psalms. In the 14th century, increased attention was paid to the devotion to Mary, the mother of Jesus. A series of 50, 100, or 150 recitations of *Ave Maria* ("Hail Mary") was condoned. The 150-prayer cycle was given the common name of a *rosarium* ("rose garden") and the term "rosary" was attached to the devotion of Mary (Hinnebusch, 1967; Wilkins, 1969: 34–36).

By the early 15th century, the two Psalters had merged. The 150 *Ave Maria* remained, divided into 15 "decades," with a *Paternoster* between each decade. In terms of the physical prayer strand, this took the form of a group of 10 beads (the *Ave Maria*) with a single bead (often larger than the others) isolated from the decades (the *Paternoster*). Often three beads and a cross were added to the beginning/end of the strand.

This form of the rosary is known as the *full (or greater) Dominican*; the more common style with five rather than 15 decades (a third of the Psalter) is called the *lesser Dominican*. The name has been derived from the assertion that St. Dominic (1170–1221) had invented or been given the first rosary by an apparition of Mary. Catholic scholars, including Dominicans, do not take the story as fact and no Papal bull has ever recognized it as such (Hinnebusch, 1967: 667–668; Wilkins, 1969: 37–41).

The Dominican order was largely responsible for spread of the popularity of the rosary (Hinnebusch, 1967: 670), but it was also promoted by other orders and used in forms other than the two Dominican ones. Another group that keenly embraced the rosary was the Franciscans, among whom devotion to Mary was favored (Wilkins, 1969: 37). Because the missionaries at Mission Santa Catalina de Guale were Franciscans (Bushnell, 1994: 49–51), their particular form of the rosary should be discussed here.

The Franciscan rosary consists of seven decades (rather than five or fifteen, as in the Dominican rosary), reflecting the seven "mysteries" in the Life of Mary (Casanowicz, 1909: 357). These mysteries are: the annunciation (Luke, 1: 26–38); the visitation to Elizabeth (Luke, 1: 39–56); the nativity (Luke, 2: 1–20); the adoration of the Magi (Matthew, 2: 1–12); the circumcision of Jesus and presentation in the Temple (Luke, 2: 21–52); the finding in the Temple (Luke, 2: 41–52); and the appearance by Jesus to Mary after the resurrection (extra-Biblical).

Franciscan rosaries were sometimes fitted with two rings so they could be suspended at the girdle (Casanowicz, 1909: 357–338). They were also sometimes quite long. One example from the Smithsonian collection is six feet, three inches (1.905 m) long. Bushnell (1994: 55) commented on some "imaginative drawings" of the missionaries in Florida wearing rosaries at their girdles and concluded, "this is unlikely." While the martyred Manuel de Mendozo in Apalache was wearing his rosary around his neck, as she reported, other Franciscans did, indeed, suspend them from their cinctures.

THE DATES OF THE BEADS

The burials at Mission Santa Catalina de Guale accumulated for almost a century. It would be convenient for several purposes to be able to refine their dates. Beads are often regarded as potential chronological markers, though the lack of information on them has prevented their widespread use for this purpose.

I believe that it may be possible to make a chronological division of the cemetery into two periods based on the bead evidence. Beadmaking during the 17th century was relatively conservative, with several new styles introduced at the beginning of the century, but developed later on (Francis, 1999a: 5–6). Some styles were discontinued during the 17th century and we can use the terminal dates for certain beads on Spanish and other colonial American sites. One of the long-lived styles changed its appearance, specifically its color value. One or two similar styles were introduced by the mid-17th century.

But several caveats must be considered:

1. The dates employed here are approximate and, while they appear to have the authenticity of historical chronology, they are still subject to revisions.

2. The dates at which particular beads are no longer found on sites, especially Spanish ones, does not necessarily mark the end of their production. For example, in the case of Nueva Cádiz and seven-layered chevron beads, we know that they were being produced and traded by Europeans other than the Spanish several decades after they disappeared from Spanish sites (Lapham, 2001). The same may have been true of charlottes. If St. Catherines Island received beads from sources other than the official ones, some of these beads may have been imported later there than they were to other Spanish colonial sites.

3. A given bead may be an heirloom, circulated for an extended period before being buried (see Francis, 1992a: 12–15). But given the wealth of beads recovered as grave goods, including those buried with children, heirlooming does not seem to have been practiced at Mission Santa Catalina de Guale.

4. Even without heirlooming, beads will circulate for some time. We have no idea at what stage in their life the Guale began wearing beads, nor whether they wore beads on a daily basis, only for certain occasions, or only at death.

5. Finally, we must keep in mind that negative evidence is not as strong as is positive evidence. Thus, burials where the discontinued beads are absent do not automatically date from a later period. The placement of the burial and the arrangement, and the total numbers and types of beads present should be considered before drawing any conclusions.

With these cautions in mind, we shall look at the beads that have some potential for helping to date the burials at St. Catherines:

1. Flush eye beads (chaps. 7 and 8) have limited temporal spans. Smith (1987: 33) reports that eye beads in the Southeast date to the period 1600–1630—noting the presence of one at Mission San Francisco de Potano (post-1606) and their absence at the post-1633 Apalachee missions. Evidence from the Northeast also suggests a 1630 terminal date for eye beads (Smith, 1987: 33; Fitzgerald, 1982; Kenyon and Kenyon, 1983; see also chaps. 7 and 15, this volume).

2. Charlottes, faceted seed beads, have been discussed elsewhere and their temporal range also ends around 1630 (Smith, 2000: personal commun.; see also chaps. 6 and 15, this volume).

3. The striated blue bubble glass beads: the copper content decreased around 1600 and the shade of blue changed from a dark or indigo blue to a lighter or turquoise blue (Hancock et al., 1994; see also chaps. 8 and 15, this volume).

4. Blue beads with compound stripes of red on white: There are several varieties of these beads, though the precise nature of the beads as listed in Kidd and Kidd (1970) is difficult to determine. These are the beads listed in their classification system as IIbb24 through 27. IIbb24, an opaque robin's egg blue oblate, seems to be a bubble glass bead (see chap. 8). In the Susquehanna sequence it is not found until the period 1718–1743 (Kent, 1983: 80; see also chap. 15, this volume).

NOTES

1. The exception is the making of amber beads at Simojoval, Chiapas. Because the location is in the Lacandon Jungle at the end of a road almost impassable even today, the Spanish hardly ever visited the region, much less established control over it. The amber is found locally and worked with modern tools (a kitchen knife to shape it, a piece of sandpaper to grind it, and a sharpened bicycle spoke to drill it) that closely resemble tools used by the ancient Maya (a stone blade, a piece of sandstone, and perhaps a cactus spine). Amber was always in demand in the region, as the Maya thought it was auspicious, especially for children (Francis, 1987a).

2. Thinking that they may have originally been made for chandeliers, I visited numerous churches and old public buildings in Puebla to see if they had been used for that purpose. We found no such examples.

3. When Kelly (1992: 141) first discusses this problem, the text reads, "the data are scanty until 1538." Subsequent pages make it clear that this was a misprint for 1583.

4. The phonemes /b/ and /v/ are interchangeable in the Andalucian dialect.

5. The word "bead" is derived from the word for prayer and praying, perhaps traceable as far back as Old English. Both the *Oxford English Dictionary* and the *Middle English Dictionary* (Kurath and Kuhn, 1952: 692-83) affirm that "bead" (variously spelled) came to be used for the physical object late in the 14th century, the earliest citation being in 1351.

PART II
THE ST. CATHERINES ISLAND BEAD ASSEMBLAGE

THE ST. CATHERINES ISLAND BEAD ASSEMBLAGE

Part II presents the baseline data regarding the total bead assemblage recovered from archaeological excavations on St. Catherines Island.

In chapter 3, David Hurst Thomas summarizes our present knowledge of Native American landscapes on St. Catherines Island, from the first human footprint (approximately 5000 years ago) through the Spanish mission period (specifically, the occupation of Mission Santa Catalina de Guale).

Chapter 4 (by Lorann S. A. Pendleton, Elliot Blair, and Eric Powell) presents the primary classification of the entire bead assemblage from St. Catherines Island. These 70,000 beads have been classified according to several criteria, including material (glass, organic, or stone), method of manufacture, and apparent internal subdivisions within the various bead classes. The provenience of all beads is provided in appendix 1, specific burial associations appear in appendix 2, and attributes for glass, imported organic, and stone beads are listed in appendix 3. Attributes for shell beads can be found in appendix 4.

CHAPTER 3
NATIVE AMERICAN LANDSCAPES OF ST. CATHERINES ISLAND

DAVID HURST THOMAS

St. Catherines Islanders have worn beads for millennia and that's what this volume is all about.

This chapter provides a long-term perspective on the aboriginal people who once lived on St. Catherines Island. My specific purpose is to synthesize the archaeological and documentary evidence most appropriate to understanding the meaning of the massive bead assemblages described and analyzed in this volume.

ARCHAEOLOGY ON ST. CATHERINES ISLAND

We have already discussed the history of archaeological research on St. Catherines Island at some length (Thomas et al., 1978: chap. 4; Thomas, 2008, chap. 1). The present account emphasizes those aspects of archaeology most directly relevant to the St. Catherines Island bead assemblage.

Archaeological investigations began on St. Catherines Island with Charles Colcock Jones, who excavated extensively in coastal and interior sites during the mid-19th century (1859, 1873, 1883). We cannot document any specific beads that C. C. Jones might have recovered on the island.

Clarence Bloomfield Moore worked on St. Catherines Island during the fall and winter of 1896–1897 (Moore, 1897; see also Larson, 1998; Larsen, 2002). Throughout his five-month campaign, Moore "demolished" [his word] more than 50 mounds along the Georgia coastline, 7 of them on St. Catherines Island (for the exact locations, see Thomas, 2008, fig. 24-1; see also fig. 15.1, this volume). Although Moore's field methods fall short of modern standards, his techniques rank among the best of his generation, and his record of prompt publication still provides a model for the modern archaeologist (myself included). Moore recorded careful field notes during his excavations, and employed a physician to identify and describe the human skeletal remains (from roughly 120 burials) in the field. Moore found numerous beads during his St. Catherines Island excavations and these are discussed in subsequent chapters.

Lewis Larson visited St. Catherines Island in 1952, spearheading the Georgia Historical Commission search for 16th- and 17th-century Spanish mission sites along the Georgia Coast. Among the "good candidates for the location of a mission," Larson (1952: 2) correctly listed "Wamassee Head on St. Catherines as the location of Santa Catherina de Guale." Larson conducted the first archaeological investigations at Wamassee Creek in 1959 and he found evidence of several aboriginal occupations and most of the recovered ceramics date to the Spanish period (see Brewer, 1985; May, 2008). Larson also found olive jar sherds and Spanish majolica wares typical of Spanish mission sites in La Florida. We now know that Larson was digging middens from the outskirts of the *pueblo* portion of the mission compound.

John W. Griffin (then Staff Archeologist, U.S. National Park Service) visited St. Catherines Island on April 5–9, 1965, preparing a report speculating about the specific whereabouts of Mission Santa Catalina de Guale (Griffin, 1965b). After examining the collections recovered previously by Lewis Larson, Griffin correctly concluding that "the location of Santa Catalina mission in the seventeenth century [may] … be fixed with assurance … to the area known as

Wamassee Head [where] abundant shell midden refuse is found, dominated by Indian potsherds of the correct time period for the mission settlement" (Griffin, 1965b: 6; see also Thomas, 1987: 105–106; Thomas, 2008: 14).

Largely as a consequence of Griffin's report to the Edward John Noble Foundation, Joseph Caldwell and his students from the University of Georgia conducted three seasons of archaeological fieldwork on St. Catherines Island, excavating both burial mounds and shell middens (including a number of test pits in the Wamassee Head area). These limited excavations turned up three Altamaha Line Block Stamped bell-shaped pots, associated with olive jar, majolica, and Spanish iron fragments. Caldwell (n.d.) concluded that "there is no reason to believe, at present, that this is not the site of the mission of Santa Catalina. So far, however, our excavations have yielded little structural detail." Water-screening mud from the freshwater creek bed adjacent to the mission, Caldwell's crew also recovered several dozen glass trade beads, which are included in the present analysis.

Beginning in 1974, archaeologists from the American Museum of Natural History began working on St. Catherines Island, pursuing extensive and intensive investigations, emphasizing island-wide landscape archaeology, bioarchaeology, and broadscale excavations of selected sites (Thomas, 2008; see also Thomas et al., 1978; Thomas and Larsen, 1979; Larsen and Thomas, 1982, 1986; Larsen, 1981, 1982, 1984, 2002).

Between 1977 and 1979, we conducted a regional archaeological survey of St. Catherines Island with two primary objectives in mind: (1) to obtain a relatively unbiased sample of archaeological sites from all time periods drawn from all part of the island (see Thomas, 2008) and (2) to pinpoint the exact location of Mission Santa Catalina de Guale. The successful search for Mission Santa Catalina has been described elsewhere (Thomas, 1987, 1988a).

We spent 15 years excavating the ruins of the 16th- and 17th-century Franciscan missions at Santa Catalina de Guale (Thomas, 1988a, 1988b, 1991, 1992). Between 1981 and 1990, the research and excavations focused almost exclusively on the mission compound on St. Catherines Island. After that, we expanded our scope to include the Native American village (*pueblo*) at Santa Catalina.

To date, we have published four monographs and one book addressing the archaeology of Mission Santa Catalina de Guale: *The Archaeology of Mission Santa Catalina de Guale: 1. Search and Discovery* (Thomas, 1987); *St. Catherines: An Island in Time* (Thomas, 1988b); *The Archaeology of Mission Santa Catalina de Guale: 2. Biocultural Interpretations of a Population in Transition* (Larsen, 1990); *Situado and Sabana: Spain's Support System of the Presidio and Mission Provinces of Florida* (Bushnell, 1994); *The Struggle for the Georgia Coast: An Eighteenth-century Spanish Retrospective on Guale and Mocama* (Worth, 1995; see also Worth, 2007).

The present volume is one of several pending publications that further explore the documentary history, material culture, paleobiology, and architecture of Mission Santa Catalina de Guale.

TABLE 3.1
The St. Catherines Island Chronology (after Thomas, 2008: table 15.3)

Periods	Chronological age (in calibrated ^{14}C years)
Altamaha period	A.D. 1580–1700[a]
Irene period	cal A.D. 1300–1580
St. Catherines period	cal A.D. 800–1300
Wilmington period	cal A.D. 350–800
Deptford period	cal 350 B.C.–A.D. 350
Refuge period	cal 1000–350 B.C.
St. Simons period	cal 3000–1000 B.C

[a] The beginning and ending age estimates for the Altamaha period in the St. Catherines Island chronology are based on historical documentation, not ^{14}C dating.

PRECOLUMBIAN HUMAN LANDSCAPES OF ST. CATHERINES ISLAND

We have recently synthesized the state of current knowledge regarding the 5000 years of human history on St. Catherines Island (Thomas, 2008; see table 3.1). This section briefly highlights the most important findings about the pre-mission people living on St. Catherines Island.[1]

St. Catherines Island is a "fake" barrier, an accident of sea-level history that is vastly different from the typical beach-ridge barrier island. An ancient part of the island survives from the Pleistocene, coupled with a much more recent Holocene outgrowth. This large "composite" island supports a rich maritime forest, a large freshwater swamp filled by artesian waters bubbling up from the Pleistocene core. This stabilized barrier island also protects extensive estuarine salt marshes, some of the world's most productive environments; and beyond the marshes lies the vast open waters of the Atlantic Ocean. This extraordinary confluence of sea levels past and present means that St. Catherines Island is one of the few places on earth where three enormously productive ecosystems are found in immediate proximity to one another. The potential for aboriginal foragers is enormous.

St. Catherines Island separated from the mainland shortly after cal 3000 B.C. and aboriginal foragers moved there almost immediately. Sea levels have continued to shift significantly since then, impacting the offshore mosaic of island habitats.

The first St. Catherines Islanders established a subsistence pattern that persisted for millennia, harvesting a broad range of vertebrate and invertebrate marine resources from the nearby estuarine and marine waters. They also hunted deer and collected a range of terrestrial food sources including hickory nuts and acorns, berries, and edible roots and tubers.

The biogeography of St. Catherines Island is such that foragers could systematically search and exploit resources in any patch on the island and return home every night. This conclusion is based on a strictly terrestrial modeling of effective foraging radius. Use of watercraft (which we think was extensive during all time periods) would have vastly extended the effective foraging radius, enabling foragers to return to their home base virtually at will.

Central place foraging theory predicts that aboriginal foragers should have positioned their residential bases to maximize the net returns given the pursuit, handling, and transport costs of resources across different patches (effectively balancing out different fitness and foraging objectives of males and females). Specifically, primary *marshside* settlements were projected along the intersection of the two highest-ranking patches, on the high ground fringing the maritime forest and the salt marsh. Late Archaic foragers (cal 3000 B.C.–1000 B.C.) established central place settlements exclusively on first-tier habitats located on the Pleistocene island core. As human population increased, so did the progressive utilization of more fragmented, second-tier habitats, suggesting a significant intensification in provisioning strategies. The probabilistic, island-wide archaeological survey demonstrates that the placement of more than 80% of the archaeological components (for all time periods) is fully consistent with the marshside settlement model derived from central place foraging theory.

The common scenario of increasing sedentism through time probably does not hold for the 5000-year-old record on St. Catherines Island. Seasonality indicators, settlement pattern distributions, and intensification of occupation proxies indicate that St. Catherines Islanders lived in virtually sedentary towns and villages until the Spanish *reduccíon* policy aggregated the aboriginal population at Mission Santa Catalina de Guale.

Mortuary evidence indicates that an egalitarian social network (involving leadership without inherited authority) prevailed on St. Catherines Island during the Deptford and Wilmington periods (cal 350 B.C.–A.D. 800). These St. Catherines Islanders were organized into tribal-level societies, likely living in economically self-sufficient, virtually sedentary, and politically autonomous villages.

Mortuary evidence further demonstrates that after cal A.D. 800 (the onset of the St. Catherines period), leadership and social status were ranked in a despotic system of inherited asymmetry, ascribing social positions and wealth at birth. Bioarchaeological evidence indicates that the ideological principle of inherited asymmetrical ranking predates significant maize cultivation on St. Catherines Island (which postdates cal A.D. 1300).

Sometime during the Irene period (post-cal A.D. 1300), St. Catherines Islanders began the intensive cultivation of maize and other domesticates. Guale labor and the agricultural products it produced translated directly into the tribute payments that fueled both domestic subsistence and political power among the coastal chiefdoms.

A variety of proxy measures indicates that the aboriginal population of St. Catherines Island expanded exponentially from the earliest human footprint (circa cal 3000 B.C.) to the abandonment of Mission Santa Catalina de Guale (in A.D. 1680). Bioarchaeology documents the progressive decline in health and spread of infectious disease among aboriginal foragers and farmers over the past 2000 years.

Models from human behavioral ecology further predict that as human population densities increase, the availability of high-ranked prey species should decrease. This did not happen with white-tailed deer populations on St. Catherines Island, where venison remained a staple throughout the aboriginal period. Through time, there is a shift from larger fish (individuals weighing more than 1 kg) to smaller saltwater fish, but the reason for this change remains unclear. The adoption of maize cultivation sometime after cal A.D. 1300 probably does not represent a broadening of diet breadth (because for millennia, St. Catherines Islanders had exploited several shellfish taxa with return rates comparable to those for maize cultivation).

The bald cypress tree-ring sequence defines a dry, cool interval—termed the St. Catherines Period Drought (A.D. 1176–1220)—that corresponds to a statistically significant gap in the cultural ^{14}C record of St. Catherines Island and suggests a partial (or perhaps complete) depopulation of the island at the end of the St. Catherines period.

The archaeological and bioarchaeological evidence thus defines two critical transitions in the aboriginal lifeways on St. Catherines Island: The relatively abrupt shift from an egalitarian ethos to inherited asymmetry and an apparently rapid transition from forager to forager/farmer. It seems clear that ranked social status developed prior to the adoption of significant maize cultivation on St. Catherines Island.

THE GUALE PEOPLE OF ST. CATHERINES ISLAND

The Guale Indians of St. Catherines Island were among the very first indigenous peoples to encounter Europeans exploring north of Mexico. The Georgia Bight was the aboriginal homeland of the Orista (and later Escamaçu) chiefdoms of South Carolina, the Guale chiefdom in coastal Georgia, and three important Mocama chiefdoms (of Saturiwa, Tacatacuru, and Guadalquini) to the south (Jones, 1978; Worth, 2004, n.d.). After several brief and sporadic contacts during the early 16th century, the 1560s brought the first sustained European contact to the area.After brief contact with the Spanish in 1526, this Muskhogean-speaking group later encountered the French, who, in 1562 and 1564, established two colonial forts (Charles Fort and Fort Carolina) at opposite ends of the central Georgia Bight. Each fort was occupied for about a year, and the subsequent Spanish towns of St. Augustine and especially Santa Elena—in roughly the same territory—continued an even more significant contact with local Indian populations after 1565. Following a brief period of Jesuit mission activity (in 1569–1570), the Franciscans launched a more sustained effort in 1574–1575. But Mocama was not truly missionized until 1587, and the major Guale missions were established in 1595–1605 (Jones, 1978; Worth, 1998, 2004, 2007). By 1684, the gradual southern withdrawal of the Spanish coupled with the southward expansion of the Carolina colony fostered relocation and reorganization of the vastly reduced Guale population.

The most important literary sources that address the nature of Guale coastal adaptations include Swanton (1922, 1946), Sturtevant (1962), Larson (1969, 1978, 1980), Jones (1978), Thomas (2008) and Worth (1995, 2004); see also Bushnell (1990), Crook (1986), C. Jones (1873), Hann (1986), and Saunders (2000a, 2000b).

Guale Social Organization

During the contact period, the Guale were aligned into a number of highly organized, politically stratified chiefdoms (Jones, 1978; Saunders, 2000b; Worth, 1999, 2004; Thomas, 2008, esp. chaps. 3, 35). Although boundaries and membership of these chiefdoms shifted in response to changing external politics, three principal chiefdoms existed throughout the period between initial European contact and the early 17th century. Each chiefdom maintained two principal towns in which the leader and some family members and retainers lived. The town centers included a large, round, community building in which periodic councils and intercommunity feasts were held. The ritual chunkey game, common to many

Southeastern aboriginal groups, was performed with poles and a disk-shaped stone in a playing ground adjacent to the community buildings (San Miguel, 1902; Sandford, 1911; Hudson, 1976).

Primary leadership was rotated between the two principal towns. The principal leader was known as the *mico*. Some Spanish reports define another office, the *mico mayor*, suggesting that these were two hierarchically related officers, each of whom lived in one of the two principal towns. A leadership council was comprised of the two primary individuals, plus a number of secondary leaders (often termed *caciques* and *principales* in the Spanish sources). *Micos* were commonly accompanied by other important, titled leaders (variously termed *mandador, aliagita, tunaque,* and *heredero* [or heir to the *mico*]). The roles and duties of the latter are poorly known, although they may have also resided in the principal towns.

The principal leaders were probably the heads of clans, in which descent was traced matrilineally. Positions of authority were commonly inherited by a younger brother, sister's son, or (in later years), by a sister's daughter. During the 17th century, female leaders became increasingly common, perhaps because of the effects of repeated epidemics, reduced participation of males in mission communities, and a Spanish policy requiring men to participate in extensive labor projects, in St. Augustine and elsewhere. At times, Franciscans opposed the principle of matrilineal succession, but their more vocal opposition centered on the common practice of polygamy among the rulers. Male leaders often had multiple wives, each of whom resided in a separate house; the wives were sometimes sisters. The friars' attempts to abolish polygamy and disrupt traditional lines of succession were major factors in the revolt of 1597.

Because the Guale settlement pattern fostered some degree of economic specialization between communities, chiefdom organization became a primary means of integrating the regional economy. Chiefs served as collectors and redistributors of food and other products. The most common mode of redistribution was the periodic ritual feast, in which items such as maize, fish, oysters, and acorns were lavished on guests. Early French sources suggest that chiefs either owned substantial agricultural land or at least maintained authority to collect tribute of maize for their own use, as well as for future distribution in the community feasts (Laudonnière, 1975). Chiefs also compensated their supporters in military activities with valued items such as deerskins, shell money, and metal tools received in European exchange. Moreover, the Indians did not have endless stores to offer the French and Spanish intruders. Running dangerously short on supplies, Laudonnière was forced to offer his Indian hosts something more valuable than mirrors and hawks bells. He put his military technology at their disposal, at times taking sides in their internecine wars.

Maize Agriculture

The Laudonniére account from Fort Caroline leaves little doubt that native people of the Georgia Bight were intimately familiar with the details of growing corn in the 1560s: These coastal people knew precisely when to plant, how to judge crop maturation across variable habitation conditions, and when to harvest each locality. The earliest European colonists commented on the extensive agricultural fields already in operation, and they quickly adopted the long-standing Native American scorched-earth policy of burning the enemy's cornfields.

It is also clear that during the 1560s (the timing of initial, sustained European contact in the area), the Guale—and the neighboring coastal chiefdoms—were already storing away an ample surplus of maize and other agricultural products. This surplus was sufficient to barter (or give away) substantial quantities of provisions to the newly arrived European colonists, while simultaneously holding back sufficient seed corn for the next planting season and saving enough surplus corn to finance chiefly negotiations for political purposes.

Milanich (1999: 146) suggests that, except for its intensification, basic aboriginal slash-and-burn cultivation continued unchanged into the mission period and Worth (1999) concurs: "annual corn crops and the fields used to produce them were very important resources for coastal chiefs . . . [and] the coastal Guale and Orista-Escamaçu were behaving very much like sedentary agricultural chiefdoms" long before the Europeans had a chance to introduce their own agricultural techniques.

Even during the initial mission period, the Guale chiefdoms contributed a significant annual tribute of maize (despite the alleged poor and patchy soil conditions). As time passed, not only did the *caciques* of coastal Georgia continue to pay their tribute to the Crown (which eventually would double earlier levels), but their slash-and-burn technology was routinely capable of producing tens of thousands of pounds of maize for barter to the Spanish ships that frequently called for fresh water and provisions. The documents further verify that "a combined labor force of probably only a few hundred men and women were able to produce not only enough corn to supply their own families and lineages, in addition to those of the chiefs and their noble relatives and other public officials such as the local missionary, but they were also able to produce tens of thousands of pounds of additional corn for barter to Spanish ships" (Worth, 1999). The combined archaeological and ethnohistoric evidence thus confirms that the aboriginal Guale people of the Georgia Bight cultivated maize in considerable quantity during the late prehistoric and early historic periods.

Additional Foraging Resources

Abundant oyster beds are present throughout Guale territory, and oysters were important components to the Guale diet. During the colonial period, shellfish collecting provided insurance against Spanish threats regarding maize supplies. Deer were commonly hunted, and their skins were important for clothing and trade (at least during the later historical periods); bears and wild turkeys were also taken. Thomas (2008: chaps. 6–9) documents the range of foraging resources available on St. Catherines Island and estimates the cost-benefits associated with each resource.

Guale Settlement Patterns

Reliable evidence illuminating Guale settlement pattern is difficult to obtain from documentary sources. The following account of the town of Orista (probably on or near Edisto Island, South Carolina) in 1666 might be applicable to most Guale towns:

> The Ttowne is scituate on the side or rather in the skirts of a faire forrest, in which at several distances are diverse fields of maiz with many little houses straglingly amongst them for the habitations of the particular families
> (in Sandford, 1911: 91).

Guale settlements were located along the banks of rivers or tidal creeks, with maize plots likely located behind the town center, opposite the river or creek banks. Local differences in shellfishing, hunting, and horticultural productivity may also have fostered some degree of economic specialization, enhancing the need for an organized system of intercommunity exchange. Although most Guale apparently maintained nearly permanent residence in a single community, some seem to have shifted their winter residence to be near areas for hunting, fishing, or shellfishing. Individuals were also temporarily absent from their communities while collecting wood, hunting, or fishing.

The Guale were town dwellers, but the "town" was not so much a specific place as a discrete group of people governed by consensus, fully capable of changing locality, building new shelters, and planting fields in one place after another. The town of Santa Catalina de Guale, onetime capital of Guale Province, is a case in point. Bushnell (1994) traces this town to at least seven known sites between 1564 and 1728.

Archaeology of the Guale People

Archaeological surveys of St. Catherines Island (Thomas, 2008: chaps. 32–34) demonstrate (1) a low degree of residential mobility throughout the entire aboriginal period and (2) an exponential increase in human population through time. This pattern continued through the late prehistoric (Irene) period, characterized by the largest and most frequent archaeological occupations recorded in the island-wide survey. The vast preponderance of archaeological evidence indicates that Irene populations on St. Catherines Island lived, year round, in sedentary dispersed towns located in a forest-marsh area (per Jones, 1978: 193–194).

This archaeological research has produced little direct evidence of maize cultivation on St. Catherines Island, but the research design did not adequately sample the paleobotanical record. The bioarchaeological record from St. Catherines Island provides no convincing evidence of maize consumption prior to cal A.D. 1300 (Thomas, 2008: chaps. 11, 24, and 32; see also Schoeninger et al., 1990; Larsen and Thomas, 1982: 327–329). A significant increase in $\delta^{13}C$ stable isotope values suggests the presence of maize cultivation sometime during the Irene period, and this evidence is supported by a contemporary increase in dental caries and periosteal lesions. These bioarchaeological data mesh neatly with ethnohistoric evidence (esp. Worth, 1999).

The late prehistoric (Irene) period was a time of significant climatic, demographic, and social change along the Georgia Bight. We believe that dynamics *at a regional level* are implicated in the adoption of significant maize cultivation on St. Catherines Island. Blanton and Thomas (2008) discuss the relevance of recent paleoclimatic research on baldcypress (*Taxodium distichum*) in the American Southeast. A prominent period of extended dryness during the latter part of the 16th century is particularly relevant to the present discussion—a time when "megadrought" conditions plagued much of North America (Stahle et al., 2000). During the early European contact period, Stahle et al. (1998: 545) document "a prolonged drought from 1562 through 1571 that was most severe from 1565 to 1569." Whereas this intensely warm and dry interval has been little discussed, it signals an extraordinarily difficult time for forager-farmers along the Georgia coastline—one of many challenges facing Europeans and Native Americans alike.

The warm and dry interval of A.D. 1527–1567 was punctuated by torrid conditions from A.D. 1554 to A.D. 1564. Menéndez de Avilés (and the Jesuit missionaries who followed him) left vivid accounts of meager poor harvests, empty storehouses, rampant hunger, and local unrest. The worst drought conditions took hold during the growing season of 1569, precisely when the missions at Guale and Orista were established and immediately preceding the only winter that Juan Rogel and Antonio Sedeño spent among the coastal Indians (Worth, 1999). During this drought-stressed interval, the Guale were at war with the Orista-Escamaçu chiefdom living to the north of the abandoned Savannah River corridor (Jones, 1978: 204; Worth, 2004: 240). The Jesuit priests had no way of knowing that they were witnessing the driest period of the 16th century (Worth, 1999; Saunders, 2000b). Adding the newly imposed European demands for foodstuffs, the new burden of epidemics, and epic drought conditions makes it clear that these early ethnohistoric accounts were describing native coastal populations under extreme duress.[2]

It seems likely that the two Jesuit missionaries rationalized their public failures in Spanish Florida, exaggerating their accounts of poverty along the Georgia Bight (Jones, 1978, 1980; Worth, 1999). Combined with the tree-ring evidence from this same area, these accounts gain considerable credibility, documenting how these coastal chiefdoms adapted their normal seasonal and annual routines to accommodate environmental fluctuations or social stress.

The tree-ring records and surviving ethnohistoric accounts seem to verify that the foraging farmers of Guale and Orista were readily capable of adapting their provisioning strategies when necessary, employing short-term backup tactics to exploit the relatively drought-resistant prey taxa. The ethnohistoric documents make it clear that, from the earliest European contact, the French and Spanish newcomers clearly harassed the Guale on St. Catherines Island with demands for food tribute (Jones, 1978; Worth, 1999). We also know that multiple epidemics swept across peninsular Florida before 1562 (Dobyns, 1983), and aboriginal people along the Southeastern coastline seem to have avoided contact with the French and Spanish newcomers whenever possible to escape the epidemic diseases they brought with them (Bushnell, 1978; Larsen, 1990: 18).[3] The Guale and nearby coastal groups during the late 16th century were deliberately avoiding contact with the early French and Spanish newcomers for multiple reasons—to feed themselves and to avoid paying tribute to the colonizers, to minimize religious harassment, to avoid resettlement in so-called *reducción* settlements (Bushnell, 1994: 22–23, 65, 126; Geiger, 1937), and to avoid epidemic disease. We suspect that residential mobility likewise was involved in attempts to maintain redistributive patterns that reinforced chiefly alliances.

Archaeological evidence suggests that the Guale participated in an active, long-distance trade network with inland peoples (Larson, 1980). The exchange involved mostly elite or nonessential goods, indicating that the Guale political hierarchy may have played a central role in regional as well as local trade.

The island-wide archaeological survey likewise documented the dramatic consolidation and contraction of aboriginal settlements on St. Catherines Island during the Spanish period (Thomas, 2008: fig. 32.14). Nucleation during the Altamaha (mission) period is entirely consistent with the well-known Spanish strategy of *reducción* in which Spanish officials gathered together aboriginal communities into fixed settlements (Bushnell, 1994: 22–23, 65, 126), thereby providing for more efficient administration, both religious and secular.

EUROPEAN COLONIAL STRATEGIES IN AMERICA

The earliest European contacts in North America differed greatly in character, reflecting in part the differing ideologies and histories of the European powers involved. From Virginia northward, these were largely mercantile ventures, initiated by privateers operating with crown permits or charters which granted rights to trade and exploit resources within a given territory (Fitzhugh, 1985: 272). European powers exercised little control over day-to-day governance and most interactions between European colonists and Native Americans were largely entrepreneurial and highly individualistic (Fitzhugh, 1985); Anglo-American colonists felt only a vague, after-the-fact sense of mission to “civilize” Native America (Spicer, 1962: 343).

The character of European settlement south of British-held Virginia differed radically from this pattern. Institutional religion so thoroughly permeated everyday life in 16th century Spain that all aspects of individual and collective life were, one way or another, touched by it. Literally 25 of every 1000 Spaniards were religious figures of one sort or another: monks living in monasteries, nuns residing in convents, lay clerics drawn from the population at large.

Although the Spanish Crown embraced an “Age of Discovery,” the timing could not have been worse for the badly battered Catholic Church. By the 16th century, the Inquisition finally had diverted its energies from punishing Jews and Moors to marshaling doctrine and ideology against the threat of Protestantism. Less than 20 years after the death of Martin Luther, Spaniards planted the cross at St. Augustine, thereby opening potential new fields to spiritual conquest at the very time Catholicism had sustained grave setbacks in Europe.

Unlike their European competitors along the Atlantic seaboard, the Spaniards colonizing La Florida made no pretense of separating Church from State. By this time, Catholicism had become a uniquely secular enterprise and as a result, the cult of the Virgin Mary was deliberately spread throughout the Americas, a legacy that remains today.

Spanish-Indian contact in La Florida was governed by formal policies designed both to apply Christian principles of governance and to reap economic benefits from the colonies. From the start, Spanish policy was grounded in a sense of duty to change the Indians from heathen barbarians into good Christians. The southland was not settled by private individuals acting on their own. Throughout Spanish Florida, Native Americans were confronted by the priest, the soldier, and the bureaucrat, each of whom answered to a much higher authority.

The earliest Spanish conquests in the New World relied on an *encomienda* strategy, in which Native American inhabitants were assigned basically as vassals to individual Spaniards (Fairbanks, 1985: 138; see also Bolton, 1917; Lyon, 1976: 24–26; McAlister, 1984: 157–167; Deagan, 1985: 292–294; Thomas, 1988a: 76). But Spanish Florida lacked the labor-intensive economic structures—such as mines or plantations—necessary to make the *encomienda* work.

Throughout the Spanish Borderlands of North America, the mission outpost replaced the *encomienda* as a way to suitably modify Native American culture to fit Spanish ethnocentric purposes (Hanke, 1964: 19–25; Bushnell, 1981: 7–8). A “mission” comprised an entire settlement—not just the religious edifices—in which aboriginal economies were reorganized (including introduction of new crops and European methods of cultivation; Bolton, 1917). Because scattered Native American groups were commonly nucleated into new settlements where diverse instruction was provided, missions attempted an explicit enculturative function (Kubler, 1940: 6–7). Their primary task was to effect religious conversion, but they also tried to raise the aborigines from the perceived primitive state to that of civilized and responsible citizens of the Spanish empire. Because colonists were in short supply, the Spanish Crown employed the missions as an agency to occupy, hold, and settle its frontier. As a pioneering “frontier” institution, the mission theoretically was to vanish with the advance of civilization.

Years of New World experience had permitted Spanish friars to perfect their techniques of wholesale conversion of Indians to the Catholic faith. Although Pedro Menéndez de Avilés, founder of St. Augustine, imported the newly founded Jesuit order to work in Spanish Florida, they were soon replaced by energetic Franciscans, who built some of the first Christian churches in what is now the United States, mastered numerous native languages, and wrote the first dictionaries based on the Indian dialects. Friars typically provided instruction not only in the catechism, but also in music, reading, and writing. To some degree, 16th/17th century churchmen at St. Augustine influenced not only religious and social conduct within the colony, but also acted as primary agents in placing new settlements, determining the nature of defensive installations, and deciding the primary emphasis of agrarian policy throughout Spanish Florida. As Father Pareja, stationed for years in La Florida, put it "we are the ones who are conquering and subduing the land" (quoted in Sturtevant, 1962: 63).

THE ARCHAEOLOGY OF MISSION SANTA CATALINA DE GUALE

It has been said that since the fall of the Roman Empire no world power has been faced with so great a need to conquer, populate, and hold a vast new territory under its dominion—until Europe found out about America. As Spain deliberately borrowed the Roman colonial model, its intrusion into the New World became a heavily regimented endeavor, conditioned by social and economic policy ingrained in the fabric of Spanish consciousness. One sees a certain "conservative" bent to Spanish colonial life in Florida when compared with the rather different course followed by evolving Anglo-American culture in New England. In both theory and law, the Spanish left little to chance, attempting to regiment everything from economy to religion, from art to architecture.

Spain issued thousands of regulations promoting, regularizing, and controlling the American colonies. But one document in particular—"The Royal Ordinances Concerning the Laying Out of Towns" issued in 1573 by Philip II—stands out because it prescribed an idealized system for promoting colonization and laying out civil settlements throughout 16th-century Spanish America (Zéndegui, 1977; Jones, 1979: 6–7; Crouch et al., 1982: 13–16).

These Royal Ordinances compiled 148 regulations dictating the practical aspects of site selection, city planning, and political organization, effectively removing these tasks from the Spanish military. New Hispanic towns were to be established only where vacant lands existed, or where Indians had consented freely to their establishment. Urban centers were supposed to be located on an elevated site, surrounded by abundant arable land for farming and pasturage. The ideal town site was also within easy reach of fresh water, fuel, timber, and native peoples (presumably for labor purposes). Sufficient space was to be left in the original town site to allow for growth. Whereas the Ordinances theoretically applied only to permanent civic settlements—not temporary missions or military encampments—in practice the familiar ordinances seem to have been applied equally to urban centers and mission outposts.

Paradoxically, the plaza and grid arrangement—hallmark of Hispanic urban planning in the New World—is virtually nonexistent in homeland Spain, where town planning is best characterized as "formless." This ideal plan was deliberately abstracted from a few selected cases, which were then projected into mainstream urban planning in the New World.

The Franciscan missions of Spanish Florida clearly followed long-established rules and time-honored sequences of construction. These matters were not subject to priestly whim. Considerable paperwork was involved to insure compliance, and high-level visitations were sufficiently frequent to insure a high degree of conformity. Native Americans at these missions lived a regimented life, and the Hispanic architecture of these settlements reflects the rigid organization of space, an idealized Spanish template upon which New World forms were modeled.

The Ordinances stipulated that, before any construction began, a detailed town plan was to be drafted. The plazas were to be laid out first, then the rest of the town oriented accordingly. The principal plaza was to be located near the landing place in coastal towns, in the center of the community for inland settlements. Always rectangular in form, the length of the plaza was to be one and one-half times its width, to provide most efficient traffic movement and also ample room for holding fiestas (Jones, 1979: 7).

We can see these principles operating at Mission Santa Catalina de Guale. As stipulated by Ordinance 110, the mission structures were laid out along a rigid grid pattern (fig. 3.1). A rectangular plaza defined the center of the sacred complex (Ordinance 112), flanked on one side by the mission church (Ordinance 124: "separated from any nearby building … and ought to be seen from all sides"), on the other by the friary (Ordinances 118, 119, 121). The plaza was surrounded by (and separated from) the secular Guale *pueblo*; "in the plaza, no lots shall be assigned to private individuals; instead they shall be used only

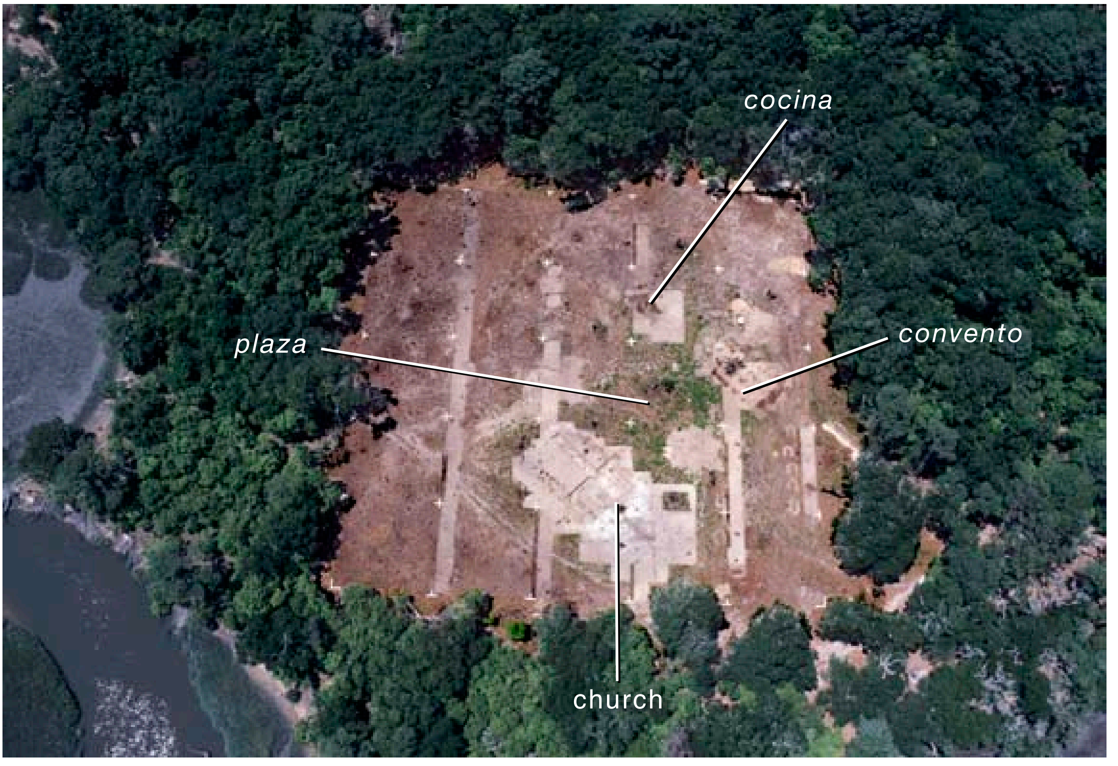


Fig. 3.1. Aerial photograph of the central compound (Quad IV) at Mission Santa Catalina de Guale. This photograph is oriented with true north at the top of the page.

for the building of the church and royal houses" (Ordinance 126).

The Churches of Mission Santa Catalina de Guale

The overwhelming majority of beads from St. Catherines Island were recovered during excavations at Mission Santa Catalina de Guale, and most of these beads came from the *campo santo* located beneath the primary mission church.

We can recognize two sequential church structures. The late 16th-century *iglesia* was destroyed by fire, probably in September 1597. These ruins were personally inspected by Governor Canzo, who had traveled north from St. Augustine to observe for himself the aftermath of the Guale Rebellion (Geiger 1937: 103–104). Subsequent building episodes have largely obscured the appearance of the earlier church.

After a period of abandonment, Santa Catalina was resettled by the Spanish (probably in 1604), and the mission church was reconstructed (apparently on the 16th-century site). Most of what we term "Structure 1" at Mission Santa Catalina is the primary 17th-century church, abandoned shortly after the British siege in 1680 (fig. 3.2).

The 17th-century church (*iglesia)* at Mission Santa Catalina de Guale (Structure 1) was a wattle-and-daub, pine plank structure measuring 20 m long and 11 m wide (Thomas, 1988a: 96–99). The church at Santa Catalina was completely exposed and the eastern wall was preserved as a witness section. The entire church interior was excavated.

The 17th-century church was constructed on a single-nave plan, lacking both transept and chancel (Kubler, 1940: 30). The southeastern-facing façade was built strictly of wattlework, anchored to four round uprights, set into shell-lined postholes. Either a pointed gable was elevated to support a steep thatch roof (as in Manucy, 1983: fig. 5), or the facade sported a false front projecting above the single-story construction of the nave.

The lateral church walls were constructed both of wattlework and pine planking. The nave portion of the church was 16 m long and

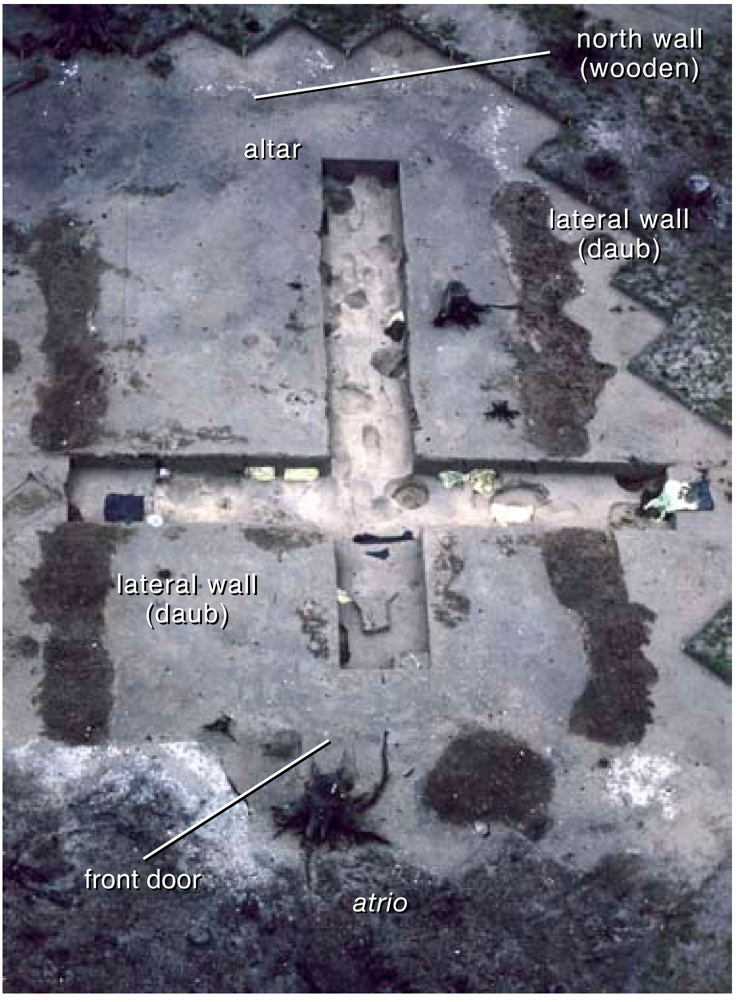


Fig. 3.2. Aerial photograph of the primary church (Structure 1) at Mission Santa Catalina de Guale. This photograph is oriented along the Hispanic grid system, with "mission north" at the top of the page.

decorated, in places, by figures sculpted in clay. The symbolic separation between nave and sanctuary is reflected in the architecture of this church. The sanctuary (northwestern) end of the church was built entirely of wooden planking and apparently elevated above the lateral wattle-and-daub walls of the nave. Some evidence suggests that the interior of the sanctuary may have been decorated with a *reredos*—several decorative metal panels which were apparently not removed before the church was abandoned.

A clearly demarcated sacristy, measuring 5 m wide by 3 m deep, was built on the Gospel side of the church (the left-hand side of the sanctuary as one faces the altar). In this sacristy were presumably stored vestments, linens, candles, processional materials, and other ritual paraphernalia essential to celebration of the Mass (Bushnell, 1990). Both the placement and configuration conform to 16th/17th-century structures in New Mexico where "the sacristy is invariably a modest room of which the function is indicated only by location and furniture" (Kubler 1940: 71–72).

The sacristy also contained a buried cache of charred wheat, likely destined to be baked into the "host," flatbread used in the Eucharist. Donna L. Ruhl (Florida Museum of Natural History, University of Florida) is currently analyzing these materials as part of her more extensive analysis of paleobotanical remains recovered from Santa Catalina (Ruhl 1990, 1993, 2003).

The Churchyard (*Atrio*): Fronting the church at Mission Santa Catalina stood a square, shell-covered subplaza, measuring about 15 m on a side (evident at the bottom of fig. 3.2). This *atrio* was likely a low-walled enclosure demarcating the public entrance to the church. Ubiquitous features of New World religious architecture, such churchyards served not only as a decorous entryway into the church, but also variously functioned as outdoor chapels, areas to contain overflow congregations, and sometimes as cemeteries (Kubler, 1940: 73–75; Montgomery et al., 1949: 54).

The churchyard at Santa Catalina was constructed of water-rolled marine shell gathered from naturally occurring deposits scattered along the intracoastal waterway; these massive shell bars are accessible only by watercraft. For years, such “shell rakes” provided building aggregate to an island lacking local stone.

The Cemetery (*Campo Santo*): The only known cemetery associated with Mission Santa Catalina de Guale was found inside the church.

The human remains recovered from Mission Santa Catalina de Guale constitute one of the best-documented and most extensive series of human remains from an early contact period site in North America. Our excavations beneath the floor of the nave and sanctuary revealed a minimum of 431 buried individuals: 52 percent ($N = 226$) were found in primary, undisturbed context and 48 percent ($N = 205$) were encountered in a disturbed, secondary context (Larsen, 1990: 21; Russell et al., n.d.). For present purposes, “primary context” is defined as supine and extended, feet toward the altar, and arms folded across the chest (Russell et al., n.d.: 4; Larsen, 1990). Russell et al. (n.d.) assigned numerical values to each individual, and itemized the skeletal elements and pathologies for each, identifying age and sex when possible.

The *campo santo* at Santa Catalina also contained a truly astounding array of associated grave goods, including the bulk of the bead assemblage discussed in this volume.

The Friary (*Convento*) Complex

The *convento* (or friary) at Mission Santa Catalina de Guale was erected on the east side of the central plaza, across from the mission church. Excavations by the American Museum of Natural History disclosed evidence of two superimposed, *convento* structures, with a nearby *cocina* (kitchen) and two wells.

The *Conventos*: Church regulations dictated the interior configuration of Franciscan *conventos*. The friary was, above all, a “cloistered,” monastic enclosure separate and apart; women were not permitted inside. Poverty, the hallmark of the Friars Minor, dictated that the friary follow a simple plan, often a single row of rooms, sometimes defining the sides of a quadrangle which contained the sacred garden (the *garth*). Inside the *convento* were the refectory, the cells, and perhaps some specialized rooms, such as a kitchen, offices, workshops, or granary. Meals were to be taken in silence. Water assumed great significance in Franciscan rite, and a source of sacred water was always a matter of concern when positioning a friary. Because of the importance of visitation—by superiors and other friars—friaries were sometimes built to serve needs far beyond those of one or two lonely friars. The *convento* at Santa Catalina seems to follow such rules rather closely. Rooms were indeed very small, and they appear to surround two central enclosures (one of which is probably the refectory). Two major wells, presumably sources of holy water, were excavated nearby.

The earlier *convento,* likely constructed in the late 16th century, was constructed entirely of rough wattle-and-daub (considerably coarser than that employed in building the church; Thomas, 1993a: 16; 1988a: 99–100; see fig. 3.3). Second only in size to the church itself, the early *convento* measured at least 10 m by 20 m, the long axis running roughly northwest-southeast (at an angle of 310°). This early building was supported by relatively large posts, set in holes with clean sand fill. It appears to have been divided into 4 rooms, 3 measuring 10 × 6 m and one measuring 10 × 4 m (Saunders, 1990: 537). The kitchen and refectory were probably housed inside the 16th century *convento*, with the additional rooms probably used for living quarters and storage. Kitchen debris and table scraps were tossed out the back door, where a fringe of shell midden accumulated against the rear wall—well out of sight from the church. A clearly incised dripline demonstrates that the 16th century *convento* had eaves extending about a meter beyond the rear wall; figure 3.3 clearly shows this dripline, along the eastern margin of Structure 4. This early friary was probably burnt by rebellious Guale in the fall of 1597 (J. Francis,

Fig. 3.3. Aerial photograph of the *convento* (Structure 4) at Mission Santa Catalina de Guale. This photograph is oriented along the Hispanic grid system, with "mission north" at the top of the page.

n.d.; Worth, n.d.).

The mission complex was rebuilt (circa 1605) and the new *convento* complex was constructed on the same location (Thomas, 1993a; 1988a; Saunders, 1990; J. Francis, n.d.; Worth, n.d.). When Fray Ruiz supervised the reconstruction in 1604, he apparently separated sacred from secular, erecting a distinct *cocina* 20 m to the north of the new *convento*. Such detached kitchens were common features within urban St. Augustine (Deagan, 1983: 247).

The 17th-century structure, a wattle-and-daub building, measured 12 × 8.5 m. The southeastern wall of both 16th- and 17th-century *conventos* was built on the same location. But the later structure was somewhat smaller. The long axis of the 17th-century *convento* is 325°; the +15° difference in orientation greatly facilitated separating the two buildings during excavation.

The later friary consisted of three well-defined and one less well-preserved daub walls, accompanied in all cases by in situ wall posts. The smaller size of the later structure probably reflects the construction of a detached kitchen, located approximately 20 m northwest of the *convento* (Thomas, 1993a: 16–17). The later *convento* was subdivided into several small rooms arranged around a central enclosure which contained a raised font. Located at the south end of the structure was a larger room, thought to be a library or refectory, heated with a central brazier. Two porches were attached to the later structure: a colonnaded porch on the western edge of the building, marking the edge of the central plaza and a porch or annex (fig. 3.3) located to the south of the library or refectory (Thomas, 1988a: 103). This second porch contained features that may indicate storage areas (Saunders, 1990: 537). The western wall was enclosed by a well-defined arcade, probably a colonnaded porch marking the eastern margin of the central plaza. At least three doorways faced the church to the west. This porch was exactly aligned with the western wall of the *cocina*. An addition of some sort, apparently not of wattle-and-daub, was appended to the southern wall.

Set into the clay floor of the central room was a curious floor feature: a rectangular clay foundation, standing 25 cm above the floor, scooped out to receive an oval, metallic receptacle (visible in the center of fig. 3.3). We think this floor font was likely employed for personal hygiene, perhaps as a footbath.

Immediately outside the back of the *convento*, we found a concentration of nearly 4 dozen bronze bell fragments (other fragments have been found haphazardly scattered about Santa Catalina). Several pieces show punch and axe marks, indicating that the bells were deliberately destroyed; at least four different bells are represented. The mission bell held a special significance to Franciscans, at times symbolizing the entire mission enterprise. Like all sacred vessels of the church, bells were consecrated and blessed, this status continuing even after the breaking of a bell; bell fragments were collected at missions San Miguel and San Luis Rey, in Alta California, and sent to Mexico, ultimately to be recast into new bells (Walsh 1934: 32). Elsewhere (Thomas 1988a: 104), I have speculated that the fragments found behind the 17th-century *convento* were from bells broken by rebellious Guale during the uprising of 1597. Friars who returned to Santa Catalina some years later undoubtedly came upon some of these fragments, and the broken bells

Fig. 3.4. Aerial photograph of the *cocina* (Structure 2) at Mission Santa Catalina de Guale. Each of the white buckets denoted a major support post. This photograph is oriented along the Hispanic grid system, with “mission north” at the top of the page.

found behind the *convento* may be a deliberate cache of still-consecrated fragments, perhaps intended for recycling into new bells.

THE KITCHEN (*COCINA*): The new friary was about 15 percent smaller than its predecessor, but this size differential was perhaps counterbalanced by the new *cocina* (kitchen) built 20 m to the northwest.[4] Figure 3.4 shows the configuration of the 17th-century kitchen, measuring 4.5 m. by 6 m, was constructed of wattle-and-daub on three sides. These walls were supported by squared-off pine posts, placed in pits. The southern end of the kitchen was apparently left open, presumably to facilitate both access and ventilation.

The cooking for the friars was probably shifted to this new structure early in the 17th century. Although most kitchen debris was discarded some distance away (probably outside the walled mission compound), some midden accumulated in pits near the *cocina*, and occasional smaller pieces of garbage were trampled underfoot, being thus incorporated in the kitchen floor.

THE MISSION WELLS: Two wells have been discovered on the eastern side of the plaza at Mission Santa Catalina de Guale (Thomas, 1988a, b, 1993a). One of these (denoted as "Structure 3" in the field notes), was discovered during the initial magnetometer survey of Quad IV (Thomas, 1987; Garrison et al., 1985; see fig. 3.5). This barrel-lined well was located several meters northeast of the *convento* and likely dates to the 16th century mission occupation (Thomas, 1993a: 19). Initially located by the magnetometer survey, was a simple barrel well, with seven decomposing iron rings above the well-preserved remains of an oak casing. The construction pit was relatively small, perhaps 1.5 m in diameter, with the much smaller barrel well located inside. Relatively little was found in the construction pit and well fill (some olive jar and majolica sherds, plus a metal plate). This well obviously had a relatively short use-life, and we think it likely that it dates from the 16th century.

A second, much larger well denoted as "Structure 2/4, FS(2/4)513" (in the field notes) is located directly between the *convento* and the *cocina*. When first recognized, the large circular construction pit was more than 4 m in diameter, with a dark, largely circular stain in the middle (fig. 3.6). As we excavated downward, the construction pit narrowed, with distinct "steps" on both sides; a 17th-century cave-in is recorded in the southern sidewall, where one of the sand steps apparently collapsed (fig. 3.7).

The well was originally much smaller, having been first constructed with standard barrels. It was subsequently renovated using a casement constructed of two U-shaped cypress logs that were lowered into the construction pit, then nailed together. This later, handmade well casing was at least 2 m in diameter, considerably larger than any of the mission period wells encountered in Spanish Florida. This well clearly crosscuts surrounding features in the *convento/cocina* complex; it was one of the last features built at the mission and was probably in use until the final mission abandonment in 1680.

The well reached a depth of roughly 2.5 m. A considerable amount of cultural and botanical remains were included in both the construction pit and well fill. A quantity of waterlogged items found at the base of the well include a broken iron hatchet (with a partial wooden handle still intact, possibly broken during the carving of the casement), two wooden balls (roughly the size of pool balls), at least five reconstructible aboriginal vessels (two of which are unbroken and one is painted on the interior and exterior), most of two olive jars, and many seeds and pits including grape, peach, and squash. At the bottom of the well were quantities of burnt cut wood, which may have been part of a superstructure which once covered the well.

EXPLORING THE GUALE *PUEBLO* AND BEYOND: We know much less about the surrounding Indian *pueblo*—primarily because the Hispanic documents gloss over such mundane matters and also because of limited archaeological exploration of the complete mission contexts. We suspect that housing in the *pueblo* at Santa Catalina consisted of rectangular buildings, perhaps separated by "streets." Native American structures were apparently built as an extension of the initial gridwork.

The mission *pueblo* must have contained a council house (or *buhio*), a massive circular building perhaps 100 ft in diameter, and capable of sleeping 300 people within. The council house, in mission times and well before, symbolized and enshrined critical sociopolitical bonds. The missionaries recognized the importance of the council house, favoring construction on the mission grounds, encouraging local Indians to think of the mission as "their home."

Similarly, we suspect that many of the Southeastern missions contained an extensive

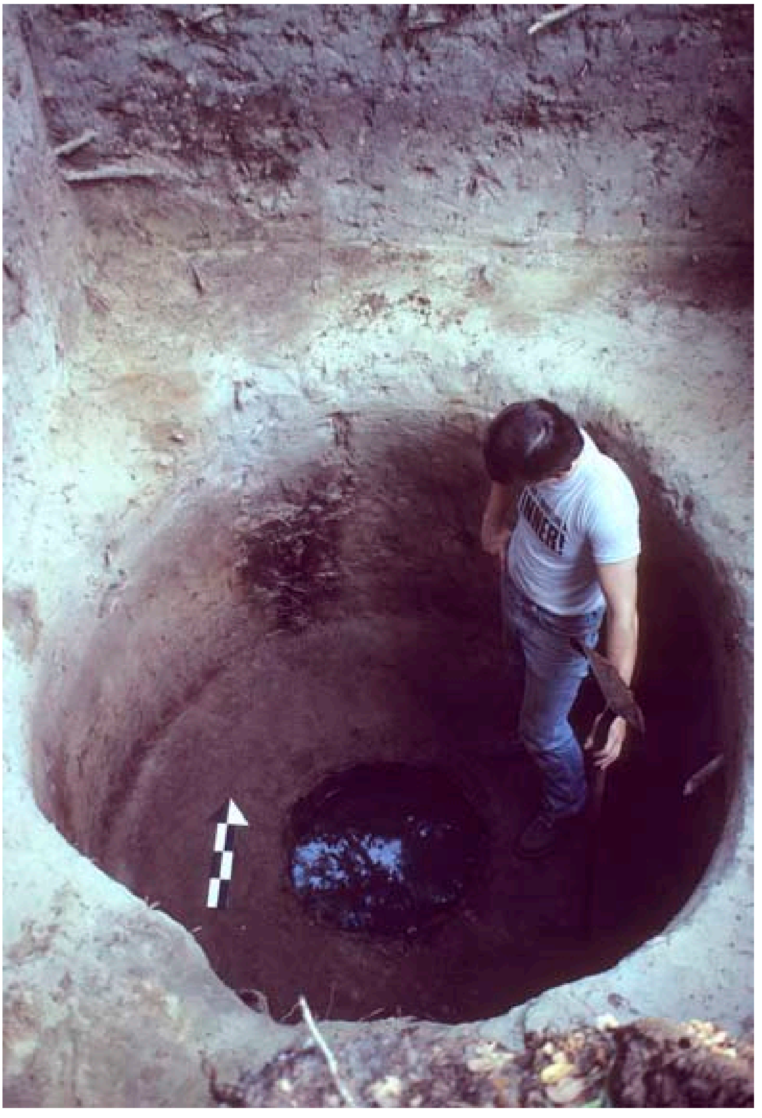


Fig. 3.5. Photograph of the first (early) well at Mission Santa Catalina de Guale. The excavator is looking at the bottom of a submerged oak barrel well. This photograph is oriented toward magnetic north.

ball yard. For decades, missionaries and other Spanish officials encouraged the neophytes to participate in this aboriginal ritual. But about 1675, the Spanish banned both the ballgame and traditional dancing from the mission grounds, arguing that it was a pagan practice and detracted from the proper function of the mission, namely to encourage Christian behavior. So far, no ball yards have been recognized in the missions of the Southeast, but archaeologists have only begun looking for such aboriginal elements in the mission context.

During our last significant field operation at Mission Santa Catalina de Guale, we shifted the archaeological focus of attention from the Hispanic core to the Native American outskirts. We had previously tested the surrounding Guale *pueblo* in several places, but our concern was primarily chronological—to be certain that this extensive habitation area surrounding the

Fig. 3.6. Aerial photograph of the second (late) well at Mission Santa Catalina de Guale (Structure 2/4) during the initial stage of excavation. The construction pit is evident as the large circular pit; the charcoal concentration in the middle denotes the well itself. This photograph is oriented along the Hispanic grid system, with “mission north” at the top of the page.

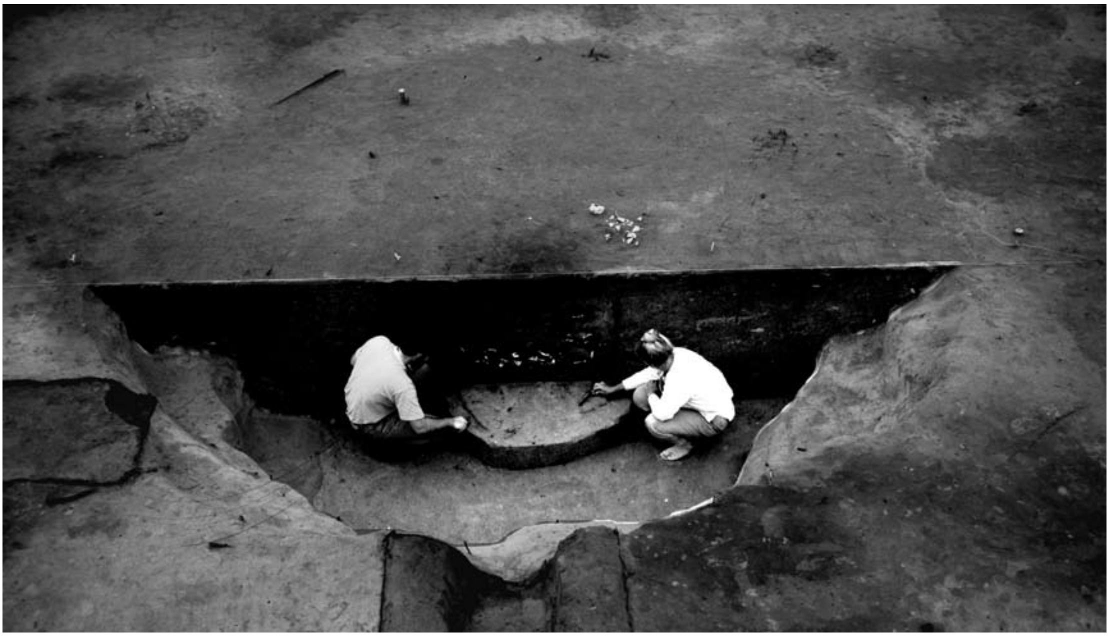


Fig. 3.7. Photograph of the second (late) well at Mission Santa Catalina de Guale (Structure 2/4) during the intermediate stage of excavation. The construction pit is evident as the large circular pit. The lateral walls of the cased well are evident as vertical stains in the profile. This photograph is facing “mission west.”

mission buildings was occupied during the 16th and 17th centuries.

We have described elsewhere the archaeological procedures involved in surveying and partitioning the mission complex (Thomas, 1987: 142-148); here we repeat only the most relevant details. A master grid system was initially extended across that portion of Wamassee Head that containing significant quantities of aboriginal ceramics. A master datum point (labeled "N0,W0") was established south of Wamassee Creek, on a spot thought to lie southeast of the mission compound. Then a series of 1 ha quads was surveyed along a 1600 m baseline (Thomas, 1987: fig. 49), with each quad assigned a Roman numeral designation. We defined a series of 20 m square blocks within each quad, assigning each block a letter designation. At first, the test units were assigned serial designations within each block, but once individual mission structures were identified, they were numbered as Structure 1 (the mission church), Structure 2 (the *cocina*), Structure 4 (the *convento*) and so forth. The structural evidence clustered around the central mission plaza is discussed above. The surrounding *pueblo* area has been divided into geographic subdivisions, clustering the various quads and structural excavations as follows:

***Pueblo* North** includes the northwestern (cardinal) part of Quad IV (presumably the area lying outside the mission wall), all of Quads VII, XX, XXI, Structure 5 excavations, excavations at AMNH 680 (State site number pending); all excavations inside the northwestern mission bastion are excluded from the Pueblo North subdivision.

***Pueblo* East** includes the northeastern (cardinal) part of Quad IV (presumably the area lying outside the mission wall), all of Quads VI and III, and that part of Quad V lying north of the freshwater creek.

***Pueblo* West** includes that southwestern (cardinal) part of Quad IV (west of the presumed mission wall) and all of Structure 1-W; all excavations inside the northwestern mission bastion are excluded from the *Pueblo* West subdivision.

***Pueblo* South** includes the southeastern (cardinal) part of Quad IV (presumably the area lying outside the mission wall), Quad II (including Structure 6 and various collections from Wamassee Head, Fallen Tree, the freshwater creek and Wamassee Creek (see Thomas, 2008: 574-580), all of Quad I (including the Fallen Tree excavations, and Wamassee Creek collections), that portion of Quad V lying south of the freshwater creek, and the portion of Quad III lying in the freshwater creek drainage).

THE BIOARCHAEOLOGY OF MISSION SANTA CATALINA DE GUALE

The archaeological program on St. Catherines Island has long pursued a program of bioarchaeology, in close collaboration with Clark Spencer Larsen and his colleagues. The early mortuary mounds of St. Catherines Island formed the basis of Larsen's doctoral research (Larsen, 1980, 1982) and with the discovery of Mission Santa Catalina de Guale, Larsen continued to share responsibility for the 15-year excavation program. In general, Thomas directed the structural and architectural excavations at Mission Santa Catalina and Larsen supervised the excavation of the cemetery area, located inside the mission church (Larsen, 1990; Larsen et al., 1990; see also Thomas, 2008, chap. 24).

Health and Nutrition: The meticulously excavated remains from Mission Santa Catalina de Guale have been studied by a number of independent techniques, including biomechanical analysis, microscopic examination of dentition, reconstruction of ancient demographic profiles, and stable isotope analysis, and the results of these diverse studies have been completely published (e.g., Thomas and Larsen, 1979; Larsen, 1982; Larsen and Thomas, 1982; Larsen and Thomas, 1986; Hutchinson and Larsen, 1988, 1990; Ruff and Larsen, 1990; Schoeninger et al., 1990; Simpson et al., 1990; Larsen et al., 1990, 1991, 1992; Larsen and Hutchinson, 1992; Larsen and Harn, 1994; Larsen and Ruff, 1994; Hutchinson et al., 1998; Larsen, 2001, 2002).

Investigators have documented major changes in body form, suggesting that during the early contact period, St. Catherines Islanders appear to have lived more sedentary lives than in precontact times (likely involving a relatively static workload and experiencing greater body weight, probably due to increased carbohydrate consumption). Females living at Mission Santa Catalina exhibited increased limb loadings (which had decreased marginally during late prehistoric times, but increased notably during the mission period). Upper limb loading also decreased from the early through late prehistoric periods, but stayed low during the mission period (Ruff and Larsen, 2001: 137). Male locomotor activities appear to have reduced during the transition from foraging to farming, which is consistent with ethnographic observations. This could be due to a greater workload during mission times, or an "increase in corpulence" triggered by greater sedentism and consumption of carbohydrates during missionization (see also Ruff et al., 1984; Ruff and Larsen, 1990; Larsen and Ruff, 1994; Larsen et al., 1996).

Twenty-two of the individuals buried inside the church/cemetery at Mission Santa Catalina de Guale were analyzed for stable carbon and nitrogen isotopes (Schoeninger et al 1990; Thomas, 2008, tables 32.2 and 32.3). The isotope concentrations leave little doubt that maize was a dietary staple during the mission period. The observed $\delta^{15}N$ values for the Mission Santa Catalina samples overlap those with pueblo agriculturalists of the American Southwest (Schoeninger et al., 1983, 1990: 90), although the continued use of marine resources depresses the overall distribution of $\delta^{15}N$ values. The $\delta^{13}C$ values for the contact period on St. Catherines Island are somewhat less than that for Southwestern pueblo farmers (implying a lower dependence on maize for the island population); the relatively large range of variability suggests that Island residents explored a broader range of subsistence alternatives than their pueblo counterparts.

Hutchinson and Larsen (1990) found that enamel hypoplasias (a commonly employed indicator of biological stress) were more common among individuals from the Mission Santa Catalina than among those living during the precontact periods. This means that people of the Deptford, Wilmington, and St. Catherines periods must have experienced more single-stress events than did contact period populations, despite the fact that the mean width of the hypoplasias was narrower (Hutchinson and Larsen, 1990: 64). This implies that some people living at Mission Santa Catalina likely experienced an increased duration of stress, an increased intensity of stresses, or perhaps both.

Larsen (1990: 40) and Russell et al. (1990: 36) conclude that the mission period population had a longer survivorship profile than their sample from the Irene period population. This demographic shift could represent either a "rebound" in overall population health and demographic robusticity or perhaps certain segments of the mission period population were not interred in the church cemetery (thereby biasing the age profiles).

Overall, then, the bioarchaeological evidence from St. Catherines Island is consistent with expectations given an exponential population growth, increased crowding, and adoption of a maize-based diet (at least during the mission period). As expected, we find a general decrease in health and an overall increase in the presence of infectious disease.

Are the Guale People Directly Descended from the Late Prehistoric Irene Population? Before leaving the bioarchaeological evidence, a cautionary note is required about bridging between the archaeological and ethnographic data. Investigators have typically assumed that during the 16th and 17th centuries, the people living at Mission Santa Catalina de Guale (and several other nearby missions along the Georgia coast) were the direct descendants of aboriginal people who lived at the precontact Irene Mound (e.g., Larson, 1980: 195; Larsen et al., 1996: 98–99). New bioarchaeological data suggest this relationship may be more complex than initially assumed.

Working from a sample of 510 individuals from 17 archaeological sites along the Georgia coast, Griffin et al. (2001: 232) caution that the degree of dissimilarity evident from univariate and multivariate analyses "casts some doubt on this relationship." Specifically, Griffin (1989, 1993; Griffin and Nelson, 1996) found that the Guale samples were "particularly diverse" in their dental and cranial nonmetric morphology (Griffin et al., 2001: 232). Based on statistical criteria of biological distance, the population living at Santa Catalina de Guale appears to be an aggregate, clouding the biological relationship to those buried in the Irene Mound, itself an aggregate ceremonial center.

The dissimilarity between Guale and Irene bioarchaeological samples cannot be explained by random genetic drift. This means that any assumption of continuity between the Irene Mound population and the later Guale people must be questioned. As noted by Jones (1978), Spanish explorers used the term "Guale" to mean both a physical location and also a culturally/linguistically affiliated social group (Jones, 1978: 186; see also Worth, 2004: 238–240, and

Saunders, 2000b)—leaving the distinct possibility that the term "Guale" (used so frequently in 16th-century ethnohistoric accounts) might have referenced merely geographic placement along the Georgia coastline, without any necessary linkage to linguistic, biological, and/or cultural identity. Or, perhaps "Guale" might have distinct linguistic and/or cultural significance, but not necessarily denote a biological breeding population. But if the Guale did indeed descend from the Irene Mound population, then a substantial biological change took place in a surprisingly short time period.

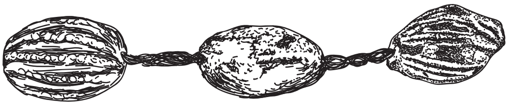
NOTES

1. In order to synthesize these diverse findings, this section is presented without bibliographic citations; those interested in pursuing these topics further should consult the recent three-part publication addressing landscape archaeology on St. Catherines Island (Thomas, 2008).

2. "In addition to the years of drought, all these accounts were authored precisely during the initial years when newly-arrived European colonists were most in need of foodstuffs received, bartered, or taken from neighboring coastal Indians, significantly reducing any annual surpluses remaining after dry growing seasons. Laudonniére's 1565 description of winter hunting haunts and spring famine came after his own purchase of most of the surplus from the 1564 growing season, and Jesuit letters were authored during a period of extreme dependence by the settlers of Santa Elena on local Indian food, a practice which had begun with the French soldiers at Charles Fort in 1562. Indeed, there are several direct textual references to Indian comments that they had sold virtually all their surplus food during those first years, and would have to seek out other foods until spring planting" (Worth, 1999).

3. Thousands died during the decade of 1649–1659 (Larsen, 1990: 18) and missions became a nexus for the spread of disease, where populations were centralized, providing ideal conditions for introduction of pathogens. In 1657, the governor of Spanish Florida commented on the drastic reduction of native population in the province of Guale "because they have been wiped out with the sickness of the plague and small-pox which have overtaken them in the past years" (quoted in Hann, 1986: 378).

4. We cannot eliminate the possibility that a 16th-century structure once stood on the site of the 17th-century *cocina*. We did not isolate a two-component occupation of Structure 2 during excavation, and subsequent analysis will be necessary to finalize this point.



CHAPTER 4
THE BEAD ASSEMBLAGE FROM ST. CATHERINES ISLAND

Lorann S. A. Pendleton, Elliot H. Blair, and Eric Powell

This chapter presents a comprehensive catalog of the entire bead assemblage currently available from St. Catherines Island. The beads are first separated into broad groupings; these are subsequently subdivided into individually numbered types. More specific attributes of the beads, and fine-grained, intratype subdivisions can be found in appendix 3.

The beads are first sorted by material (glass, metal, jet, amber, carnelian, crystal, shell, pearls, bone, wood, antler, and soft stone). For glass beads, further subdivisions include method of manufacture, construction, and finishing method. Manufacturing methods include drawing, winding, segmenting, individually blowing, and molding. These manufacturing methods are described more extensively in Part III of this volume.

Those beads manufactured by the "drawing" method (pulling out a long tube of glass, cutting it into sections, and [usually] finishing or rounding off the cut segments) are further subdivided by construction: simple (composed of a single layer of glass), compound (made of two or more layers of glass), complex (with added decoration), and composite (with more than one layer of glass and added decorations).

The finishing methods include unmodified tubular beads (bugles), *a ferrazza* finished beads (stirring the cut segments over heat), and *a speo* finished beads (beads mounted on a spit which was twirled over a fire to round the beads).[1]

Wound beads are subdivided based on the Kidd and Kidd (1970) wire wound bead chart subdivisions: Groups WI, WII, and WIII. Group WI beads are monochromatic beads of simple shapes. Group WII beads are monochromatic beads with irregular shapes and modifications. Group WIII beads have added decorations.

We began the individual bead analysis with a pilot sample of beads from the cemetery at Mission Santa Catalina de Guale. Each bead was measured and described according to established systems of bead analysis designed by Jeffrey Mitchem (1992) and Kathleen Deagan (1987). We specifically adopted Mitchem's definition of measurements and utilized his methods of description, although we augmented his categories with Deagan's definition of shapes and decoration. In addition, Kidd and Kidd's (1970) bead typology, a standard reference in North American bead research, was employed, and where possible beads were also assigned their designations. In the course of the study, however, we found, as have other researchers, that many Kidd designations are imprecise (see Mitchem, 1992), especially where color and shape are concerned.

Once each bead was measured, a data sheet was generated and all data were entered into an Excel spreadsheet. Specimens were measured to the nearest millimeter using Mititoyo Digimatic calipers. Intact beads were measured for: maximum diameter, the dimension perpendicular to the perforation; diameter of the perforation; and length, the measurement of the bead parallel to the perforation. Fractured beads that retained less than half of the original bead structure were not measured. Beads that were fractured, but obviously still retained at least half of the original structure, were measured.

The balance of the analysis consisted of determining the following: material, shape, decoration, diaphaneity, color, and type (where applicable). Each bead was examined under a Nikon 80× microscope, using a 150W light source.

Specimens were cleaned using ethanol, applied with a cotton swab. Material, manufacture, shape, and decoration were all determined by close observation under a microscope. In some cases in which material and construction were difficult to determine, Lois Dubin, Peter Francis, Jr., Jeffrey Mitchem, Anibal Rodriguez, and Marvin Smith provided assistance. As consistently as possible, bead shape was determined by following the diagrams and definitions set out by Deagan (1987).

Diaphaneity proved more difficult to determine. We used a method devised by Smith and Good (1982). Specimens were exposed to a 150W light source, held with a dental pick. Diaphaneity was determined on the basis of the degree to which light penetrated the specimen. If no light was visible through the bead, it was designated as opaque. If some light was visible and the perforation was slightly visible, then the specimen was called translucent. If the perforation was clearly visible within the bead, it was transparent. The diaphaneity designations remained subjective so grades of diaphaneity were often recorded (e.g., transparent/translucent).

Color was determined by comparing the bead directly to color chips produced by the National Bureau of Standards (NBS). Establishing consistency in color analysis proved virtually impossible; however, procedures were developed to minimize inconsistency. Color was determined after placing the bead on a white background and then directly on top of a particular NBS color chip. This small white background between the bead and the color chip ensured that color from the NBS chip did not diffuse through the glass bead and create a false match. The bead and color chip were compared while still under high-intensity light to maintain consistency with the microscope viewing. The color of each bead type often extended over several NBS color chips. If the color of the specific bead type varied slightly between specimens, a range of numbers was recorded. Analytic variability in color was also minimized by assigning an individual analyst for each general color. For example, all blue beads were analyzed by the same person; a different person would analyze all green beads, and so on. We felt that one pair of eyes analyzing the nuances within a color category would be much more consistent than three pairs of eyes attempting the same analysis.

There was a strong recommendation to use the Munsell system of colors, rather than NBS, due to its wider availability (Karklins, 2006, personal commun.). All NBS numbers were converted to Munsell numbers using Karklins' (1989: 10–11) correlations and the NBS book itself, which has conversion codes. The original NBS designations are on file in the Nels Nelson Laboratory of North American Archaeology, American Museum of Natural History.

Once analysis of the bead pilot sample was completed, steps were taken to refine the analysis to more appropriately define the larger bead population of Mission Santa Catalina. Drawing on the lessons learned in the 1987 pilot study, we undertook a second pilot study in 1996. Rather than using the Kidd and Kidd size designations (e.g., very small, under 2 mm; small, 2–4 mm; medium, 4–6 mm; etc.), we decided to measure a sample of beads from the cemetery, then create a histogram of observed size ranges, hoping that this process would reveal the natural (intrinsic) size breaks within the St. Catherines bead assemblage (fig. 4.1). We selected four excavation units for analysis, two units near the altar of the church (R101 and S101) and two near the church entrance (J101 and K101) (see fig. 15.9). Each bead in this sample was measured precisely on a number of dimensions (diameter, length, and perforation diameter) and these measurements were entered into a database and sorted into a histogram. This histogram suggested that the bead diameters were distributed as follows: <2.60 mm, 2.60–3.50 mm, 3.51–4.75 mm, 4.76–7.99 mm, 8.00–14.99 mm, and >15.00 mm. This sample also suggested that bead length was distributed in the following ordinal categories: <2.51 mm, 2.51–4.50 mm, 4.51–5.35 mm, and >5.36 mm for length.

Based on these preliminary analyses, the balance of the bead assemblage was analyzed by the same protocols and is herein presented.

DRAWN GLASS BEADS OF SIMPLE CONSTRUCTION

Bugles

Type 1 (Ia2^2): Manganese Violet Bugle (Plate 1-A): Type 1 beads are translucent manganese violet (7.8YR 1/1, N 1/0) tubes, with round cross sections. The beads range in size from 11.1 to 15 mm in length and are less than 2.60 mm in diameter. The ends of the beads are rough. This bead is similar to Kidd and Kidd Ia2. Benson (1967: 123) reports similar beads from

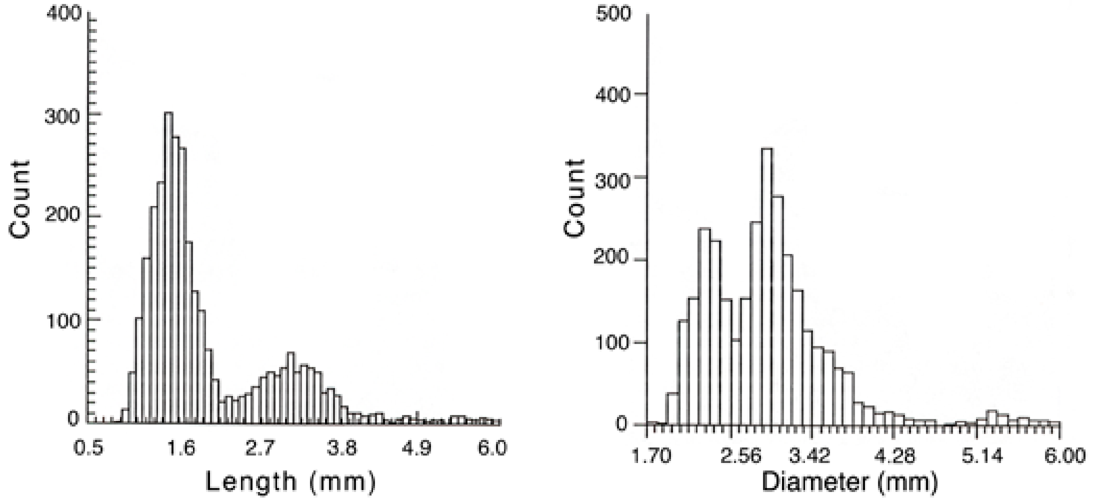


Fig. 4.1. Histogram of bead size distribution.

Philip Mound. Artifact 3234 from the *convento* at *San Luis de Talimali* appears to match Type 1 (Mitchem, 1992: 250). Number of specimens: 7.

Type 2 (Ia20): Cobalt Blue Bugles (Plate 1-B): Type 2 beads are translucent cobalt blue (2.9PB 4/10, 2.8PB 3/8, 7.8PB 2/12) tubes, with round cross sections and prominent longitudinal striations on the surface. The striations consist of minute longitudinal bubbles, somewhat yellowish (9.4YR 8/7). This variety ranges in size from 3.51 to 4.75 mm in diameter and 7.1 to 15 mm in length. The ends of the beads are rough. Benson reports translucent dark blue tubes from Philip Mound (Benson, 1967: 123). Type 2 corresponds to Variety IA3 from the Tunica Treasure (Brain, 1981). Dark blue plain bugles were recovered at Seven Oaks, Goodnow Mound and Albritton Mound (Goggin, n.d.: 44). Type 122 from the Guebert Site is an exact match (Good, 1972). Number of specimens: 6.

Type 3 (Ia20): Cobalt Blue Bugles (Plate 1-C): Type 3 beads are transparent cobalt blue (2.8PB 3/8, 2.2PB 2/6) tubes with round cross sections. The ends of the beads are smooth and were probably reheated. The striations prominent on the surface of Type 2 specimens are absent on Type 3. This bead ranges in size from 2.60 to 3.50 mm in diameter and 4.51–5.35 mm in length. Number of specimens: 7.

A Ferrazza Finished Beads

Type 4 (IIa): Medium/Deep Blue-Green Seed Bead (Plate 1-D): Type 4 beads are transparent to translucent medium to deep blue-green (4.7B 4/5) rings. This bead type ranges in size from 2.6 to 3.58 mm in diameter, and is less than 2.51 mm in length. Mitchem (1992) refers to this type as drawn translucent bluish green, and Smith (1983) calls them translucent medium blue beads. Number of specimens: 393.

Type 5 (IIa41): Turquoise/Green-Blue Seed Bead (Plate 1-E): Type 5 beads are opaque to translucent turquoise blue/deep green-blue (4.9B 5/8; 4.5B 7/5; 4.7B 5/5) rings. The sizes range from less than 2.60 mm to 4.75 mm in diameter and from less than 2.51 mm to 4.5 mm in length. Number of specimens: 5777.

Type 6 (IIa56): Cobalt Blue Seed Bead (Plate 1-F): Type 6 specimens are transparent to translucent cobalt blue (2.9PB 4/10; 3.0PB 4/7, 2.2PB 2/6, 0.2PB 4/3, 7.8PB 2/13) beads. Most specimens are ring shaped, although seven specimens were fused together during the heat finishing process. Eleven specimens are irregularly shaped rings that grade into barrels. They range in size from less than 2.60 to 7.99 mm in diameter and from less than 2.51 to 4.50 mm in length. Number of specimens: 20,906.

Type 7 (IIa): Deep Green Seed Bead (Plate

1-G): Type 7 beads are opaque yellow-green (6.2G 7/8, 0.4G 5/9) to deep green (5.1G 3/8) ring shaped beads, though one specimen has an irregular shape and faint impressions that resemble facets. They range in size from less than 2.60 to 4.75 mm in diameter and are less than 2.51 mm in length. Number of specimens: 10.

Type 8 (IIa): Olive Seed Bead (Plate 1-H): Type 8 beads are translucent, olive colored (7.6Y 4/5, 8.9Y 2/3), and ring shaped. This bead is 3.51–4.75 mm in diameter and less than 2.51 mm in length. Number of specimens: 1.

Type 9 (IIa): Gray-Blue Seed Bead (Plate 1-I): Type 9 beads are opaque, gray-blue (0.2PB 4/3), ring-shaped beads. These beads range from 2.60 to 5.15 mm in diameter and from less than 2.51 to 4.50 mm in length. Number of specimens: 19.

Type 10 (IIa): Orange-Yellow Ring Seed Bead (Plate 1-J): Type 10 beads are opaque, orange-yellow (8.6YR 6/12, 9.1 YR 7/12), and ring shaped. The beads range in size from less than 2.60 to 3.50 mm in diameter and are less than 2.51 mm in length. Number of specimens: 7.

Type 11 (IIa): Yellow-Brown Seed Bead (Plate 1-K): Type 11 beads are transparent, yellow-brown (8.6YR 6/12, 8.8YR 5/9), and ring shaped. Some specimens have developed whitish patinas. These beads range in size from less than 2.60 mm to 5.35 mm in diameter and from less than 2.51 mm to 4.50 mm in length. Number of specimens: 1954 (whole and fragmentary).

Type 12 (IIa): Red-Brown Seed Bead (Plate 1-L): Type 12 beads are opaque to translucent, red-brown (0.3YR 3/10, 9R 3/5), and ring shaped. They range in size from less than 2.60 mm to 4.75 mm in diameter and are less than 2.51 mm in length. Number of specimens: 3.

Type 13 (IIa7): Manganese Violet Seed Bead (Plate 1-M): Type 13 beads are transparent to translucent "manganese violet" (2.9R 3/2) beads. Most of the Type 13 specimens are ring shaped, although 123 grade into a barrel shape and 5 specimens were fused together during the *a ferrazza* process. Type 13 might be a slight variant of Type 17, though Peter Francis (personal commun.) believed Type 13 to be an example of monochrome *rocaille* beads and Type 17 to be simple bubble glass beads (*a speo*). They range in size from less than 2.60 mm to 4.76 mm in diameter and from less than 2.51 mm to 4.50 mm in length. Number of specimens: 1807.

Type 14 (IIa): Clear Seed Bead (Plate 1-N): Type 14 beads are transparent, colorless, and ring shaped. Some specimens have developed whitish patinas on the surface. They range in size from less than 2.60 mm to 3.50 mm in diameter and from less than 2.51 mm to 4.50 mm in length. Number of specimens: 2059.

Type 15 (IIa14): White Seed Bead (Plate 1-O): Type 15 beads are opaque, white (4.5Y 9/1, 2.5PB 10/0), and ring shaped. These beads range from 2.60 mm to 3.50 mm in diameter and are less than 2.51 mm in length. Number of specimens: 101.

Type 16 (IIa6): Manganese Violet Bead (Plate 1-P): Type 16 beads are transparent and manganese violet (6.9P 1/5, 0.8RP 1/2; 1.3RP 3/5). This type includes both spherical and ring shaped specimens. The beads range in diameter from 4.76 to 7.99 mm and from 4.20 to 6.61 mm in length. This type is differentiated from Type 13 because it is too large to be considered a seed bead. Number of specimens: 3.

A Speo Finished Beads

Type 17 (IIa6, IIa7, IIa8): Manganese Black Opaque/Translucent (Plate 1-Q): Type 17 beads are opaque to translucent, manganese black beads (3.9R 1/2, 6R 3/1, 2R 1/1, N 1/0) beads. Most Type 17 specimens are ring shaped, though spherical, barrel, oval, and olive specimens are also present. Twenty-two of these beads are examples of bilobed or conjoined shapes that were fused together during the *a speo* process. Peter Francis believed Type 17 to be finished by the *a speo* method, discussing them as "Black Bubble Glass Beads" (Francis, chapter 8). Upon reexamination it is difficult to conclude that all specimens are *a speo* finished. Some show clear evidence of the *a speo* process, while others are of ambiguous finish and fall within the size range of seed beads. There is likely some overlap between Type 17 and the *a ferrazza* finished Type 13. The beads range in diameter from less than 2.60 mm to 8.40 mm and in length from less than 2.51 mm to 14.6 mm. Number of specimens: 6697.

Type 18 (IIa40): Ichtucknee Plain, Early Blue, or Simple Blue Bubble Glass (Plate 1-R): Type 18, widely known in the Southeast as "Ichtucknee Plain," are opaque to translucent, turquoise blue to deep green-blue (4.6B 6/8, 4.9B 5/8, 4.5B 6/5) beads. They are characterized by prominent longitudinal bubbles on the surface, resulting in a "striated" or "spun sugar" appearance (Harris et al., 1965: 309, type 9), and tend to be unstable. They often form white patinas on the surface, especially on fragmented specimens. For a thorough discussion of blue bubble glass, see Francis (chap. 8, this volume). Shapes include barrel, oval, spherical, and ring. The beads range in diameter from 3.51 mm to 14.99 mm and in length from 2.51 mm to 13.0 mm. Specimens that are conjoined can reach 15.0 mm in length. Number of specimens: 5265 (whole and fragmentary).

Type 19 (IIa44): Transparent Medium Blue (Plate 2-A): Type 19 beads are transparent, turquoise blue (4.9B 5/8, 4.6B 6/8) to deep green-blue (2.8 BG 2/8; 2.9BG 6/10). Most specimens are either oval or spherical, though one is a weathered, irregular ring and six others are conjoined from the *a speo* process. The beads range in size from 3.51 mm to 14.99 mm in diameter and from 2.51 mm to 11.0 mm in length. Number of specimens: 1329 (whole and fragmentary)

Type 20 (IIa55): Cobalt Blue (Plate 2-B): Type 20 beads are translucent to transparent, cobalt blue (1.6PB 6/9, 2.9PB 4/10, 2.8PB 3/8, 7.8PB 2/12). They include bilobed, oval, barrel, spherical, and olive shapes and range in diameter from less than 2.60 mm to14.99 mm. They range from less than 2.51 mm to 11.0 mm in length. Number of specimens: 2682.

Type 21 (IIa): Bluish Green (Plate 2-C): Type 21 beads are transparent and bluish-green (2.8BG 2/8, 4.9BG 3/5) to green (6.3G 5/5, 6.6G 3/5). They range from 2.60 mm to 14.99 mm in diameter and from less than 2.51 mm to 13.0 mm in length, and include oval, spherical, barrel, and ring shaped specimens. Number of specimens: 150 (whole and fragmentary).

Type 22 (IIa): Yellow-Green (Plate 2-D): Type 22 beads are transparent, spherical, and yellow-green (3.4GY 9/2). They range from 4.76 mm to 7.99 mm in diameter and from 5.35 mm to 7.0 mm in length. Number of specimens: 7.

Type 23 (IIa13): White Opaque (Plate 2-E): Type 23 beads are opaque white (2.5 PB 10/0, 4.7Y 9/4, 4.5Y 9/1). The type includes barrel, olive, oval, and spherical specimens. Two are conjoined from the *a speo* process. The beads range in diameter between 3.51 mm and 7.99 mm and from 2.51 to 13.0 mm in length. Number of specimens: 1357.

Type 24 (IIa): Yellow Opaque (Plate 2-F): Type 24 beads are opaque yellow (4.3Y 9/7, 4.7Y 9/4, 4.4Y 7/4). They range in diameter from 4.76 mm to 7.99 mm, in length from 5.35 mm to 7.0 mm, and are barrel, oval, and spherical in shape. Number of specimens: 52.

Type 25 (IIa18): Brown Transparent (Plate 2-G): Type 25 beads are transparent brown (8.6YR 6/12, 8.8YR 5/9, 4.4Y 9/9, 3.7Y 7/9). Sizes range from 4.76 to 14.99 mm in diameter and from 4.51 to 9.0 mm in length. The type includes oval, spherical, and barrel shaped specimens. Some have developed an iridescent patina. Number of specimens: 67.

Type 26 (IIa): Colorless (Plate 2-H): Type 26 beads are transparent and colorless. Specimens are spherical and barrel shaped, and one (28.0/4659.0717) is conjoined from the *a speo* process. The beads have diameters ranging from 4.76 to 7.99 mm and lengths ranging from 2.51 to 13.0 mm. Number of specimens: 168.

A Ferrazza Finished Faceted Beads (Charlottes)

Type 27 (If): Transparent Deep Orange Yellow Faceted (Plate 2-I): Type 27 beads are transparent, deep orange-yellow (8.6 YR 6/12), and faceted. They are spherical, have 3 to 4 facets, range in diameter from 2.60 to 3.50 mm, and range in length from 2.51 mm to 4.50 mm. Number of specimens: 3.

Type 28 (If): Greenish-Blue Faceted (Plate 2-J): Type 28 beads are transparent bluish-green (2.8BG 2/8, 4.9BG 3/5) faceted. They are barrel, oval, and spherical in shape, have 1 to 4 facets, range in diameter from 2.60 mm to 7.99 mm, and range in length from 2.51 to greater than 5.35 mm. Number of specimens: 138.

Type 29 (If): Transparent Gray-Violet Faceted (Plate 2-K): Type 29 beads are transparent gray-violet (1.2P 3/4, 0.5RP 3/2) faceted. They are spherical in shape, have 3 to 4 facets, range in diameter from 3.51 mm to 4.75 mm, and range in length from 2.51 mm to 4.50 mm. Number of specimens: 5.

A Speo Finished Faceted Beads

Type 30 (If): Cobalt Blue Faceted (Plate 3-A): Type 30 beads are translucent to transparent, cobalt blue (1.6PB 6/9, 2.9PB 4/10, 2.8PB 3/8, 7.8PB 2/13) faceted. Type 30 beads are visually identical to Type 20 with the exception of faceting. The beads are barrel, olive, oval, and spherical in shape, have 1 to 4 facets, range in diameter from less than 2.60 mm and 7.99 mm (most between 2.60 and 3.50), and range in length from less than 2.51 mm to 5.35

mm. Number of specimens: 2297.

Type 31 (If): Green Faceted (Plate 3-B): Type 31 consists of transparent green (6.3G 5/5, 6.6G 3/5) faceted beads. They are oval and spherical, range in diameter from 2.60 to 7.99 mm, range in length from 2.51 to 7.0 mm, and have 1 to 4 facets. Except for faceting, Type 31 specimens are visually similar to Type 21. Number of specimens: 41.

Type 32 (If): Manganese Black Faceted (Plate 3-C): Type 32 beads are translucent, manganese black (4.2R 1/5, 2.9R 3/2, 3.9R 1/2, 9.6R 1/4) faceted. They include spherical, oval, and ring shaped specimens. The beads have from 1 to 3 facets, range from 2.60 to 4.75 mm in diameter, and from less than 2.51 mm to 5.35 mm in length. With the exception of faceting, Type 32 is visually identical to Type 17. Number of specimens: 60.

Melon Beads

Type 33 (IIe2): Deep Green-Blue Melon (Plate 3-D): Type 33 is a deep green-blue (4.9B 5/8) melon-shaped bead, with eight longitudinal flutes and eight corresponding pointed lobes. The bead is 7.60 mm in diameter and 6.80 mm in length. Number of specimens: 1.

DRAWN GLASS BEADS OF COMPOUND CONSTRUCTION

Compound Segments

Type 34 (IIIa): Cut Segments, Clear Coat (Plate 3-E): Type 34 beads are opaque white (4.5Y 9/1) cut segments with a round cross section and a thin veneer of clear glass. They are 3.51–4.75 mm in diameter and 2.51–4.50 mm in length—too short in relation to their length to be considered bugles. Number of specimens: 4.

Compound Bugles

Type 35 (IIIa3): Green Heart Bugles (Plate 3-F): Type 35, known as a Green Heart Bugles, has a thin veneer of clear glass overlying a red-orange (9.2R 4/12, 9.3R 4/9, 0.3YR 3/10) layer over a dark green-blue (5.0B 2/4) to transparent greenish yellow (9.5Y 7/7) core. The whole beads ($N = 3$) range in diameter from 2.60 mm to 3.50 mm, and in length from 5.35 mm to 9.0 mm. Number of specimens: 5.

Tubular Beads with Square Cross Sections

Type 36 (IIIc3): Small Nueva Cádiz (Plate 3-G): Type 36, widely known as a Small Nueva Cádiz Plain, consists of three layers of glass. The exterior of the bead is opaque cobalt blue (2.2PB 2/6) over a thin white (2.5PB 10/0) layer with a translucent gray-blue (9.2B 3/2) interior. Type 36 has a square cross section and the corners have 11 offset facets. The bead is 5.40 mm in diameter face-to-face, 6.18 mm in diameter corner-to-+corner, and 11.10 mm in length. This bead appears to match Smith and Good's (1982) #54 or #56. Number of specimens: 1.

A Ferrazza Finished Compound Beads

Type 37 (IVa): Turquoise Blue with Clear Core (Plate 3-H): Type 37 beads have an opaque outer layer of turquoise blue (4.5B 7/5, 4.7B 5/5) glass and a transparent, colorless core. The beads are ring shaped, with diameters less than 2.60 mm, and lengths less than 2.51 mm. Number of specimens: 7.

Type 38 (IVa): Opaque White with Clear Core (Plate 3-I): Type 38 is opaque white (4.5Y 9/1, 2.5PB 10/0) glass over a transparent colorless core. In some specimens, the white glass is heavily eroded and has developed a light yellow (4.3Y 9/7) hue. The beads are highly unstable, and the opaque white layer in some cases erodes completely, leaving a separated core. Some specimens may have a clear coat. The beads are ring and barrel shaped, ranging from less than 2.60 mm to 7.99 mm in diameter and from less than 2.51 mm to 4.50 mm in length. Number of specimens: 6514.

Type 39 (IVa): Turquoise Blue with Clear Core and Clear Coat (Plate 3-J): Type 39 has a thin veneer of clear glass over an opaque layer of blue to green (4.6B 6/9, 4.6B 6/8) glass over a transparent colorless core. The thickness of the turquoise layer is highly variable. These beads are ring shaped, and range in diameter from less than 2.60 mm to 3.50 mm, and are less than 2.51 mm in length. Number of specimens: 1884.

Type 40 (IVa): Bluish-Green with Clear Core and Clear Coat (Plate 3-K): Type 40 has a thin veneer of clear glass over an opaque layer of blue-green (3.2G 5/11, 6.2G 7/8, 5.8G 4/9, 6.0G 6/5, 6.3G 5/5) to yellow-green (4.9GY 8/9, 5.0GY 8/6) glass over a transparent colorless core. The thickness of the blue-green layer varies from bead to bead. These beads are ring shaped, have diameters from less than 2.60 mm to 3.50 mm, and have lengths that are less than 2.51 mm. Number of specimens: 2271.

Type 41 (IVa5): Green Heart (Plate 3-L):

Type 41 beads are commonly known as Green Hearts. They are constructed with a thin veneer of clear glass overlying an opaque layer of red-orange (9.2R 4/12, 9.3R 4/9, 0.3YR 3/10) glass, overlying a transparent green-yellow (9.5Y 7/7) core. The beads are spherical. The type ranges from less than 2.60 mm to 4.75 mm in diameter and from less than 2.51 mm to 4.50 mm in length. Number of specimens: 7.

Type 42 (IVa): Yellow, Green Ring (Plate 3-M): Type 42 beads are very unstable, heavily eroded and deteriorated beads that consist of a layer of opaque yellow (4.3Y 9/7, 4.7Y 9/4) glass over an opaque green (5.8G 4/9, 5.1G 3/8) core. The beads range from less than 2.60 mm to 4.75 mm in diameter and from less than 2.51 mm to 4.50 mm in length. Number of specimens: 862.

Type 43 (IVa): Colorless Compound Barrel (Plate 3-N): Type 43 is a barrel shaped bead consisting of two layers of identical, but clearly distinct, transparent, colorless glass. The single bead is 5.22 mm in diameter and 4.48 mm in length. Number of specimens: 1.

Type 44 (IVa): Green Compound (Plate 3-O): Type 44 is a spherical bead consisting of two layers of identical, but distinct, yellow-green (5.4GY 6/9) glass. The single specimen measures 9.27 mm in diameter and 8.23 mm in length. Number of specimens: 1.

Type 45 (IVa): Purple with Turquoise Core (Plate 4-A): Type 45 is a spherical bead with an outer layer of purple (6.9P 1/5, 0.8RP 1/2) over a turquoise blue (4.0B 8/4) core. The single specimen measures 9.17 mm in diameter and 9.01 mm in length. Number of specimens: 1.

Type 46 (IVa): Orange-Yellow with Transparent Green Core (Plate 4-B): Type 46 beads are spherical and composed of three layers of glass. A translucent orange-yellow layer (8.6YR 6/12, 8.8YR 5/9) lies over a thin opaque white (4.5Y 9/1) layer with a transparent green (7.6G 6/2) core. The beads range in diameter from 8 to 14.99 mm and in length from 7.1–9.0 mm. Number of specimens: 3.

A Speo Finished Compound Beads

Type 47 (IVa5, IVa7): *a Speo* Green Hearts (Plate 4-C): Type 47 beads are commonly known as Green Hearts. These beads are constructed with a thin veneer of clear coat overlying an opaque layer of red-orange (9.2R 4/12, 9.3R 4/9, 0.3YR 3/10) glass, overlying a transparent green-yellow (9.5Y 7/7) core. The beads are primarily spherical and oval, though one specimen is conjoined from the *a speo* process and another is a collar shaped bead—manifesting puckered ends—likely from overheating during the *a speo* process (Karklins, personal commun., 2006). The type ranges from 3.51–4.75 mm in diameter and from 4.51 mm to greater than 5.35 mm in length. Number of specimens: 12.

Type 48 (IVk6): Five Layer Chevron (Plate 4-D): Type 48, known as Five Layer Chevrons, are highly distinctive compound beads with five layers that form a star pattern when viewed from the ends. The beads are composed of an outer, translucent green (6.6G 3/5) layer over an opaque white (2.5PB 10/0) layer over an opaque red (5.1R 3/10, 4.0R 3/7) layer over a second opaque white (2.5PB 10/0) layer with a thin, translucent green (6.6G 3/5) core. Unlike many chevrons, this variety is not faceted (see Francis, chap. 8, this volume for differences between Type IVk and this bead). The beads have diameters that range from 10.15 mm to 11.39 mm and lengths that range from 9.22 mm to 9.56 mm. Number of specimens: 3 (each specimen is only half of a bead).

DRAWN GLASS BEADS OF COMPLEX CONSTRUCTION

A Ferrazza Finished Complex Beads

Type 49 (IIb): Cobalt Blue with White Stripes (Plate 4-E): Type 49 is a translucent cobalt blue (2.9PB 4/10, 2.8PB 3/8) bead decorated with five extremely thin longitudinal white stripes on the surface. The stripes are irregularly spaced and cluster on one hemisphere of the bead. The bead is spherical and measures 3.50 mm in diameter and 2.85 mm in length. No comparisons could be found in the available literature. Number of specimens: 1.

Type 50 (IIb71): Cobalt Blue with Red and White Stripes (Plate 4-F): Type 50 beads are translucent cobalt blue (2.9PB 4/10, 2.8PB 3/8) decorated with longitudinal alternating red (5.1R 3/10) and white stripes. Two specimens (28.1/4882.0006 and 28.1/4882.0007) have two red and two white stripes and are ring and spherical in shape, respectively. One specimen (28.0/6054.0001) is spherical and has three red stripes and three white stripes. These beads measure from 2.60 mm to 4.75 mm in diameter and from less than 2.51 mm to 4.50 mm in length. Number of specimens: 3.

Type 51 (IIb): Yellow with Red Stripes

(Plate 4-G): Type 51 beads are opaque yellow (4.7Y 9/4), decorated with four red (6.5R 2/8) evenly spaced stripes on the surface. A thin, transparent yellowish-gray (3.8Y 7/1) film covers both specimens, and is possibly a clear coat. This type is ring shaped and measures from 3.25 mm to 4.28 mm in diameter, and from 1.90 mm to 2.73 mm in length. No comparisons were found in the available literature. Number of specimens: 2.

Type 52 (IIb): Rust Brown with Brown Stripes (Plate 4-H): Type 52 is an opaque, rust brown (9.0R 3/5) bead decorated with six longitudinal brown (9.6R 1/4, 1.6YR 2/8) stripes on the surface. The bead's surface is pitted. This bead is spherical and measures 4.22 mm in diameter and 3.08 mm in length. No comparisons could be found in the available literature. Number of specimens: 1.

A Speo Finished Complex Beads

Type 53 (IIb68, IIb70): Cobalt Blue with White Stripes (Plate 4-I): Type 53 beads are translucent cobalt blue (1.6PB 6/9, 2.9PB 4/10) decorated with white longitudinal stripes on the surface. The number and uniformity of the stripes vary. The shapes range from oval to spherical, the diameters range from 2.60 to 7.99 mm, and lengths from 2.51 to 5.35 mm. Smith (1983: 149, 153) illustrates "Simple 'tumbled,' simple stripes" with varying numbers of stripes that appear to be cobalt blue and reports their occurrence at Cooper Farm, AL; Plum Grove, TN; Apalachee Missions, FL; Bradford Ferry, AL; Williams Is., TN; Abercrombie, AL; Goodnow, FL; 8Sa36, Fl; Terrapin Creek, AL; Philip Mound, FL; Seven Oaks, FL; Weeki Wachee, FL; and Nueva Cádiz, Venezuela. Twenty-nine translucent blue beads are reported from Philip Mound with varying numbers and uniformity of stripes (Benson, 1967: 121). Number of specimens: 14.

Type 54 (IIbb24): Turquoise Blue with Red on White Stripes (Plate 5-A): Type 54 is an opaque turquoise blue (4.6B 6/8, 4.9B 5/8) spherical bead decorated with three brownish red (0.3YR 3/10) on white longitudinal stripes. It is similar to Ichtucknee Plain in color and diaphaneity, and, like Ichtucknee Plain beads, has longitudinal "spun sugar striations" or distinctive longitudinal bubbles. The bead is 6.85 mm in diameter and 5.80 mm in length. Mitchem (1991b: 5) describes two "drawn barrel opaque medium blue with 3 longitudinal red-on-white stripes on exterior" from the Spanish village at San Luis, FL. Number of specimens: 1.

Type 55 (IIb65): Cobalt Blue with Red Stripes (Plate 5-B): Type 55 beads are translucent cobalt blue (2.9PB 4/10, 2.8PB 3/8, 2.2PB 2/6) spherical, decorated with three longitudinal red (5.1R 3/10, 3.8R 4/9) stripes. This type measures 4.76 mm to 7.99 mm in diameter and 4.51 mm to 5.35 mm in length. It is similar to Kidd and Kidd number IIb65, which has two red stripes. Number of specimens: 17.

Type 56 (IIb56): Turquoise Blue with White Stripes (Plate 5-C): Type 56 beads are opaque turquoise blue (4.6B 6/8, 4.5B 6/5, 4.7B 4/5) with three longitudinal white stripes. Type 56 is similar to Ichtucknee Plain in color and diaphaneity, and, like Ichtuknee Plain beads, has longitudinal "spun sugar striations" or distinctive longitudinal bubbles. Many have developed a thin white patina, which in some specimens has an iridescent sheen. The beads in this type are generally spherical, although a few examples are ring and oval shaped, and three specimens are bilobed from the *a speo* process. They range in diameter from 4.76 to 14.99 mm and in length from 2.51 to 13.00 mm. Smith (1983: 153) reports that this type has been recovered from: Goodnow Mound, FL; Bradford Ferry, AL; San Francisco de Potano, FL; Cooper Farm, AL; Apalachee Missions, FL. Number of specimens: 119.

Type 57 (IIb): Green with White Stripes (Plate 5-D): Type 57 consists of transparent green (6.6G 3/5, 6.3G 5/5) beads decorated with three longitudinal white stripes. The stripes differ from those of other complex beads in that they are not flush with the surface of the bead, but slightly lower. This type is spherical and measures from 4.76 to 7.99 mm in diameter and from 4.51 to 5.35 mm in length. No exact comparisons could be found in the available literature. Smith's (1992a: 110) Type 16 from the Council House at San Luis, FL is a transparent green bead with eight longitudinal white stripes. Number of specimens: 2.

Type 58 (IIbb27): Cobalt Blue with Red on White Stripes (Plate 5-E): Type 58 beads are translucent cobalt blue (2.9PB 4/10, 2.8PB 3/8) decorated with three red (5.1R 3/10) on white stripes. The width of the stripes varies from bead to bead. This type is primarily spherical, though one specimen is barrel shaped and another is conjoined from the *a speo* process. The beads range in size from 4.76 to 7.99 mm in diameter and from 4.51 to 5.35 mm in length. The single barrel shaped specimen measures 17.35 mm in length.

These beads are widely reported in the literature. Karklins (1993: 34) illustrates two beads from 17th-century Seneca sites that match Type 58, and identifies them as good examples of *a speo* treated beads. Deagan (1987: 167) illustrates "translucent heat altered cane beads with narrow red stripes over broad white stripes." "Spherical Blue with Red on White Stripes" are also reported from Fountain of Youth Park, St. Augustine (Deagan, 1987: 172). Smith (1983: 149) illustrates a "Simple 'Tumbled'; Compound Stripes (IIbb)" from Terrapin Creek, AL. Beads of the same type are also reported from 8Sa36, FL; 1Ce308, AL; Philip Mound, FL. (Smith, 1983: 153). Number of specimens: 70 (whole and fragmented).

Type 59 (IIb): Manganese Black with White Band (Plate 5-F): Type 59 is an opaque manganese black (3.9R 1/2) bead decorated with a white latitudinal band around the bead's circumference. The beads are spherical and measure 6.67–6.90 mm in diameter and 6.23–6.27 mm in length. No comparisons were found in the available literature. Number of specimens: 2.

Type 60 (IIb10, IIb11): Ichtucknee Inlaid Black (Plate 5-G): Type 60, commonly known as Ichtucknee Inlaid Blacks, are opaque manganese black (3.9R 1/2, 24) beads originally decorated with three longitudinal white inlays. All but two of the specimens (28.2/3497 and 28.2/3225) have the white inlays missing, leaving empty cavities on the surface of the beads. Two fragments have longitudinal, spiral stripes, also missing inlays. The beads range from spherical to oval to barrel in shape and range from 4.76 to 14.99 mm in diameter and from 5.35 to 15.0 mm in length.

Ichtucknee Inlaid Black beads have been found at numerous sites in the Southeast (Smith, 1992a: 110). Goggin (n.d.: 34) was the first to identify the type and to note its presence at Spanish period sites; he dated Ichtucknee Inlaid Black to the late 16th and early 17th centuries. Mitchem (1992: 253) describes an atypical Ichtucknee Inlaid Black recovered from the San Luis church midden, which had three spiral stripes on the exterior (Mitchem, 1992: 253). An Ichtucknee Inlaid Black with one stripe was also recovered from the Spanish Village of San Luis de Talamali (Mitchem, 1991b: 5). Smith's Type 17 from the *San Luis* Council House is an Ichtuknee Inlaid Black with three longitudinal stripes, which corresponds to the majority of Ichtuknee Inlaid Blacks in the Mission Santa Catalina de Guale collection (Smith, 1992a: 110). Number of specimens: 22 (whole and fragmentary).

Type 61 (IIb): White with Red and Blue Stripes (Plate 5-H): Type 61 is an opaque white (2.5PB 10/0) bead decorated by two broad, longitudinal red (4.0R 3/7) stripes on one hemisphere, and two slender, longitudinal blue (2.9PB 4/10) stripes on the other hemisphere. The blue stripes are grouped more closely together than are the red stripes. The bead is oval and measures 5.30 mm in diameter and 8.50 mm in length. Kidd and Kidd (1970) number IIb32, which has alternating blue and red stripes, is not a perfect match, but it is the closest parallel that could be found. Number of specimens: 1.

Type 62 (IIb): Clear with Single Opaque White Stripe (Plate 5-I): Type 62 is a transparent, clear to slightly yellow-white (4.5Y 9/1) bead with a single longitudinal opaque white (2.5PB 10/0) stripe. This bead is oval and measures 4.76 mm to 7.99 mm in diameter and 4.51 mm to 5.35 mm in length. Number of specimens: 1.

Type 63 (IIb23): White with Black Stripes (Plate 5-J): Type 63 is an opaque white (2.5PB 10/0) bead fragment decorated with two longitudinal black (N 1/0) stripes. The fragment that represents this type is exactly half a bead. Since the stripes are evenly arranged, this type (when intact) would have had four longitudinal black stripes. The bead is spherical and measures 5.20 mm in diameter and 5.75 mm in length. Number of specimens: 1 (fragmentary).

Type 64 (IIg, IIh1): Turquoise Blue Eye Bead with Three Stars (Plate 6-A): Type 64 beads are large opaque turquoise blue (4.6B 6/8, 4.9B 5/8) decorated with three inlaid reddish-brown (9.0R 3/5), white, and purplish-blue (7.8PB 2/12) "stars." While each "star" varies in size and pattern, they are all of the same compound construction with the reddish brown component over the white layer, which in turn overlies the purplish blue layer. Except for decoration, these beads are visually identical to Ichtucknee Plain (Type 18) specimens. The bead is spherical and ranges from 8.00 mm to 14.99 mm in diameter and from 5.35 mm to 9.00 mm in length. This type is similar to Kidd and Kidd (1970) number IIg3—a white bead with "3 Redwood Stars on White Dots on Brite Blue Dots." While the color of the bead does not match Type 64, the description of the "Redwood Stars" does match the Type 64 decoration. Smith (1983: 149) illustrates an Eye Bead, from Bradford Ferry, AL, which appears to correspond exactly to Type 64. Number of specimens: 25.

Type 65 (IIg): Turquoise Blue Eye Bead with Three Stars and White Stripes (Plate 6-B): Type 65 beads are opaque turquoise blue (4.6B 6/8, 4.9B 5/8) spherical with three inlaid reddish brown (9.0R 3/5), white, and purplish blue (7.8PB 2/12) "stars" and two bands of double, longitudinal white stripes. Type 65 is virtually identical to Type 64 with the addition of the longitudinal white stripes. This type ranges from 8.00 mm to 14.99 mm in diameter and from 5.35 mm to 9.0 mm in length. No exact comparisons could be found. Number of specimens: 4.

Type 66 (IIg): Cobalt Blue Eye Bead with One Star (Plate 6-C): Type 66 is a transparent cobalt blue (2.9PB 4/10, 2.8PB 3/8) bead decorated with one reddish brown (9.0R 3/5) and white "star" on a layer of purplish-blue (7.8PB 2/12) glass. The "star" is similar to those seen on Types 64 and 65, but does not appear fully embedded in the glass. Two additional patches of purplish blue glass are present on the bead and may at one time have had "stars" on top of them. The bead is spherical and measures 8.93 mm in diameter and 9.66 mm in length. No exact comparisons could be found in the available literature. Number of specimens: 1.

Type 67 (IIg4): White Eye Bead with Blue and White Eyes (Plate 6-D): Type 67 is an opaque, grayish white bead decorated with four cobalt blue (7.8PB 2/13, 7.8PB 2/8) eyes. One blue eye has one white dot and another has two white dots. This bead is oval and measures 7.60 mm in diameter and 8.03 mm in length. Smith (1983: 149) illustrates an Eye Bead from Bradford Ferry, AL that appears to be an exact match with Type 67. Number of specimens: 1.

Type 68 (IIg): White Eye Bead with Cobalt Blue and Brown Inlays (Plate 6-E): Type 68 is an opaque spherical white bead decorated with three reddish brown (9.0R 3/5) on cobalt blue (1.5PB 8/3) inlaid "eyes." This bead measures 6.80 mm in diameter and 6.70 mm in length. The cobalt blue component of the eyes has eroded to such an extent that each eye has become a shallow depression, with small reddish brown dots still intact in the center. Cobalt blue glass is still present at the margins of the eyes. No comparisons to this type of Flush Eye Bead could be found in the available literature. Number of specimens: 1.

Type 69 (IVa): Clear with Gilded Perforation (Plate 6-F): Type 69 beads are transparent and colorless with gilded yellow perforations (4.4Y 9/9, 3.7Y 7/9). The perforations seem to be gilded with an applique that forms a distinct layer over the glass. It is possible that the yellow layer is simply a form of patina and not related to the manufacture of the beads. The type includes an oval and a barrel shaped specimen, which measure 5.00 to 6.00 mm in diameter and 6.20 to 6.96 mm in length. Number of specimens: 2.

DRAWN GLASS BEADS OF COMPOSITE CONSTRUCTION

A Speo Finished Composite Beads

Type 70 (IIb18): Gooseberry (Plate 6-G): The Gooseberry is a transparent bead with 10–14 internal, longitudinal white stripes between two layers of clear glass. The St. Catherines specimens range from slightly grayish greenish-yellow (9.0Y 7/4), to near colorless. They are all spherical with the exception of two that are irregular rings. The beads range from 3.51 to 7.99 mm in diameter and from 2.51 to 7.0 mm in length. Many specimens have chalky yellow (4.7Y 9/4) patinas on the surface. Although this bead is often reported as Kidd and Kidd (1970) number IIb18, as a composite bead, it more properly belongs in the IVb group. Smith (1983: 153) notes the presence of Gooseberries at a number of sites in the Southeast: Apalachee Missions, FL; San Francisco de Potano, FL; 9GE948, GA; Bradford Ferry, AL; Curiosity Hammock, FL; Fountain of Youth Park, FL; Goodnow, FL; Terrapin Creek, AL; Philip Mound, FL; Seven Oaks, FL; Ft. Center, FL; and Weeki Wachee, FL. Number of specimens: 261.

Type 71 (IVb): White over Pale Blue with Blue Stripes (Plate 6-H): Type 71 is an opaque spherical bead with six longitudinal blue (3.0PB 4/7) stripes. The interior of the bead is opaque pale blue (9.2B 9/1) and the outer layer is opaque white (2.5PB 10/0). The stripes appear to be slightly raised above the surface of the bead. This may be caused by erosion of the surface, as the bead is pitted and very weathered. It is 6.54 mm in diameter and 4.91 mm in length. No exact comparisons could be found in the available literature. Number of specimens: 1

Type 72 (IVbb): Opaque Blue over Transparent Blue with Red on White Stripes (Plate 6-I): Type 72 is an opaque two-layered bead. It consists of a cobalt blue (2.9PB 4/10, 2.8PB 3/8) layer over a transparent blue (2.9PB 4/10, 2.8PB 3/8) core, decorated with three red (5.1R 3/10) on white stripes. This oval shaped bead measures 4.12 mm in diameter and 4.18

mm in length. We know of no parallels with a similar composite construction. Number of specimens: 1.

Type 73 (IVb): Red Striped Gooseberries (Plate 6-J): Type 73 is a three-layered opaque white bead with 5–7 longitudinal red (6.5R 2/8) stripes. The core is transparent and colorless; the second layer is opaque white. A third layer, a clear coat, overlies the red stripes. These beads are ring shaped and range from 2.60 to 4.75 mm in diameter and from less than 2.51 mm to 4.50 mm in length. No perfect parallels have been identified, though Brain (1981) reports a somewhat similar bead from the Tunica Treasure, variety IVb8, and Burke (1938: 54) also reports a similar bead from Alabama. Number of specimens: 102.

Type 74 (IVb): Olive Green with White Stripes (Plate 6-K): Type 74 is a transparent olive green (7.6Y 4/5) spherical bead with nine longitudinal white (2.5PB 10/0) stripes. Two distinct patches of a thin colorless veneer suggest that, at one time, the entire bead was covered with a clear coat. One of the nine longitudinal stripes is irregular; a hairline fracture appears to split the stripe into two slightly offset bands. Two thin, longitudinal, red (6.5R 2/8) stripes in the interior of the bead run parallel to one of the white stripes. Presumably these red stripes are the result of some impurities present in the glass at the time of the beads' manufacture. The bead is 9.10 mm in diameter and 7.90 mm in length. While no exact comparisons could be found in the available literature, Smith's Type 16 from the San Luis Council House appears to be close (Smith, 1992a: 110). He describes a drawn transparent green bead with eight longitudinal white stripes, but does not note the presence of a clear coat (see also chap. 7, this volume). Number of specimens: 1.

WOUND GLASS BEADS

Group WI Beads

Type 75 (WIb, WId): Wound Translucent-Transparent Green (Plate 7-A): Type 75 beads are spherical and ring shaped, composed of transparent to translucent green (5.8G 4/9) glass. The beads measure 3.51–7.99 mm in diameter and 2.51–5.35 mm in length. Number of specimens: 4.

Type 76 (WIc6): Wound Yellow-Brown (Plate 7-B): Type 76 are transparent yellow-brown (4.6YR 4/8, 8.6YR 6/12, 9.3YR 6/8, 8.8YR 5/9) olive-shaped beads. They measure 4.76–7.99 mm in diameter and are greater than 5.35 mm in length. This type appears similar to #101 reported by Smith and Good (1982). Number of specimens: 36.

Type 77 (WIb): Wound Gray-Greenish Yellow (Plate 7-C): Type 77 is a transparent, gray-greenish yellow (9.5Y 7/7, 9.0Y 7/4) spherical bead. Two faint impressions indicate that the specimen may have been faceted. Copper wire is present in the perforation of the bead. It measures 4.43 mm in diameter and 4.33 mm in length. Number of specimens: 1.

Type 78 (WIc1): Barleycorn (Plate 7-D): Type 78, a Barleycorn, is an opaque white (2.5PB 10/0) oval bead. Latitudinal striations are prominent on the surface. This bead is 6.88 mm in diameter and 10.78 mm in length. Number of specimens: 1.

Type 79 (WI): Wound Transparent Yellow (Plate 7-E): Type 79 beads are transparent yellow (9.1YR 7/12, 4.4Y 9/9, 3.7Y 7/9, 4.3Y 9/7, 4.4Y 7/4) spherical, barrel, and oval-shaped. Most specimens are highly weathered. They measure 2.60–7.99 mm in diameter and from less than 2.51 mm to greater than 9.00 mm in length. Number of specimens: 27.

Type 80 (WId): Wound Colorless (Plate 7-F): Type 80 specimens are transparent, colorless, ring shaped beads. They measure 5.21–6.41 mm in diameter and 2.67 mm in length. The beads are much deteriorated. Number of specimens: 2.

Type 81 (WId3): Wound Turquoise (Plate 7-G): Type 81 beads are opaque, ring shaped, turquoise blue (4.6B 6/8, 4.9B 5/8) wound. The specimens are heavily weathered and range from 4.76 to 7.99 mm in diameter and from 2.51 to 4.50 mm in length. Number of specimens: 3.

Type 82 (WId): Wound Blue-Green (Plate 7-H): Type 82 is a transparent, irregular ring shaped blue-green (4.6BG 7/5, 4.6BG 5/5) bead. The type ranges from 3.51 to 4.75 mm in diameter and from 5.35 to 7.00 mm in length. Number of specimens: 2.

Type 83 (WId): Wound Manganese Violet (Plate 7-I): Type 83 is a transparent manganese violet (4.2R 1/5 2.9R 3/2, 3.9R 1/2) ring shaped bead. The bead measures 3.51 mm to 4.75 mm in diameter and 2.51 mm to 4.50 mm in length. Type 83 is very similar to Type 94 Faceted Manganese Violet. Number of specimens: 1.

Type 84 (WId): Wound Green (Plate 7-J): Type 84 beads are translucent green (6.3G 5/5) rings. They measure 4.76–7.99 mm in diameter and less than 2.51 mm in length. Number of specimens: 3.

Type 85 (WId1): Wound Yellow (Plate 7-K): Type 85 is a transparent yellow-orange (9.1YR 7/12, 4.4Y 9/9, 3.7Y 7/9), heavily weathered, ring measuring 4.85 mm in diameter and 1.34 mm in length. Number of specimens: 2.

Type 86 (WId1): Wound Yellow Ring (Plate 7-L): Type 86 beads are transparent yellow-orange (9.1YR 7/12, 4.4Y 9/9, 3.7Y 7/9) and ring shaped. The type measures 1.86 mm to 2.20 mm in diameter and 1.10 mm to 1.15 mm in length. This type is differentiated from Type 85 by its much smaller size. Number of specimens: 2.

Type 87 (WId): Wound Manganese Black Ring (Plate 7-M): Type 87 is a translucent, manganese black (3.9R 1/2, 2.0R 1/1) ring shaped bead. It measures 5.20 mm in diameter and 1.50 mm in length. Number of specimens: 1.

Type 88 (WId): Wound White Ring (Plate 7-N): Type 88 is an opaque white (2.5PB 10/0) ring shaped bead. The specimen is extremely weathered; and the surface of the bead is extremely pitted. It measures 3.70 mm in diameter and 1.02 mm in length. Number of specimens: 1.

Type 89 (WI): Wound Deep Green (Plate 8-I): Type 89 is a translucent deep-green (6.6G 3/5, 8.0G 2/3) spherical bead fragment. The surface of the bead is extremely weathered, and the body is fractured and appears almost vitrified. The single specimen measures 9.93 mm in diameter and has no intact length. Number of specimens: 1.

Group WII Beads

Type 90 (WIIe2): Yellow Melon (Plate 8-B): Type 90 is a translucent yellow (4.4Y 9/9, 3.7Y 7/9) melon shaped bead. The bead has six "lobes," two of which are decorated with two smaller, parallel incisions. The bead measures 5.81 mm in diameter and 5.16 mm in length. Number of specimens: 1.

Type 91 (WII): Wound Orange-Brown Faceted (Plate 8-C): Type 91 beads are orange-brown (4.1YR 5/8, 4.6YR 4/8) faceted fragments of varying shape and size. The beads are very weathered. Number of specimens: 39.

Type 92 (WII): Wound Green Faceted Teardrop (Plate 8-D): Type 92 is a green (5.1G 3/8, 6.6G 3/5) faceted, teardrop shaped bead. Six small facets at the wider end of the "teardrop" offset four larger facets that run the length of the bead. The bead measures 17.80 mm in length and 7.90 mm in diameter. Number of specimens: 1.

Type 93 (WII): Ruby Red Faceted (Plate 8-E): Type 93 beads are translucent "Ruby Red," or red-orange (4.0R 3/7, 9.8R 5/15, 9.2R 4/12) faceted bicones. Each specimen is impressed with two rows of six facets. The beads measure 2.60–3.50 mm in diameter and 2.51–4.50 mm in length. Number of specimens: 3.

Type 94 (WII): Wound Manganese Violet Faceted (Plate 8-F): Type 94 beads are transparent manganese violet (2.9R 3/2), faceted and barrel-shaped. The facets are irregular, impressed without any discernable pattern, and vary in number from seven to ten. The beads measure 3.51 mm to 4.75 mm in diameter and from 2.51 mm to 4.50 mm in length. Fifty-seven specimens are double beads (5.35–7.0 mm in length), and one specimen is a triple bead (2.60 mm-3.50 mm in diameter and 11.1 mm-13.0 mm in length). This type appears to match #118 reported by Smith and Good (1982). Number of specimens: 1136.

Type 95 (WII): Wound Incised Green (Plate 8-G): Type 95, represented by three fragments of one bead, is wound, transparent green (6.2G 7/8), and incised. Three distinct circular incisions form raised "eyes" on each of the fragments. The bead's surface is highly polished. Number of specimens: 3 fragments (all from one bead).

Group WIII Beads

Type 96 (WIII): Pale Green Core, Yellow-Green Exterior (Plate 8-A): Type 96 is composed of three layers: a yellow-green (0.5G 6/5) exterior and a pale green (7.3G 9/2) core sandwich a disintegrating yellow layer. The surface is highly weathered. This bead measures 7.55 mm in diameter and 2.94 mm in length. Number of specimens: 1.

Type 97 (WIII): Cobalt Blue with White Appliqué Dots (Plate 8-H): Type 97 is a highly distinctive wound, cobalt blue (1.6PB 6/9, 2.9PB 4/10, 2.8PB 3/8, 7.8PB 2/12) bead decorated with raised white (2.5PB 10/0) dots. Only bead fragments were recovered and these preclude analysis of shape or size. We know of no parallels. Number of specimens: 9.

Gilded Glass Beads

These beads are made of translucent pale green glass and gilded with gold. They differ in shape and incising.

Type 98: Spherical Gilded Glass Beads (Plate 9-A): Type 98 is spherical with no incising. Beads vary in diameter between 4.20 and 8.88 mm and in length between 3.90 and 8.49 mm. Number of specimens: 264.

Type 99: Oval Gilded Glass Beads (Plate 9-B): Type 99 is oval with no incising. Beads vary in diameter between 6.50 and 8.04 mm and in length from 9.52 to 13.12 mm. Number of specimens: 22.

Type 100: Ring Gilded Glass Beads (Plate 9-C): Type 100 is ring shaped with no incising. Beads vary in diameter between 2.71 and 4.25 mm and in length from 1.27 to 2.61 mm. Number of specimens: 46.

Type 101: Spherical Incised Gilded Glass Beads (Plate 9-D): Type 101 is spherical translucent green glass gilded with gold. The beads have 15 longitudinal lines incised into them. They vary in diameter from 5.25 to 6.84 mm, and in length from 4.10 to 6.54 mm. These beads have been referred to as Seven Oaks Gilded Molded (Goggin, n.d.: 33). For a full discussion of nomenclature and manufacturing techniques (including the use of the "comb") for Types 98–108, refer to Francis, chapter 10, this volume. Number of specimens: 30.

Type 102: Oval Spiral-Incised Gilded Glass Beads (Plate 9-E): Type 102 is an oval bead made of translucent green glass gilded with gold. These beads are made like those above but the lines were incised spirally. They vary in length from 9.29 to 12.55 mm and in diameter from 6.75 to 8.07 mm. Number of specimens: 26.

Type 103: Spherical Dash-Incised Gilded Glass Beads (Comb A) (Plate 9-F): Type 103 is a spherical bead made of translucent green glass gilded with gold. These beads have been decorated with nine incised longitudinal lines with alternating lines of incised dashes (Comb A). These five beads vary in diameter between 8.22 and 8.43 mm, and in length between 7.11 and 7.47 mm. Number of specimens: 5.

Type 104: Oval Dot-Incised Gilded Glass Beads (Comb A) (Plate 9-G): Type 104 is an oval bead made of translucent green glass gilded with gold. These beads have been decorated with 10 to 12 incised longitudinal lines with alternating lines of incised dots (Comb A). They range from 5.22 to 8.00 mm in diameter and from 9.25 to 11.34 mm in length. Number of specimens: 11.

Type 105: Spherical Dot-Incised Gilded Glass Beads (Comb A) (Plate 9-H): Type 105 is a spherical bead made of translucent green glass gilded with gold. These beads have been decorated with 12 to 13 incised longitudinal lines with alternating lines of incised dots (Comb A). The beads vary in diameter from 5.17 to 6.33 mm and in length from 5.08 to 5.36 mm. Number of specimens: 6.

Type 106: Oval Dot-Incised Gilded Glass Beads (Comb B) (Plate 9-I): Type 106 is an oval bead made of translucent green glass gilded with gold. These beads have been decorated with seven to eight incised longitudinal lines with alternating lines of incised dots (Comb B). They range from 4.00 to 6.03 mm in diameter and 7.91 to 10.60 mm in length. Number of specimens: 15.

Type 107: Spherical Dot-Incised Gilded Glass Beads (Comb B) (Plate 9-J): Type 107 is a spherical bead made of translucent green glass gilded with gold. These beads have been decorated with eight to nine incised longitudinal lines with alternating lines of incised dots (Comb B). The beads vary from 6.00 mm to 7.00 mm in diameter and from 5.00 to 6.00 mm in length. Number of specimens: 6.

Type 108: Fancy Double Spacer Tabulars (Plate 10-A): Type 108 is an ellipsoidal tabular bead composed of a translucent greenish glass, incised with dots (Comb A), gilded with gold, and decorated with one large black glass dot in the center of the bead and five to six small white glass dots paralleling the perforation. An ellipsoidal tabular bead is one which has been flattened and perforated through the long axis, with the flat side of the bead being ellipsoidal in shape. These beads are called spacers, specifically double spacers, because they have two parallel perforations and are designed to separate, or hold apart, two strings of beads. For a detailed discussion of the manufacturing technique of this bead see Francis (chap. 10, this volume). These beads range from 12.01 to 12.64 mm in diameter, from 9.41 to 10.00 mm in length, and from 4.75 to 5.07 mm in thickness. Number of specimens: 6.

Type 109: Glass Cross Variety 1 (Plate 10-B): Type 109 is a decorated glass cross composed of a thin cane of manganese black glass formed into an elongated figure-8, with an extended dumbbell shaped neck. The center was reinforced with a few more passages of the black cane creating a small platform with two loops at the ends. The cross is decorated with 5 small, flattened dots/discs of the black glass attached to the platform, three down the center and two at the sides of the central one, forming a cross. A thin cane of white glass is present in four short waves at the edges of the black discs, helping to reinforce the discs on the side. Two white dots were put on the outer edge of the side discs. A dot of light blue glass was placed at one end of each of the white waves on the side discs. The beads range from 12.90 to 21.30 mm in length, from 10.91 to 13.41 mm in width, and from 2.00 to 2.75 mm in thickness. Number of specimens: 5.

Type 110: Glass Cross Variety 2 (Plate 10-C): Type 110 is a decorated glass cross composed of a thin cane of manganese black glass formed into an elongated figure-8, with an extended neck–dumbbell shaped. This bead has a slightly longer platform than cross 109. Six black dots, flattened into discs, are grouped in triangles with the apex pointing at the loop at each end of the platform, leaving room in the center of the platform. At the center, a slightly larger, unflattened blue glass dot occurs as a rounded dome-shaped element. Around the base of the blue dome is a fibrous-looking "string" of gilded glass. Four white dots are at the outer junctures of the black discs, and two white dots are present at each outer side of the blue/gold-glass dome. Two blue dots are at the outer juncture of these latter white dots. The dimensions of the intact crosses are 18.12 mm to 20.77 mm in length, 9.61 mm to 13.00 mm in width, and 4.06 mm to 4.37 mm in thickness. Number of specimens: 2 (whole), 9 fragments (MNI: 6).

HOLLOW GLASS BEADS

Segmented

Type 111: Purplish Blue Bilobe (Trilobe) (Plate 10-D): Type 111 beads are segmented, transparent purplish blue (7.0PB 8/4, 6.9PB 3/4, 1.0 RP 6/1) bilobed beads. The scoring is u-shaped. One specimen is trilobed. The beads range from 2.60 to 4.75 mm in diameter and from 2.51 to 11.0 mm in length. Number of specimens: 36

Type 112: Transparent Colorless with Cinnabar (Plate 10-E): Type 112 beads are segmented, transparent, and colorless. The scoring is u-shaped. The type includes single-lobed, bilobed, and trilobed specimens. Many specimens have a red powder (2.1R 6/11) inside the perforation. Initial tests have revealed that this substance can be tentatively identified as cinnabar. The beads range from 3.51 to 7.99 mm in diameter and from 2.51 to 13.0 mm in length. Number of specimens: 449.

Type 113: White Opaque Segmented (Plate 10-F): Type 113 beads are segmented, opaque pale greenish yellow (9.5Y 9/4, 9.0Y 7/4) to white (2.5PB 10/0). The scoring of Type 113 is v-shaped, which results in spherical shaped lobes. The beads range from 3.51 to 4.75 mm in diameter and are greater than 5.35 mm in length. Number of specimens: 169.

Type 114: Transparent Colorless Faceted with Cinnabar (Plate 10-G): Type 114 beads are segmented, transparent, colorless, and faceted. They have between 15 and 18 regular facets, and the interior contains a red (2.1R 6/11) powder that has tentatively been identified as cinnabar. All specimens have one segment. The beads range from 8.00 mm to 14.99 mm in diameter and from 9.1 to 13.0 mm in length. Number of specimens: 5.

Type 115: Gold Glass Segmented (Plate 10-H): Type 115 gold glass segmented beads are collared white spheres with gold collars. They range in diameter from 4.76 to 7.99 and in length from 5.35 to 7.00 mm. The gold glass beads in the St. Catherines Island collection are highly patinated, forming a white crust over the beads. Gold glass beads have been well described in the literature (see especially Spaer, 1993; see also Francis, chap. 10, this volume). Number of specimens: 3.

Type 116: Green Bilobe (Plate 10-I): Type 116 beads are segmented, transparent green (6.0G 6/5, 6.3G 4/5), and bilobed with u-shaped scoring. The beads are 3.51–4.75 mm in diameter and greater than 5.35 mm in length. Number of specimens: 3.

Type 117: Green Ring (Plate 10-J): Type 117 beads are segmented, transparent green (5.8G 4/9) with collared ring. They are less than 2.60 mm in diameter and less than 2.51 mm in length. Number of specimens: 7.

Individually Blown Beads

Type 118: Transparent Colorless (Plate 11-A): Type 118 beads are blown, transparent, and colorless with reheated apertures and added tubes/caps similar to Type 119. The beads are very fragile and fragmentary. This bead may be similar to ones found at the Governor Martin site (Ewen and Hann, 1998: 86, fig. 5.17; Smith, 1989) and the Poarch Farm site (Langford, 1990: 139–140, 147–149; Ewen, 1990a: 88; 1998: 86; Smith, 2000: Plate 2, B)—both associated with the de Soto expedition. Number of specimens: 17.

Type 119: Black with Greenish Yellow Dots (Plate 11-B): Type 119 beads are blown, black (N

1/0), with 70–80 medium greenish yellow (9.5Y 7/7) dots applied to the exterior. The beads have reheated apertures and added tubes/caps. They are 8.00–14.99 mm in diameter and greater than 5.35 mm in length. There are no known parallels. Number of specimens: 13.

TYPE 120: BLUE BLOWN TEARDROP (PLATE 11-C): Type 120 is a blown, compound, teardrop-shaped bead. A fragmented outer layer of turquoise blue (4.5B 6/5) to blue-green (4.4BG 8/5, 4.6BG 7/5) lies over a layer of grayish-yellow (4.4Y 7/4). The bead measures between 8.00 mm and 14.99 mm in diameter and greater than 5.35 mm in length. Number of specimens: 2, with 10 fragments.

TYPE 121: BLOWN WHITE SPHERES (PLATE 11-D): Type 121 beads are small spherical blown white (25 PB 10/0) opaque glass. They range in size from 3.51 mm to 4.75 mm and in length from 2.51 mm to 4.50 mm. They have no pippet or collar. Number of specimens: 21.

TYPE 122: BLOWN BLUISH GREEN (PLATE 11-E): Type 122 is a compound blown bead consisting of four layers: a bluish-green layer (4.6BG 7/5) over a deep olive (8.9Y 2/3) layer over a core of yellow-white (4.5Y 9/1). The final inner layer is a twisted bluish green glass around the perforation linking all three outer layers. The beads measure 1.00–1.50 mm in diameter and 0.90–1.20 mm in length. Number of specimens: 9.

MOLDED GLASS BEADS

TYPE 123: RUBY RED MOLDED (PLATE 11-F): Type 123 is a molded, translucent deep red (5.0R 4/15, 5.1R 3/10) faceted bead. The facets were molded (not ground) and are regularly placed in 3 rows of 6. A mold seam bisects the bead longitudinally. The beads measure 8.00–14.99 mm in diameter and 5.35–7.0 mm in length. Number of specimens: 2.

NONGLASS BEADS

METAL BEADS

METAL BEAD (PLATE 11-G): The metal beads found on St. Catherines Island are all dissimilar. One is a copper alloy collared sphere strung on a short piece of wire. The bead measures 4.20 mm in diameter and 5.20 mm in length. Another is a ring shaped iron bead blank with a diameter of 14.22 mm and a length of 8.54 mm. A subspherical lead bead with an hourglass shaped perforation—measuring 5.78 mm in diameter and 3.76 mm in length—was the third variety. The final metal bead was a subspherical lead bead blank that was dimpled but not drilled. It measures 5.30 mm in diameter and 3.80 mm in length. Number of specimens: 4.

JET BEADS

JET VARIETY 1 (PLATE 12-A): Jet Variety 1 beads are spherical and have 20-25 facets each. Seven of these beads measure 6.26–9.53 mm in length and 8.28–9.67 mm in diameter. Four beads are smaller, only measuring 2.61–5.69 mm in length and 5.08–5.60 mm in diameter. The beads were drilled from a single side with a straight drill. Number of specimens: 11.

JET VARIETY 2 (PLATE 12-B): Jet Variety 2 beads are pentagonal and have 5-10 facets each. The beads range from 3.32 to 7.99 mm in length and from less than 2.51 mm to 6.70 mm in diameter. They were drilled from both sides with a tapered drill. Number of specimens: 304.

JET VARIETY 3 (PLATE 12-C): Jet Variety 3's are irregular hexagonal, lozenge shaped tabular beads. They measure 9.53–10.46 mm in length, 6.08–7.96 mm in diameter, and 2.64–3.89 mm in thickness. The beads were drilled from both sides with a tapered drill. Number of specimens: 4.

JET VARIETY 4 (PLATE 12-D): Jet Variety 4 beads are irregular, octagonal, tabular triple-spacers with 9-10 facets. They range from 10.89 to 13.73 mm in length, from 14.30 to 20.39 mm in diameter, and from 5.17 to 8.86 mm in thickness. The beads were drilled from both sides with a tapered drill. Number of specimens: 18.

JET VARIETY 5 (PLATE 12-E): Jet Variety 5 is a fragment of a bead or ornament incised with a leaf shaped object. It measures 9.82 mm in length. Number of specimens: 1.

JET VARIETY 6 (PLATE 12-F): Jet Variety 6 is a deteriorated pendant, possibly with an incised cross motif. It measures 27.02 mm in length, 22.16 mm in width, and 13.47 mm in thickness. Number of specimens: 1.

AMBER BEADS (PLATE 12-G)

The amber beads are made of a reddish orange (9.3R 4/9, 9.2R 4/12, 0.3YR 3/10) cloudy amber. They appear to be biconically drilled and are spherical to subspherical in shape. Both beads are quite large, measuring 17.14 mm and 27.00 mm in length, and 15.85 mm and 18.50 mm in diameter, respectively. Number of specimens: 2.

Carnelian Beads

Carnelian Variety 1 (Plate 12-H): Carnelian Variety 1 is a multifaceted, spherical, reddish orange bead. It measures 13.10 mm in diameter and 12.00 mm in length. Number of specimens: 1.

Carnelian Variety 2 (Plate 12-I): Carnelian Variety 2 beads are irregular discs and orange-red in color. They measure between 8.00 mm and 14.99 mm in diameter and 4.51 mm and 5.35 mm in length. Number of specimens: 3.

Cut Crystal Beads

Cut Crystal Variety 1 (Plate 12-J): Cut Crystal Variety 1 is a teardrop-shaped pendant with 12 facets—six facets form a pyramidal base and six other facets run the length of the pendant. It measures 15.5 mm in length. Number of specimens: 1.

Cut Crystal Variety 2 (Plate 12-K): Cut Crystal Variety 2 beads are faceted and subspherical in shape. Four specimens contain 4 rows with 6 facets each, while two specimens have 4 rows with 7 facets each. These beads are often referred to as “Florida Cut Crystals” in the Southeast (Goggin, n.d.: 26–30; see also Fairbanks, 1968: 13–16). These beads appear to match Wheeler’s (2000: 91, fig. 4.42) Florida Cut Crystal bead styles 4 and 5a. The beads measure 11.49–13.16 mm in diameter and 7.31–10.05 mm in length. Number of specimens: 6.

BEADS OF “LOCAL” MANUFACTURE

Shell Beads: Many shell beads from a variety of contexts have been found on St. Catherines Island. See chapter 12, chapter 15, figs. 15.3, 15.4, 15.5, 15.6, and appendices 1 and 4 for discussions of manufacture, distribution, and individual characteristics. Number of specimens: 851.

Pearls: The pearls found on St. Catherines Island include both drilled and undrilled specimens. See chapter 12, table 12.1, chapter 15, and appendix 1, for a discussion of the production, individual characteristics, and the distribution of these. Number of specimens: 16.

Bone Beads: The individual details of the bone beads found on St. Catherines Island are detailed in chapter 12, table 12.2. Many of the bone beads recovered from Mission Santa Catalina may be of European origin. The distribution of these beads is summarized in chapter 15 and appendix 1. Number of specimens: 12.

Wooden Beads: The wooden beads are very fragmentary and oval in shape. Four specimens are connected with a copper allow wire, while another two are joined with two links of a copper alloy chain. See chapter 15 and fig. 15.19 for additional information. Number of specimens: 7.

Antler Bead (Fig. 4.2): One antler bead preform (28.1/6277) was found at the Mission. The single preform was found still attached to the tine of antler, along with fragments of antler and a deer cranium. A line was incised entirely around the circumference, about 5 mm from the end of the tine. The line was enhanced until a small circle formed at the end. At this point, the maker attempted to drill a hole into the circle, before detaching the bead from the antler. The drill bit used to make the perforation broke the side out of the bead. The bead remains unfinished, still attached to the tine. See also figure 15.24.

Fig. 4.2. Deer antler bead preform (28.1/6277).

Beads of Unidentified Organic Material: These beads are fragmentary and the material of which they are composed could not be determined. Both are subspherical in shape. One has an hourglass perforation and measures 5.8 mm in diameter and 4.6 mm in length. The other is fragmentary. Number of specimens: 2.

Soft Stone Beads: A single bead made of burgundy soapstone was found on St. Catherines Island. This bead was spherical in shape and measured 5.50 mm in diameter and 5.18 mm in length. Number of specimens: 1.

NOTES

1. For detailed descriptions of these methods and the associated manufacturing guilds see chaps. 5, 6, and 7.

2. AMNH type numbers are followed by the closest Kidd and Kidd (1970) designation.

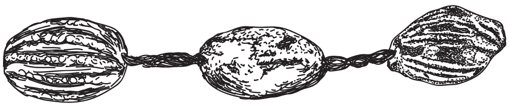
PART III
BEAD MANUFACTURE AND ORIGINS

BEAD MANUFACTURE AND ORIGINS

The third part of this monograph consists of 10 chapters that detail the present state of knowledge regarding the sources and manufacturing technology reflected in the St. Catherines Island bead assemblage.

In chapter 5, Lorann S. A. Pendleton and Peter Francis, Jr., introduce the overarching global perspective employed in this analysis, defining the nature of glass as a medium, delineating the centers of manufacturing, and describing the various manufacturing technologies evident in the beads recovered on St. Catherines Island.

Throughout the rest of Part III, the late Peter Francis, Jr., discusses the available evidence regarding bead manufacturing centers and worldwide trade, as reflected in the St. Catherines Island bead assemblage. He begins with the beads manufactured by the *Margariteri* and *Paternostri* guilds in Venice, France, and the Netherlands (chaps. 6–8), then moves to China, Spain, and additional likely manufacturing centers (chaps. 9–11). The final chapters in this section discuss beads made of shell, pearls, bone, jet, amber, crystal, and carnelian (chaps. 12–14).



CHAPTER 5
INTRODUCTION TO BEAD MANUFACTURE AND ORIGINS

Lorann S. A. Pendleton and Peter Francis, Jr.

As already discussed in chapter 2, the historical record is vague about the origins of the trade beads recorded on St. Catherines Island. Cargo lists, while supplying some information about beads as a generic category, provide scanty information about where the beads were manufactured before arriving in the New World. Rarely are points of manufacture delineated, and while it is tempting to assume that the beads were either Spanish or Venetian, several additional likely centers of manufacture include Italy, Flanders, Germany, and France during the 16th and 17th centuries. The following discussion provides a worldwide perspective for understanding the bead assemblage recovered on St. Catherines Island.

BEAD ORIGINS

Glass beads can be classified according to their inferred places of origin. The next three chapters address those beads manufactured by the "drawing" method, literally pulling out a long tube, cutting it into sections, and (usually) finishing or rounding off the cut segments. Four artisan guilds manufactured drawn beads: the *Margaritari* and the *Paternostri*, in Venice, Amsterdam, and France. The *Margaritari* (chap. 6, this volume) made mostly small beads (seed beads or *rocailles*), which were finished by stirring the cut segments over heat (*a ferrazza).* The *Paternostri* (chap. 7 and 8) made mostly larger, and often fancier, beads. The larger beads were finished either by grinding the edges or by reheating the bead by the *a speo* method ("by the spit" in Italian). *A speo* finished beads were mounted on a tool, or spit, with six or so tines grouped around a handle, which was twirled over a fire with beads mounted on the tines, to round off the beads. Two additional guild manufacturers of drawn beads, the Dutch and the French (chap. 8), also finished beads by the *a speo* method.

Drawn beads can be further subdivided. The *Margaritari* made small "seed beads" used for beadwork or embroidery. The nomenclature of the commercial seed bead industry is retained here for seed beads: *rocailles* are plain seed beads; *charlottes* are faceted *rocailles*; and bugles are tubular forms. These three groups are further subdivided according to standard bead terminology:[1] simple or plain; compound (made of two or more layers of glass); complex (with added decoration); and composite (with more than one layer of glass and added decorations). These same conventions are applied to the beads of the Venetian *Paternostri* and the beads believed to be made by the Dutch and the French.

The remaining glass beads are divided according to presumed source: China (chap. 9), Spain (chap. 10), and Bohemia (plus other unknown centers, chap. 11). The Spanish and Chinese made beads by winding and blowing, during the 16th and 17th centuries, usually by putting an iron rod (a mandrel) into a crucible of glass, heating in a furnace, and winding the bead from the batch. The Spanish often gilded their beads and also made some glass crosses outside of the furnace. A number of Spanish beads were made by segmenting, a process involving the heating of a small glass tube and rolling it over a mold to form pinches and bulges which were later cut apart as single or multiple beads. Segmenting is thought to be a Moorish technique and Spain apparently inherited the segmented bead industry from Egypt, likely before or just after the demise of the Egyptian glass bead industry in the 12th century, when Spain remained part of the Islamic world.

Only two beads from Bohemia (now in the Czech Republic) have been identified in the St. Catherines Island assemblage. This identification was determined by their color (red) and by the fact that they were molded. These are the earliest Bohemian glass beads thus far identified in the world.

Finally, there are a few glass beads, mostly wound, whose origins cannot be identified. As this is the oldest and historically the most common way to make glass beads, wound beads are often difficult to source, unless they are made of a particular glass or have some other unique characteristic. We also have some beads made by blowing, inflating the end of a tube held over a heat source. Several of these are rather spectacular, without known parallels, though similar work was carried out in France during the 16th and 17th centuries.

While all the glass beads were imports to St. Catherines Island, the beads made from organic materials and stones were probably manufactured both locally and imported. These are subdivided by material, with the locally made beads treated first and the imported ones afterwards. Part III contains separate chapters for locally made beads from organic materials (chap. 12), imported beads made from organic materials (chap. 13), and stone beads, both locally made and imported (chap. 14). Figure 5.1 shows the sources for the beads on St. Catherines Island.

GLASS

Glass is by far the most common bead material in the St. Catherines Island assemblage—accounting for 98.3% of the beads and six of the nine chapters describing the beads. Because the glass beadmakers of Venice are central to this story, accounting for two chapters and appearing in two other chapters (with Venetian stone beadmakers discussed in yet another chapter), additional background regarding the Venetian bead industry seems appropriate.

In practical terms, glass is usually viewed as a solid, but its ability to melt in stages is one trait that is critical to its use as a material for beads. Technically, glass is not a "material" at all, but rather a state of matter created when a metal or metalloid is melted and then cooled without being allowed to recrystallize. Virtually all metallic elements can be put into the glassy state, with glassy iron, glassy gold, and similar glassy metals used in a number of applications.

Natural glasses are also sometimes used as bead source material. Such natural glass is known from St. Catherines Island only in the form of fulgurites (sand fused by lightning strikes); all the glass artifacts in the St. Catherines Island assemblage are artificial.

All glass artifacts are based on silica, obtained as silicon dioxide (SiO_2), generally from sand. In addition to silica, glass contains a host of other elements, often as oxides. Older furnaces never attained enough heat to melt silica, so a flux,

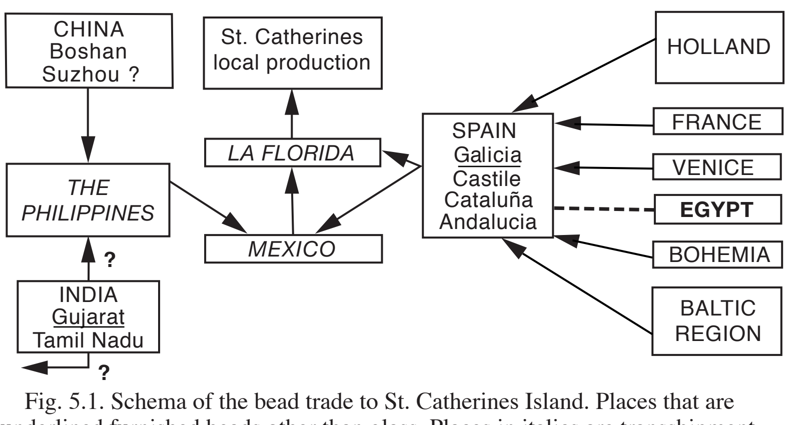


Fig. 5.1. Schema of the bead trade to St. Catherines Island. Places that are underlined furnished beads other than glass. Places in italics are transshipment locales; they did not furnish beads. Egypt is boldfaced and the dotted line to Andalucia indicates a beadmaking technique transfer rather than shipment of beads (after Francis, 2001b).

usually soda (NaO_2) or potash (KO), was added to lower the melting temperature. Lime (CaO) is also essential to stabilize the glass,[2] but this fact was apparently unknown to early glassmakers. Both Christopher Merret in his translation of Antonio Neri of 1662 and Haudricquet de Blancourt in 1697, for instance, advise against adding lime to a glass batch. Lime was apparently first used deliberately in glass manufacture during the early 19th century. Before that, lime was apparently an accidental inclusion with the sand (Turner, 1956b: 45T–47T).

Many other additions are found in glass beyond these three principal ingredients. Lead gives glass a certain sparkle, makes it easier to cut and melt, and helps dissolve certain colorants. Aluminum, manganese, magnesium, and iron are also common impurities (ranging to 1% or more). Iron and copper have long been used as colorants, imparting different colors depending upon the furnace (whether open, oxygenated, or reduced). Cobalt has been employed as a blue colorant since ancient times; even a tiny amount imparts a pleasing blue to glass. Newly made glass is usually a shade of translucent green ("bottle-green," from its use for that product) due to the admixture of iron. Color can be canceled out by the addition of a small amount of manganese (hence the name "glassmakers' soap"). Black glass is rarely opaque black; it is usually a very deep shade of green (from iron) or violet (from a large amount of manganese). Most black glass beads in the St. Catherines Island assemblage were colored with manganese. Tin was used almost exclusively as an opacifier from the 1st century A.D. until the late 17th century. These were the principal glass ingredients employed during the occupation of Mission Santa Catalina de Guale, before the rise of industrial and subsequent scientific glassmaking.

Many other trace elements are found in glass and once these are more fully understood, the task of pinpointing glass origins may be simplified. But today, many small-scale glass- and beadmakers recycle old glass (such as broken bottles), making the sourcing of glass much more difficult.

Glass was not made in the Americas until after European colonization and all glass beads in the St. Catherines Island assemblage were imported from Old World sources.

Drawn Beads

The majority of glass beads in the St. Catherines Island assemblage (94.7% of the collection) were formed by "drawing," a process developed (or adapted) in Venice about 1490, meaning that drawn Venetian beads were available for even the earliest European voyages of exploration.

To make drawn beads, a master took a gather of glass on an iron rod (*pontil*; punty in English), then formed the glass into a hollow cylinder. A cylindrical shape was achieved by rolling the gather on a heat-resistant surface (a *marver,* originally made of marble). The hollow in the interior was made in several ways. Blowing into the glass (in which case the punty was a blowpipe) is often suggested in the literature, but blowing a bubble into a substantial piece of glass is difficult. The best available references addressing Venetian beadmaking during the last century are Abbot Zanetti (1869: 38–39) and Dominique Bussolin (originally 1847, in Karklins and Adams, 1990: 70–71). These authorities do not speak of blowing, but rather of manipulating the glass with a punty or a pincer device that opened up inside the glass.

Once the gather was prepared, an assistant with a punty attached some cold glass to the distal end of the gather, then walked (or ran, depending on the desired diameter of the tube) down a gallery especially built for the operation. Other assistants cooled the tube as it reached the right diameter by fanning it with leather flaps. The elongated tube was rested on wooden bars set perpendicular to the tube on the floor.

The tubes were then passed to other workers who cut them into suitable sizes for the beads being produced. These segments were occasionally sold without further modification, but it was more common to finish them, so that they were not sharp on the ends. All European drawn beads (until the introduction of tube-drawing processes and machines beginning in the late 19th century) began with the process described above, with the final finishing of the beads becoming the trademark of various beadmakers.[3]

Beadmaking in Venice

About a century prior to the establishment of Mission Santa Catalina de Guale, somebody (or some group of people) figured out how to mass-produce glass beads. This invention, conceived within the Republic of Venice, would profoundly influence trading patterns around the globe and render life on St. Catherines Island a bit more colorful. Mass-produced beads were introduced just before the opening of the Age of Exploration and they accompanied virtually every explorer, missionary, and trader to the far corners of the world.

The Lagoon of Venice had been home to a glassmaking industry since the 7th century A.D. Furnaces had been established on the island of Torcello by that time to make bottles for wine produced by monks and small tiles to form mosaic decoration for Torcello Cathedral (Gasparetto, 1967; Tabaczynska, 1965). Rialto (the "high bank"), the heart of modern Venice, was founded in the late 6th or early 7th century (Ammerman et al., 1995), but only began to eclipse Torcello after the bones of St. Mark had been brought there from Alexandria in A.D. 823.

Documents from the late 10th century attest to the presence of *philolari* (or bottle makers) who also made mosaic tiles for San Marco Cathedral on Rialto (Gasparetto, 1960: 37). In 1291 the Senate decreed that glassmaking was too dangerous for the wooden structures of Rialto and ordered the furnaces to move to the island of Murano. This law was, at times, disobeyed (Hazlitt, 1915: 703), but most of the industry did indeed move to Murano, in part because this island was safer, but also because it was easier to police, as the government was attempting to monopolize this lucrative industry.

Murano was successful in attracting other glassmakers. By 1350, at least 60 of them from the Venetian-controlled Dalmatian coast and other parts of Italy had moved there, many apparently members of the Diaspora (Kurensky, 1991: 383). Venice favored its glassmakers; after 25 years of residence, an immigrant could become a citizen of one of the wealthiest cities in the world. The heirs of a glassmaker's daughter and her noble husband inherited his title and one could even purchase such a title, as did the famous Morelli family in 1686 for 100,000 ducats (Perrot, 1958: 21; Gasparetto, 1958: 189).

Venice worked hard to restrict glassmaking to Murano, or at least the Lagoon of Venice, but there were many incidents of glassmakers sneaking out to all parts of Italy and most of the rest of Europe (Francis, 1998a: 3–4). Some even went to the New World; Venetian glassmakers were imported to Jamestown, Virginia in 1621 (Harrington, 1952: 9), though their enterprise was unsuccessful. The first of several bead factories was established in the Netherlands in 1597 with the aid of Venetians smuggled out to Amsterdam (van der Sleen, 1973: 108; Karklins, 1974: 54–55; Baart, 1988: 67–69). Beads that are called "Venetian" in this discussion may, in some cases, actually have originated from these Dutch factories.

One cannot appreciate the history of Venetian glass beadmaking (and, by extension, the bead assemblage from St. Catherines Island) without an understanding of the guild system, then dominant across Europe. The first mention of glass beads in Venice occurs in 1268 (Gasparetto, 1958: 182). In 1308 the State Inquisition formed the *Arte de Margariteri*[4] (Beadmaker's Guild) and a second glass beadmakers' guild, the *Paternostri*, was founded in 1486. It is unclear what distinguished these two groups at the beginning, but an important distinction becomes clear later.

The founding of glass beadmaking guilds threatened the very existence of the *Arte Minuta* branch of the *Cristalleri* guild. The *Arte Minuta* had been organized in 1284 (Alcouffe, 1984b: 274). The *Cristalleri* worked hard stone into a variety of objects, while the *Arte Minuta* worked with small objects, such as beads (some of which may have come to St. Catherines). Competition was fierce between the stone cutters and glassmakers, though the glass beadmakers were nominally under the control of the *Cristalleri* until as late as 1604. By 1301, the stone cutters had lost their monopoly on the making of lenses (Perocco, 1984: 30). They passed rules and got the Senate and the Inquisition to pass laws restricting false gem making (Gasparetto, 1958: 184; Morazzoni and Pasquato, 1953: 22).

But this was to no avail. On 17 February 1510, the *Capitolo dell'Arte*, the governing board of all guilds in Venice, announced their support of the glass beadmakers. So firm was this decision that Astone Gasparetto (1958: 185–186), the dean of Venetian glass historians, wrote, "Rock crystal was dead and glass beads born."

Both the ordinance of the *Capitolo dell'Arte* and the rules (*marigola*) of the *Paternostri* spoke of a recent innovation. The ordinance says, "Newly discovered twenty years ago … an invention made by our glassmakers of Murano of pure canes of common *cristallo* and colors of diverse sorts…." (Gasperetto, 1958: 184). The *marigola* mentions, "other sorts of work newly discovered."

What was this new discovery? Both clear *cristallo* and colored glass had been around for a long time. However, another, fundamental element was listed in both sources: canes, drawn tubes of glass that could be turned into beads with a series of discrete steps performed by specialists. Glass tubes had been made around the Mediterranean for nearly 2 millennia, but they were apparently all rather short and were never finished in the way that Venice started finishing them around 1490.

This interpretation was offered more than 20 years ago (Francis, 1979c: 6) and apparently reached consensus, as it has never been questioned, nor has evidence emerged to refute it. In support of this argument is the fact that Venetians taught monks in southern Bohemia to make beads in 1486. The method they taught them was to dip an iron rod into molten glass in a furnace and twist a bead from the glass, the time-honored furnace-winding method (Jackson, 1927), not a drawn beadmaking method.

It remains to be learned how this invention was born,[5] but it can be viewed as the first step toward the Industrial Revolution, which was still rather far off in the future. The method requires a large factory where the glass is made and drawn into tubes as well as subsidiary workshops, often in workers' homes, to finish the beads. The result is a factory-and-cottage industry that could mass-produce glass beads just at the opening of the Age of Exploration. Given the timing, it is little wonder that Venice dominated the world's glass bead industry for centuries thereafter.

NOTES

1. The system that is now fairly standard, at least among American investigators, was first proposed by Duffield and Jelks (1961: 40-41), who used "compound" to refer to beads with two or more layers and "complex" as a bead with several layers and added decoration. Subsequently, Stone (1974: 88-89) retained "compound," redefined "complex" as having added decorations (but only one layer of glass), and named "composite" as having more than one layer and added decoration (see also Sprague, 1985: 90-91). Stone's system is retained here, however, I think it would have been easier had all three words not begun with "com-."

2. Otherwise, the glass could be dissolved in water, that is "water glass."

3. While sorting the bead assemblage from St. Catherines Island, the staff at the Archaeology Laboratory at the American Museum of Natural History often remarked that the ends of drawn beads had thin concentric lines on them. This is a result of the glass gather being wound concentrically from the furnace and then rolled on the marver to make it into a cylinder. Drawn beads whose original gathers were formed differently show different patterns on the ends. Thus, Indo-Pacific beads, whose gather was churned and stirred before being pulled out as a tube (Francis, 2001b: 22), show a swirling pattern on their ends. Modern drawn beads, which are made mechanically, show no patterns.

4. *Margariteri* is derived from the Greek and Latin words for "pearl," *margarite*, and by extension "bead."

5. The first bead industry to make a long, continuous tube, cut it, and heat the segments to round them off into beads was the Indo-Pacific industry, born in southeast India several centuries B.C. This industry spread to what are now recognized as at least 10 sites in six modern countries. Its principal product, small drawn glass beads, was the greatest trade bead, perhaps the greatest trade item of all times (Francis, 2001b: 19-50).

Before the introduction of machinery to facilitate many of the steps in the making of drawn beads, two comprehensive reports on Venetian beadmaking by Dominico (Dominque) Bussolin in 1847 (Karklins and Adams, 1990) and Abbot Zanetti in 1869 (Zanetti, 1869: 44-52) were written. Except for the drawing of the tube, which in the Indo-Pacific system is quite complicated, all the steps in Venice match, almost to the last detail, those being used in the village of Papanaidupet, Andhra Pradesh, India, the last of the Indo-Pacific beadmaking sites (Francis, 1998b: 8).

Is it too much to imagine that a Venetian, maybe even a glassmaker, visited India in the late 15th century? He may even have gone with the express purpose of discovering why the small Indo-Pacific beads were in such great demand along the East African Coast and elsewhere. Encountering the complexity of the *lada* method of drawing glass tubes, Venetians could have devised another method for this operation, with all the subsequent steps the Venetian traveler observed.

There is, of course, no proof that this happened and perhaps none will ever become known. It is, however, worth remembering that Europe has not always been the font of new ideas and India was one of the major centers of civilization for a long time.

CHAPTER 6
THE GLASS BEADS OF THE *MARGARITERI* OF VENICE

PETER FRANCIS, JR.

The *Margariteri* was the first and the most prolific glass beadmaking guild in Venice. Beads manufactured by the *Margariteri* outnumber all other types of beads in the St. Catherines Island assemblage. While the *Margariteri* produced some larger beads, their principal output was seed beads—small drawn glass beads commonly used in beadwork and also strung to hang at the neck, wrist, or elsewhere. Their production was for many centuries the backbone of the Venetian glass bead industry.[1]

SEED BEADS

Seed beads were made by drawing a long, thin tube to a length of up to 100 meters. The tube was then allowed to cool and cut into meter (yard) lengths. These were passed to a male worker who placed the tubes on a fixed blade and brought a handheld blade down onto them to chop them into segments approximately the length of the finished bead. These segments had sharp edges that were sometimes left as is to be sold as bugles, a form of seed bead.[2]

More commonly, however, the cut segments were further finished. In the 17th century, small segments to be made into seed beads were packed in ash or a mixture of lime and charcoal. This mixture prevented the beads from collapsing or adhering to each other when heated. The mixture was forced into the holes of segments by hand, then put into a copper pan over a fire. A worker with a paddle stirred them until they had melted slightly, rounding off their sharp edges[3]. When sufficiently rounded, the beads were screened, then shaken in a bag to remove the refractory material.

Beads were then separated by size using increasingly fine screens. The sorted beads were then polished by being shaken in a bag with sand and in another bag with bran. The finished beads were then strung by women using a dozen, or more, long, fine needles, passing them through the beads held in a flat basket, usually picking up several beads per needle per pass.

The above description has been compiled from 19th-century descriptions by Zanetti (1869) and Bussolin (Karklins and Adams, 1990). We do not know precisely which of these operations were used during the 17th century.

Achieving uniformity in the size of seed beads is a complex task; seed beads did not even approach uniformity until the mid-20th century (Francis, 1997b). Even today, the major seed beadmakers (including those using computer-controlled machines) print a line on their sample cards to the effect that, "variations in colors and sizes must be allowed" (by the purchaser).

It is unknown if the seed beads sent to St. Catherines Island were strung before being shipped or were shipped in bulk. Stringing has several advantages. It makes the beads easier to handle and to divide. It also adds value to them and produces revenue for the stringers (invariably women). No archaeological or historical evidence has survived to tell us in what state the beads arrived at St. Catherines Island.[4]

SEED BEADS: THE NAME

The term "seed bead" refers to small beads, usually of drawn glass finished by tumbling (or by the *a ferrazza* method[5]), that are commonly (but not exclusively) employed in beadwork. In

Venice, they were produced by the *Margariteri*. While several writers have opined that the English name comes from the replacement of seeds by glass beads, this is a false etymology, as it makes neither historical nor linguistic sense. It is very likely that the term was derived from "seed pearl," cited by the *Oxford English Dictionary* as early as 1553.

The French equivalent is *grain*, used as early as 1647 by Haudicquer de Blancourt: "*Tous nos merciers vendant cette rocaille qui son des grains jaune et verts*." (Barrelet, 1953: 166). That is, "All our tailors sell rocailles, which are yellow and green seed beads."

In English, the term "seed bead" has a long history, though not yet traced as far back as the French *grain*. In 1803, Ephraim Hart took out two advertisements in *The Daily Advertiser* of New York City, listing seed beads among his goods (Gottesman, 1965: 108, 347). In the same year an invoice of goods sold to the Lewis and Clark expedition by Israel Whelen of Philadelphia contains the term (Davis, 1972: 288). Joseph Corry (1968: 58), enumerating goods to carry to West Africa, recorded a British use of "seed bead" during his trip of 1805–1806. Hence, at least by the first decade of the 19th century the term was widely used on both sides of the Atlantic.

Given the use of the cognates "seed" in English, *grain* in French, *granos* in Italian, and occasionally *Körner* in German,[6] one wonders if *granos* might have been used in Spanish for these beads. In modern Spanish, the word for "bead" is usually *cuenta* or *abalorios*, while small beads are known as *chaquira*.[7] In only one instance is "bead" listed in an on-line Spanish dictionary (www.spanishdict.com) as a synonym for *grano* (grain).

Miguel de Cervantes Saavedra (Cervantes, 1547–1616) used the term *granos* on two occasions to refer to pearls as beads or perhaps to seed pearls. The author of *Don Quixote* (*Don Quijote*) was a contemporary of Shakespeare (they died in the same year) and at least as important to Spanish literature as Shakespeare was to English. He also was alive during the first two decades of Mission Santa Catalina de Guale.

The word *granos* appears twice in this way in *Don Quixote*[8] as the protagonist imagines that wheat grains can be turned into pearls. "'*Pues haz cuenta', dixo don Quixote, 'que los granos de aquel trigo eran granos de perlas ....'*" (Because a string [or line] of beads," said Don Quixote, "that are grains of wheat will become beads of pearls [or seed pearls] *...).*[9] "*Pero ya tengo yo dicho que aquel trigo ni era rubion ni trigo, sino granos de perlas orientales"* (But now I have to tell you that this wheat will not be rubies nor wheat, but only beads of oriental pearls).[10]

If *granos* was in general use in 16th-century Spanish for "seed bead," it might be that the reference was missed both by the person working for John Goggin and by Flores de Rodrígues (working for Isabel Kelly) in the archives of Seville (see chap. 2), having been mistaken for edible grains. That could explain why there are no references to these small beads in the published cargo lists, although they are quite evident on Spanish colonial sites.

Identifying Seed Beads

Seed beads are the only glass beads differentiated by size. The sizes of seed beads, however, present several problems for the beadmakers, for beadworkers, and for bead researchers. Researchers (and a very few beadmakers) measure the size of these beads in millimeters. But most beadmakers and beadworkers use a more arcane system, akin to that used for wires. A "null bead" (written as 0 or 1/0) is established as the basis for further measurement. While some recent beadmakers have selected 6.5 mm or 7 mm, most null beads are based on the measurement of a "line," one-twelfth of an inch, itself one-twelfth of a foot. Before the establishment of the metric system, the measurement of a foot differed in different countries.[11] Most, but not all beadmakers, chose two French lines as the size for the null bead, that being 4.512 mm.

Beads smaller than the null bead were initially figured at one-quarter, one-half, three-quarters, and so on of a line smaller, being designated 00, 000, 0000 or more commonly 2/0, 3/0, 4/0 (read as two-ought, three-ought, four-ought), and on down the line. In more recent times, the *difference* between each smaller bead was progressively smaller, so that beads as small as 16/0, 18/0, and 20/0 could be specified.

In practice, it is extremely difficult to turn out a batch of seed beads of all the same size. The major modern beadmakers go through many complex steps to try to come as close to achieving this as possible, and did not come remotely close until the 1920s (Francis, 1997b: 8). Thus, standards differ and actual sizes differ. As an example of this, table 6.1, detailing measurements of beads

TABLE 6.1
Sizes of Seed Beads on Sample Cards in Millimeters

Manufacturer, date of card	Null bead	5/0	8/0	11/0
Grübe, Germany, 1980s	7.0	4.0	3.0	2.2
Salvadori, France, 1930s	3.0[a]	–	–	–
Toho, Japan, 1970s	–	–	2.8	2.1
Miyuki, Japan 1990s	–	–	3.0	2.2
Jablonex,[b] Czech Republic, 1950s	–	4.6	3.1	2.4
Jablonex, Czech Republic, 1990s	–	4.3	3.1	2.1

[a]As listed on the card; in fact it is 2.8 mm.
[b]Jablonex is an exporter, not a manufacturer.

on sample cards, should demonstrate the problem (from Francis, 1997b: 7).

The problem for bead researchers, especially with a collection like that of St. Catherines Island, is deciding where to divide the size of seed beads. Students of later beadwork put the upper limit of size at 3.0 mm (Hail, 1980: 53) or even 2.0 mm (Duncan, 1989: 64). Duncan (1989: 64), however, concedes that "the no. 8 bead, slightly larger than 2 millimeters, is often called a 'large seed bead.'" As table 6.1 shows, the 8/0 bead is usually around 3.0 mm.

In the parlance of American beadworkers, a somewhat larger drawn and finished bead that preceded seed beads into the American interior are known as "pony beads," from the assumption that they were brought into the Great Plains and beyond on small horses. The sizes of such beads are said to be 3.5 mm (Duncan, 1989: 64), 3.5 to 4.0 mm (Hail, 1980: 53), or up to a quarter of an inch or 6.35 mm (Moss and Scherer, 1992: 105). This is not the forum to reconcile these differences. A few tenths of a millimeter or even a few millimeters would have made no difference to St. Catherines Islanders. During the days of Mission Santa Catalina de Guale, there was no standardization among seed beads in color, diameter, or length.

There is an additional difficulty with our data and it may serve as an object lesson for future researchers. The staff of the Archaeology Laboratory at the American Museum of Natural History, who performed the enormous task of measuring the beads, chose ranges of sizes.[12] The ranges for diameters began with <2.60 mm, 2.60–3.50 mm, and 3.50–4.75 mm. The next range was 4.76–7.99 mm. For our purposes, I am opting to set the upper limit for seed beads at the old size for the null bead, about 4.5 or even 5.0 mm. Some purists may object to this, but they should keep in mind that these small beads were not used for beadwork on St. Catherines Island.[13]

This limit overlaps the 4.76–7.99 mm range and for descriptive purposes, beads in this range that are similar to other beads clearly recognized as seed beads are included in the seed bead tables. Certainly a bead with a diameter of nearly 8.0 mm is not a seed bead, but in practice there are very few such beads in the 4.76–7.99 mm range and it is likely that most of them are toward the smaller end of the range.

Additionally, a large number of the bubble glass beads (chap. 8, this volume) easily fall within the range of seed beads, even if the highest range were 3.5 mm. As discussed in chapter 8, I believe these very common beads were made in France and that all of them were made by a *Paternostri* guild, as the beads are finished by the *a speo* method rather than having been stirred over heat. That alone is enough to exclude them from the class of seed beads. The small and large bubble glass beads are grouped together in chapter 8. This problem, while not unique to St. Catherines Island, does not arise for discussion by those who study more recent beadwork.

Finally, it is an almost futile exercise to try to identify precise shapes of seed beads. The ultimate shape of the bead depends on a variety of factors, which, before the introduction of automated machinery, were almost completely random. Tube segments will be longer or shorter depending on the positioning of the tubes by the man who cuts them. The final shape will be heavily influenced by the amount of heat used and the length of time employed for stirring the beads during the finishing process (the "R factor"[14]). Another variation, rarely recorded, happens when the tube is cut at one or two angles. In the first case, one end of the bead will be at an angle different from the end that is perpendicular to the sides. In the second case, the angles may be either parallel or set opposite to each other. By recording the diameter, length, R factor, and position of any angled cuts, one can reconstruct the shape of a bead, and this method is recommended for such small specimens if such precision is desired (Francis, 2002: 25–26).

Rocailles: [15]Although not widely used in the United States, seed beadmakers (at least the Italians, the French, the Czech, the Japanese and the Indians[16]) apply this term to the most common seed beads, the round ones. The term carries some status, and in the Czech context at least, it means a hard[17] glass made with a soda-potassium-lime formula.

The origin of the word is French, first used in the plural (*rocquailles*) in 1360 and in the singular in 1648. It initially referred to a mass of small stones or shells and was later extended to imitation surfaces decorated with small stones, such as with those found inside fabricated grottos used to contain the Stations of the Cross. During the Regency period and under Louis XV it described elaborate decoration on various surfaces. Both the French Academy and Victor Hugo used it as a synonym for "rococo" in the 1840s (Grand Larousse, 1977: 5233). Its extension to beads was most likely due to the tactile quality of beadwork. Its first use is in the passage cited above from Haudicquer de Blancourt.

Rocailles of Compound Construction[18]: In bead classification, the term "compound" refers to a bead made with more than one layer of glass. The term was apparently introduced by Duffield and Jelks (1961: 40). It is not a term glassmakers or glassworkers use; they speak of "cased" glass. The Venetians, at least the women who did the stringing, called beads with more than one layer "beads with a heart" (Ninni and Segatti, 1991: 76) hence the term "green heart" as used below. To make a compound tubular bead, the tube is prepared as detailed above, but before being marvered into a cylinder, the original gather is put into another crucible of a differently colored glass. One possible exception to this is with some green hearts.

Compound beads were especially popular in the 17th century (Francis, 1999a: 6). A favorite variety of this bead, both in the American (including the Southeast) and African contexts was a bead with a blue-white-blue construction (Francis, 1999b: 6). Curiously, it is not found in the St. Catherines Island assemblage.

The most famous of these beads is the green heart (opaque red over translucent green—or sometimes other colors—often with a clear coat on the surface). This bead was not popular on St. Catherines Island, where only seven (Type 41) were uncovered[19]. This lends credence to the idea that red beads in general were far more acceptable in the Northeast, while blue beads dominated in the Southeast (Smith, 1983: 151). Green hearts began around 1600 and in the American context were largely gone by the 1830s, though in Africa they were used somewhat later (Francis, 1999b: 6).

In the Northeast, green hearts replaced the popular plain opaque red bead and it has been suggested that the translucent green was a cheaper glass to produce than opaque red. While "bottle green" is the cheapest glass to produce, opaque red is not especially expensive, requiring only copper to make it (cuprous oxide crystals are suspended in the glass). However, opaque red requires a muffled (oxygen-starved) furnace. The red layer is quite thin on many green hearts, and we can speculate that the glass may have been prepared with copper in it and then at some stage placed in a muffled furnace just long enough for the surface to turn red.

The most numerous among the compound *rocailles* are opaque white with a clear coat and sometimes a clear core (Type 38), together numbering 6514 specimens. Clear coats were put on various colors, presumably to give them sheen. From around 1600 the Venetians used these combinations for most of their white beads (there are only 101 *rocailles* that are of simple construction (Type 15), continuing to do so until about 1870 (Francis, 1999a: 6). They also used clear glass over white in larger objects, such as a bowl made by Barbaria before 1818 (Neuwirth, 1993: 125). In East Africa, larger clear over white beads are called "crackled whites" because the white tends to crack under the clear coat (David Killick, 1989, personal commun.).

The most unusual beads of this group are those with clear cores and coats and a layer of translucent blue or green between them (Types 39 and 40). This is a large group at St.

Catherines Island, totaling 4155 beads, and as of yet they have no known parallels from elsewhere.

Rocailles of Complex Construction[20]: Duffield and Jelks (1961: 40–41), proposed using the term "complex" for beads with two or more layers and added decoration. Stone (1974: 88–89) redefined "complex" as beads with only one layer and added decorations, reserving "composite" for the beads with at least two layers and added decoration.

All the complex *rocailles* from St. Catherines Island are decorated with simple longitudinal lines. These would have been made by adding warm canes of the desired color along the sides of the glass cylinder. The cylinder would then have been marvered again to deeper impress the canes before it was drawn out into a tube. One bead (28.0/6706.0001; Type 49—cobalt blue with white stripes) shows that this was not always a smooth operation, as the stripes are not evenly spaced, but cluster on one hemisphere of the bead.

Charlottes:[21] Charlottes are seed beads that have one or a few facets ground into their sides. The origin of the name is obscure. Perhaps it comes from the French *charlot*, meaning "cart" as they must have been carted somewhere from Venice to be faceted.

The beads themselves are fine *rocailles*, made of hard (nonlead) glass. They are faceted by stringing them on a wire and pressing the resulting row against a grinding wheel. It usually takes several passes against the wheel to grind the facets successfully. The work is labor-intensive and, all things being equal, charlottes are the most expensive of the seed beads. The faceting operation is done to give the beads a "sparkle" as light hits the flat facets.[22]

Altmüller in 1841 wrote, "Venetian beads frequently go to Bohemia to be ground and faceted. This is even done with the finest knitting beads which also acquire their facets this way . . . and then become a new commercial article the two distant countries both have a part in." (Translated by and quoted in Neuwirth, 1994: 212.) The reason for shipping the beads is that water power is not available in the Lagoon of Venice, but plentiful in northern Bohemia. It is not known whether this was the practice in the 17th century. Alternative possible faceting centers in northern Italy could be Belluno or other towns along the Piave River or Treviso, where chevrons were apparently faceted in the 16th century (Dillon, 1907: 185–189). These towns were under Venetian control at an early date and they have abundant water power.

Charlottes are not often reported from early archaeological sites, perhaps because recovery techniques have only recently been improved to the point where they can be found. Smith et al. (1994: 38–39) reported that they constituted 16.2% of all beads found at Tipu, Belize, one of the largest groups of beads from the site, whose bead assemblage ranges from the 1540s to the early 17th century. They cited only three other sites where charlottes had been found, two of them with only one bead each. The excavators suggested that they might be good markers for the period 1540–1630. Marvin Smith (personal correspondence, 2000) still holds that view.

The 17th century was the apex of Venetian beadmaking (Gasparetto, 1958: 189), even though the Venetian empire was slowly crumbling. There does not seem to be anything in the history of Venice or Bohemia or of beadmaking in either place that would make 1630 a pivotal date. Why their production ceased is curious. Perhaps the Spanish just stopped importing charlottes because of their cost, as they seem to have stopped importing Nueva Cádiz and chevron beads several decades before their production ended. In any case, this date might tentatively be applied to the chronology of St. Catherines Island.

Simple Bugles[23]: This is the only seed bead name furnished by the English language, though its etymology is rather convoluted. The first dictionary entry of the word was published in 1632 in Cotgrave's French-English dictionary. The word *buisune* was defined as "pipe." The word, however, is Old French and means "trumpet" or "bugle." It was confused with the French word *buise*, which does mean pipe (Wiener, 1922: 248). (*Buise* is now spelled *buse* and used only in technical writing.)

The confusion in the English mind of pipe equaling trumpet, equaling bugle, however, predates the dictionary entry. Two of England's most famous 16th-century writers use the word to indicate the small glass tubular beads then being made in England as well as elsewhere. The first was Edmund Spenser in *The Shephaerdes Calender* (*The Shepherd's Calendar*), written in 1579. In the section on February, Cuddie says:

> But Phyllis is mine for many days
> I wonne her with a girdle of gilt,
> Embossed with buegle around the belt

The first edition was supplied with a glossary of terms in the extended poem with which English readers were presumed not to be familiar. "Belt" was glossed at the time (it also rhymed with "gilt"). But not so "buegle," which was presumably a word that was already in circulation.

Two decades later William Shakespeare also used the word. It is in *As You Like It* (III, v; 46–48), which was first staged in 1599:

> 'Tis not your inky brows, your black silk hair
> Your bugle eyeballs nor your cheeks of cream
> That can entame my spirits to your worship

The use of "bugle" here does not reflect the shape of the bead, but rather the dark green, nearly black color of these beads then being made in England (Thorpe, 1935: 119–120). Of course, bugles were also made in Venice and that is a much more likely source for those of the Spanish trade, given the politics of the day.

COMPOUND BUGLES: Only one type of this bead has been uncovered at St. Catherines Island, a green heart (Type 35). See the discussion above about compound *rocailles*.

COMPOUND SEGMENTS: These few beads (Type 34) are parts of a tube of seed-bead size, but were not finished by being stirred over heat. They are too short to be bugles, therefore are being listed separately. They may have been meant to be sold as beads or they may have been cut segments that were included with finished beads accidentally.

LARGER BEADS MADE BY THE *MARGARITERI*

These beads are really too large to be called "seed beads," but were made by being cut from a tube and stirred over heat to round them off. They form only a small group: three simple beads (Type 16) and six compound beads (Types 43-46). Type 46 (translucent orange-yellow or "amber" over opaque white over transparent green) is a most interesting bead with no known parallels.

NOTES

1. It ceased in Venice in 1992.

2. For a discussion of the etymology and use of this and other seed bead names see Francis, 1997a.

3. This is known as the *a ferrazza* method. [EHB]

4. The excavations at Berenike, Egypt, uncovered a number of short strings with small drawn Indo-Pacific beads (the seed beads of the day) attached to them, especially beginning in the 4th century. The beads were apparently from Mantai, Sri Lanka, and the strings were twisted in the Indian rather than the Western fashion. It appears that in this branch of the industry, at least, that beads were often or always strung before being sold.

5. This is an important distinction (see Karklins, 1993). [EHB]

6. In current German, the usual words for seed beads are *sprengperle* or *hackebissel* (*hackebissel* once indicated a different sort of bead), though in 1799 Joseph Schreyer wrote of *Körner oder Korallen* (seeds or corals) (Neuwirth, 1994: 177).

7. I am grateful to Ernesto Bravo-Núñez and Nuviea Garcia Urbano of the University of Zaragoza for this information and for their attempts to help me track down the older Spanish term for "seed bead."

8. I used the on-line version of *Complete Works of Miguel de Cervantes Editions* published by Rudolph Schevill and Adolfo Bonilla, Madrid: Gráficas Reunidas 1914–1944 found at http://www.csdl.tamu.edu/cervantes/english/ctxt/sb/

9. *Don Quijote* Reference Version Vol. 2, Chapter 31, p. 64; translation mine. See note 12.

10. *Don Quijote*, Reference version Vol. 3, Part 2, Chapter 32, p. 40; translation mine. See note 12.

11. In England and Russia it was 30.480 cm, in the Rhineland it was 37.664 cm, and in France it was 38.982 cm.

12. See A Personal Preface and chapter 4 (this volume), for a discussion of why size ranges were used for this analysis. [EHB]

13. This is not necessarily correct. There is some evidence of beadwork in the assemblage found with Individual 307 (see chapter 15, this volume). [EHB]

14. The "Roundness Factor." This is very difficult to quantify with such small beads. I record it in four steps. R0 is a bead segment that has not been subjected to finishing. R1 is a bead that has been subjected to finishing for a short while. The ends have run a little but the edges are only slightly beveled. R2 is a bead with a distinctly beveled edge, and R3 is a bead that has been rounded off (see Francis, 2002: 25–26).

15. While not discussed here, *rocailles* of simple construction include Types 4–15. [EHB]

16. The Chinese and the Taiwanese also make seed beads, but I am not sure if they employ this term.

17. As opposed to a soft glass made with some lead and commonly used for bugles (see below).

18. These are Types 37–42. [EHB]

19. In addition to the seven *rocailles* green hearts discussed here, five green heart bugles (Type 35) and 12 *a speo* finished green hearts (Type 47) (see Francis, this volume, chap. 5) were also recovered. [EHB]

20. This includes Types 49, 50, 51, and 52. [EHB]

21. These are Types 27, 28, and 29. [EHB]

22. Marvin Smith (2006, personal commun.) believes that the facets on charlottes are pressed rather than ground [EHB].

23. These are Types 1, 2, and 3. [EHB]

CHAPTER 7
THE GLASS BEADS OF THE *PATERNOSTRI* OF VENICE

PETER FRANCIS, JR.

The *Paternostri* Venetian beadmakers guild was founded in 1486. *Paternostri* is derived from the first two words of the prayer ordained by Jesus, beginning in English with, "Our Father." The Latin version begins *Pater noster*. This suggests that these beadmakers produced beads for rosaries, at least at the beginning.

The first rules (*marigola*) of the *Paternosteri* say that a master had to know how to make, "'*paternosteri' a rosetta,* di '*oldoni*,'[1] *di canne e di altera "sorte de lavori trovati nouvamente'*." (Gasparetto, 1958: 184) That is, "*paternosters*" of chevrons, "oldonis," canes and other "sorts of work newly discovered." Gasparetto evidently inserted *rosetta* (chevron), as it was clearly his understanding that those beads were what were meant by *paternostri*.

The products of the *Margariteri* and of the *Paternostri* guilds differ in several important respects, the first being the gross size of the beads. The *Margariteri* produced chiefly seed beads, and while there is some overlap in sizes, the *Paternostri* generally made larger beads. The chief difference between the two guilds was how the beads were finished. The *Margariteri* finished their beads "*a ferrazza*" (on an iron pan) by stirring them over heat, while the *Paternostri* finished beads "*a speo*" (by the spit) (Gasparetto, 1958: 186). Francis was the first to report this in English (Sprague, 1985: 91; Francis, 1979c: 8), but it was left to Karklins (1993) to uncover the details.

In the *a speo* method, segments cut from the drawn tube are mounted on a unique tool. This device has a round metal base held by a wooden handle. Six or so tines arranged evenly around the edge of the base rise perpendicularly from the base in the direction opposite the handle. Several glass tube segments are placed on each tine. The metal part of the tool and the segments are held in the fire and rotated by hand. The segments began to soften and assume a round bead shape.

If done correctly, the end product is a segment equal in length and diameter, a nicely rounded sphere. Often, however, the process was not quite so perfect, and beads finished *a speo* commonly are misshapen, have small "tails" at one or both ends, or other abnormalities. Karklins (1993: 30–34) lists eight such traits. It was not uncommon for two beads on the same tine to be fused partly or completely, and these were sold with other beads (1993: 30), as is demonstrated in the St. Catherines Island assemblage. Two beads on neighboring tines that fused side-by-side were not admitted into commerce unless one or both survived physical separation (1993: 32).

Early in their history, the *Paternostri* also finished beads in another way, by faceting the ends by grinding them against a flat wheel. We do not know who carried out this work. It could not have been done in Venice itself, because of the lack of water power. Some chevrons were apparently ground at Treviso, inland from Venice, near where, early in the 20th century, a large deposit of chevron bead fragments was found. Treviso is the nearest source of water power to Venice. The fragments were not melted, but apparently broken off from the beads (Dillon, 1907: 185–289). Chevrons (and Nueva Cádiz beads) could also have been faceted at other places in the Venetian Republic, as discussed in the section on charlottes (chap. 6, this volume). Whether the grinders were members of the *Paternostri* remains unknown.[2]

SIMPLE VENETIAN *PATERNOSTRI* BEADS

These are monochrome beads finished by the *a speo* method.[3]

COMPOUND VENETIAN *PATERNOSTRI* BEAD WITH A SQUARE SECTION: THE NUEVA CÁDIZ BEAD

The Nueva Cádiz bead is one of the most recognizable beads found on St. Catherines Island. The single specimen (28.0/9056.0761; Type 36) is fairly long (11.1 mm), in comparison to its diameter (6.18 mm corner to corner; 5.4 mm face to face).[4] It is square in cross section, has a dark blue core, a thin white coating, and an exterior coating of dark blue. The corners were faceted. This bead appears to match Smith and Good's (1982) #54 or #56. Many varieties of this bead are known in other contexts. They are found in a range of colors and color schemes. Some are solid, though most have three layers.[5] Some are striped, some are twisted, some are ground at the corners, some are smaller—like the one found on St. Catherines Island[6]—and others are of a larger variety.[7]

Goggin (n.d.: 22) had originally thought that Nueva Cádiz beads were made by drawing a glass tube through a square die. He apparently also considered that the tube was marvered square after being drawn (Fairbanks, 1968: 6). Discussions with Robert Brill and Paul Perrot at the Corning Museum of Glass convinced Fairbanks (1968) that it is far more likely that a squared gather was drawn out as a tube.

The bead is named after the first Spanish settlement in Venezuela, the town of Nueva Cádiz, on Cubagua Island off the coast of what was then called "Tierra Firme." The town was founded in 1515 by 300 settlers and had jurisdiction over the much larger Margarita Island to the north and the coast to the south. It quickly grew into one of the most prosperous cities in the Indies (Morón, 1964: 33–34). The island was totally barren, "this island had no water that could be drunk, nor trees nor beasts; for all is brackish except those hogs what have the navel in their backbone,[8] and some small conies [rabbits]…" (Herrera, 1906: 459; insertion mine). This desolate place, where even water was brought in from the mainland, was prosperous because it was in the middle of a very rich pearl bed (chap. 12, this volume). However, by 1543 the entire population moved to Margarita because Cubagua experienced an immense earthquake and the pearl beds had been exhausted (Herrera, 1906: 459–460; Morón, 1964: 34; Willis, 1980).

Schoolcraft first published Nueva Cádiz beads from a site at Beverly "twelve miles from Dundas, in Canada West." (Schoolcraft, 1851: 103) Dundas is a small town just south of Kingstown, Ontario.[9] Among the "four beads of opaque glass twisted" and "minor specimens of glass or enamel" (Schoolcraft, 1851: 104), two (nos. 10 and 13, plate 25) appear to be Nueva Cádiz beads, a blue plain one and a red twisted one,[10] respectively. The drawn and hand-painted plate, however, is a little difficult to interpret. The bead was subsequently published in other reports.

The excavation of Nueva Cádiz by the University of Florida uncovered a fair number of the beads, and John Goggin named them for the site. He listed 33 other Spanish colonial sites, including several unspecified ones, at which the beads had been found, noting that they were particularly common in Peru (Goggin, n.d: 7). Fairbanks (1968: 8) listed nine published references to the bead, including Schoolcraft's. Smith and Good's (1982) and Smith's (1983) work on Spanish colonial beads, including those from Peru, made them a crucial bead for the identification of Spanish influence during certain periods. These writers also mentioned the later occurrence of red beads (and red-cored blue beads) of this type in Huronia and Iroquoia (Ontario and New York).

It has long been agreed (Goggin, n.d.: 24; Smith and Good, 1982: 7–8, 10; Francis, 1986c: 37) that the "string of twisted glass beads packed in cotton scented with musk" (Diaz del Castillo, 1956: 71) given to Moctezuma by Cortéz was the twisted variety of Nueva Cádiz bead. Examples of these beads have been found in the Philippines[11] (Francis, 1989: 15, 30), which makes (Kelly, 1992: 139) a good case for Nueva Cádiz beads to have been called *diamantes* by the Spanish, due to their diamond-shaped cross sections. This helps explain the various historical references to diamonds and false diamonds as gifts from the Spanish. There are, in fact, records of *diamantes* shipped directly to Cubagua (Nueva Cádiz) in 1520 and 1532, one of which contained ten pounds of *diamantes* (Kelly, 1992: 144, 210).

The origin of the Nueva Cádiz beads has been debated for some time (Goggin, n.d. 6–7, 20;

Fairbanks, 1968: 8; Smith and Good, 1982: 12–15; Harris and Liu, 1982: 7–10). In general, while Goggin acknowledged the importance of Venetian beadmaking, he leaned toward a hypothesis that these and other beads found in Spanish colonial sites were made within a particular region of Spain. Goggin (n.d.: 7) wrote, "it is probable that the bulk of the beads found in New World Spanish sites were in fact made in Spain, very likely in Andalucia." He searched for evidence of beadmaking and examples of Nueva Cádiz beads in Spain; the closest he came to them were a few in Portuguese museums (Goggin, n.d.: 20).

Smith and Good (1982: 12–15) presented the most thorough discussion of this problem. They suggested that chemical analyses might help solve the problem, while stating that they might be inconclusive, as Venice often used Spanish alkalis. Analyses to date have not been helpful. In one study (Harris and Liu, 1982: 8) only 1 of 12 beads had more than a fraction of a percent of iron, 3 beads had no sodium, and only 1% (two beads) or 2% (one bead) of potassium. These are very low amounts of iron and alkalis for any glass. A more recent study (Veiga and Figueiredo, 2002: 300–304), of seven Nueva Cádiz excavated in Lisbon, was inconclusive.

Smith and Good (1982) also considered Amsterdam as a possible source of these beads, but no firm conclusion was made from the material published by Karklins (1974). They wrote, "The possibility that the beads discussed in this volume were made in Venice (or elsewhere) cannot be dismissed" (Smith and Good, 1982: 14).

The evidence is growing that Nueva Cádiz beads were made in Venice. Aside from the negative evidence in Spain and the importation (mostly by the French) into northeastern North America, there are other occurrences of this bead in places where the Spanish had no presence. One of these is Jamestown (Francis, 1996a; Lapham, 2001), where the English settlers were the sworn enemy of the Spanish. A second is Fustat (Old Cairo) (Francis, 2001a), where the Venetians had trading links while Spain did not. A third is Volémar, Madagascar (Thierry, 1961: 117–8; Vernier and Millot, 1971: 157); the beads may have been brought by either the Portuguese or Arab traders, but this was in Portugal's "half of the world" and not Spain's. In each of these places, as in many Spanish colonial sites, seven-layered chevrons, universally regarded as Venetian (chap. 8, this volume), are also found. Additionally, the "Treasure Room" of the Stuttgart Landesmuseum contains a fork and spoon set with beads on the handles, including a Nueva Cádiz plain and a Nueva Cádiz twisted bead. They are labeled "Italian, about 1600."

A final question regards the date at which the Nueva Cádiz bead disappeared from trade. Goggin (n.d.: 23–24) put their terminal date to "the 16th and, perhaps, the early part of the 17th century." The latest examples he cited were from Ste. Marie, Ontario, dated from 1639 to 1649; however, he believed they might be heirlooms, and they were red (Kidd, 1949: 142). Fairbanks (1968: 8, 12) agreed with that time period and suggested that the Canadian (and perhaps the New York) examples were made at a place different from the Spanish colonial ones, because the northeastern ones were of different colors.

Smith and Good (1982: 11) said that Nueva Cádiz beads were not common (in Spanish contexts) after 1560: "Apparently by this time, bead styles had changed significantly, and these long tubular Nueva Cádiz beads either were no longer popular, no longer available, or considered too expensive to be purchased for the Indian trade." Smith (1983: 148, 155) noted that the type was the first to drop out of circulation in the Southeast and put the end of its trade between 1550 and 1575, suggesting that the small blue ones may have lasted until 1600.

In her overview of Spanish colonial artifacts, Deagan (1987: 163; insertion mine) was a little more firm, "Beads of Spanish colonial Nueva Cádiz [type] occur only at sites with a pre-1550 occupancy." Most recently Smith et al. (1994: 41) wrote, "Any provenience that contains Nueva Cádiz beads probably predates 1550 or 1560," again making an exception for the small blue type.

As true as this may be for Spanish colonial sites, we now know this generalization does not hold everywhere. Aside from the examples from northeastern North America, there is the evidence at Jamestown. As of the end of the 1997 excavations, 61 Nueva Cádiz beads, both large and small, had been found, making up 18% of all beads excavated (Lapham, 2001; see also Francis, 1996a).[12] Nor were they some "new" or "other place" red variety; they were all some shade of blue.

The dating for the beads at Jamestown is quite firmly put between 1607 and 1610. It does not seem that they are heirlooms from an earlier distribution. The conclusion is inescapable: 1550 or 1560 does not represent the date at which production of these beads ceased.

Yet the mid-16th century is when Nueva Cádiz beads disappear from Spanish colonial sites. In addition to the citations above, *diamantes* disappeared from the Spanish cargo lists by 1583 (Kelly, 1992: 147). In fact, they are not found on the lists from 1534 to 1586 (Torre Revello, 1943). As already mentioned, Smith and Good (1982: 11) suggested three possible reasons for their disappearing at this time: the end of their production, a loss of popularity, or becoming too expensive in the "Indian trade." We know it was not the end of production. We would doubt that these beautiful beads suddenly became unpopular. The most logical answer seems to be that they became too expensive.

The history of the bead trade in America (as well as Africa, and mirrored by other commodities, as well) shows that while the early explorers brought expensive beads with them, after an area was secured, inferior goods were used for trading (Francis, 1986c: 30). As it became more costly to maintain the American possessions and as the Spanish treasury was being drained, the royal patron experimented with various means of subsidizing the colonies, especially in the late 16th century (Bushnell, 1994: 43). Using cheaper beads was probably only one form of economizing brought to bear on the problem. The disappearance of other costly beads, including chevrons, crystal and amber beads, and charlottes soon thereafter may also have similar explanations.

COMPLEX *PATERNOSTRI* BEADS[13]

Complex glass beads are monochromes with added decorations. Both stripes and "eyes" are found on these beads at St. Catherines, reflecting similar beads of this date in other assemblages.

The stripes may be simple, composed of one color that contrasts with the body or base of the bead, or they may themselves be complex, consisting of a thin stripe of one color in approximately the center of a stripe of another color. Dark blue beads with three compound red on white stripes (Type 58; Kidd type IIbb27) are widely reported in the literature (Smith, 1983: 149, 153; Huey, 1983: 88; Karklins, 1993: 34; Kent, 1983: 80; Deagan, 1987: 167, 172; Mitchem, 1991a, b). Drawn beads with three sets of stripes are found throughout the 17th century. By the 18th century, the same color combinations are found, though they then had four stripes, and later many of the same combinations are found on lamp-wound beads (Francis, 1999a: 6). Those with four compound stripes are found in West Africa (Shaw, 1961: 72), and often cut into discs and reheated.

"Eyes" are composed of small slices of compound or complex canes. Only a few eyes, generally three or four, were placed on the beads around their equator. Drawn beads with inlaid eyes are known in the literature as "Flush Eye Beads." In a sense, they may be thought of as forerunners to the popular mosaic or *millefiori* beads, though the latter are made on wound cores and covered completely with mosaic glass chips. There is also a very wide time difference, as most *millefiori* are products of the early 20th century.

Another difference between the later *millefiori* and the earlier eye beads is that the cane slices (*murrini*) are put on the beads in a different manner. With *millefiori* beads, they are put directly on the core. With the drawn eye beads, a patch of glass was first smeared onto the bead and the cane slice put on this, as a sort of adhesive.[14]

The term "flush eye bead" was apparently introduced by Wray and Schoff (1953: 56) to denote a drawn bead with imbedded mosaic eyes. Since there are no other sorts of eye beads in the American trade at this time, they are herein referred to simply as "eye beads," but the distinction may be useful in other situations. The chips used for the "eye" on the beads listed here differ from those used on complex bubble glass beads, discussed in chapter 8, further indicating that the latter were not made in Venice.

These beads had a relatively short period of circulation, for example in the Seneca sequence between 1570 and 1635 (Wray, 1983: 42) and in Susquehanna sites between 1575 and 1600 (Kent, 1983: 81). Smith (1987: 33) suggests that eye beads in the southeast are most common from 1600–1630. He also notes (1983: 148–150) that some of the eye beads found in the Southeast are identical to some from the Northeast, implying that others were not. Similar beads are also found in West Africa, though they have not yet been dated (Francis, 1999b: 5).

One complex bead (28.1/6661.0001, Type 59) is most unusual. The orientation of the seeds (small bubbles) in the glass along the axis of the perforation show that it is a drawn bead and it appears to have been finished *a speo*. Yet, it also has an equatorial band or zone of white glass.

This must have been done after the segment was cut from the tube, or more likely after the *a speo* rounding, as was done with "eye" beads. It has no known parallel, but the quality of the glass suggests that it may be Venetian.

COMPOSITE *PATERNOSTRI* BEADS[15]

Composite glass beads are both compound (made from two or more layers of glass) and complex (decorated). By far the most important of these beads is the "gooseberry bead," consisting of two layers of clear glass with white stripes between them.

Gooseberries: The Glass and the Fruit

Gooseberries (Type 70) are historically one of the most important bead types found in the St. Catherines Island collection. It is a drawn bead with white lines sandwiched in between two layers of clear glass. Similar beads with white lines laid on the surface are not true gooseberries.

Most, perhaps all, gooseberries were made in Venice, though there may be some exceptions in the St. Catherines Island assemblage. They are a combination of two glasses, white and the famous *cristallo*. In *L'arte vetraria* (originally 1612), Antonio Neri devoted considerable space to *cristallo*. The finest (called *bollito*) was made from marble pebbles from rivers in northern Italy. The soda ash was brought from Syria and purified several times. Manganese from Piemonte was used to clarify the glass, and the initial frit was crushed and reheated several times before being sufficiently pure (Mentasti, 1980: LV–LVI, 1–2).

The result was the clearest glass then made anywhere, though it was still slightly gray or grayish-green. At some point, lead was added to *cristallo*. There is a written record of this by 1847 (Moretti, 1982: 75–76). However, gooseberry beads were on the *Henrietta Marie*, an English slaver that was wrecked off the Florida Keys between October 1701 and March 1702 (Francis, 1994b; 1995). They were tested at the Center for Bead Research for their specific gravity, which was 3.33, indicating the heavy use of lead at this early date.

The name of the bead is quite old. Its earliest known use is in 1704 by John Barbot who was engaged in the slave trade in West Africa. He referred to "beads gooseberry-colour, large and small" (Barbot, 1745: 404). The name is apt, as the bead somewhat resembles the gooseberry fruit.

The fruit (*Ribes* spp.) is a type of currant that was not domesticated until the 16th century. It became very popular in the succeeding two centuries. There were "Gooseberry Clubs" for gentlemen developing new varieties, 722 of which were named by 1831. The fad disappeared after the infestation of the American gooseberry mildew in 1905, American gooseberries being popular chiefly in Oregon (Smith, 1979: 309–310).

The period of popularity of the fruit is parallel with that of the glass bead. The bead is found on mid- to late 16th-century sites in America and Africa. The last record of it is on a sample card of 1909 (Francis, 1988: 24). Whether the bead was initially made in honor of the fruit is not known, but seems possible, as their parallel histories are so striking.

Gooseberry Beads in the Slave Trade: The gooseberry bead played a significant, even leading, role in the slave trade. Barbot (1745: 404) said that they were an essential bead in this commerce. Harter (1981: 11–12, 1992: 10) called them "the most precious beads in the [Cameroon] Grassfields" and reported that in the 19th century 20 of them would buy a male slave.

They have also been found on two shipwrecks associated with the slave trade. The earlier was the *Henrietta Marie*, the English slaver mentioned above that sunk off the Florida coast in 1701–1702 (Francis, 1994b; 1995). The other was the mid-18th century Dutch "Manilla" wreck (Karklins, 1991: 34; for a picture see Peterson, 1977: 724–727).[16]

Gooseberry beads have also been uncovered from a slave cemetery on Newton Plantation, Barbados, ca. 1660–1775 (Handler and Lange, 1978), as well as in several sites in Africa (Francis, 1994b: 6). It appears that this bead, rather than the chevron, was the most important bead in the slave trade. In addition to its status in Europe, being identified with the favorite fruit of the elite, it was also an important trade item in America. Smith (1983: 153) lists 12 sites where they are found, Brain (1979: 106) lists 10; only one site is found on both lists.

Varieties of Gooseberry Beads: Pink gooseberries have been reported (Good, 1972: 126; Harter, 1981: 11; Harter and Opper, 1992: 10). These, however, are the result of the solarizing of the manganese used to clarify the glass (see Francis, 1994b: 5). "Frosted" surfaces have also been reported (Harris et al., 1965: 312; Good, 1972: 126, Francis, 1994b: 8), probably due to corrosion.

There has been some discussion of the white stripes. Looking at a somewhat corroded bead, Karklins (1974: 72) reported that the stripes were actually air bubbles. Unfortunately, that has been blindly repeated, even though Karklins (1997, personal commun.) no longer believes it. The number of stripes reported range from 8 to 18. Those from St. Catherines Island range from 10 to 14.

These beads also have different shapes, including tubular, round, and ellipsoidal. Some of them are twisted. Smith (1983: 150) suggested that ellipsoidal ones were earlier, followed by round ones from around 1650. Again, this has received wide currency, but, round gooseberries are known from several late 16th-century sites in America (Pratt, 1961: 8; Wray, 1983: 42; Kent, 1983: 80). On St. Catherines Island, all but two of the 262 gooseberry beads recovered were round.

In addition to the white-striped gooseberries from St. Catherines Island, there are 101 beads and one fragment with red stripes lying on a thin white layer sandwiched between two clear layers that may be called "red gooseberries" or perhaps "red-striped gooseberries" (Type 73). They have a clear core and an opaque white layer on which are thin red stripes, covered with a clear coat. These are rarely reported. Brain (1979: 107, type IVb8) describes a similar bead but without noting the clear core. He also said that the stripes were composed of several thin filaments, whereas those from St. Catherines Island appear to be solid canes. He noted a parallel only from Alabama (Burke,[17] 1936: 54). However, Burke (1936, type 21) does not mention a clear coating, only a clear core, and the red stripes on opaque white. It is, thus, unclear whether either of these sources are true parallels. They are also later than the St. Catherines Island context, the Alabama beads dating around 1725 and Brain's Tunica Treasure at Trudeau, Louisiana between 1731 and 1764.

While the red-striped gooseberries at St. Catherines are made of a rather clear glass (*cristallo*), the white-striped ones are not. The glass of these beads is strikingly greenish. If all Venetian gooseberries were made with *cristallo*, as they seem to have been, could these have come from another beadmaking area? Five were found at s'Graveland in The Netherlands and were possibly made there. Karklins (1974: 72), however, described their color as "transparent, light gray," indicating the use of manganese. Could this bead, so important in the slave trade, have been a Venetian-style bead made in Catalunia?[18]

NOTES

1. This word has never been identified. Even Venetians are at a loss to explain it. It would appear to be a type of bead.

2. Marvin Smith (personal commun., 2008) believes that faceting would be relatively simple with a peddle-powered grinding wheel or even a kick wheel. Finishing the beads elsewhere would make them prohibitively expensive. [LSAP]

3. Types 17–26 are such beads. Only Type 25 has been identified by Francis as of likely Venetian origin; however, it seems that some (or all) of these other types may also be Venetian. Types 20 and 26 seem like particularly good candidates. See also Chapter 8 for a discussion of these types. [EHB]

4. Beck (1928: 2) advised that when measuring the diameter of beads, the "maximum width of the transverse section" should be recorded. On beads with a square section this is corner-to-corner (see diagram in Beck 1928: 3). We have inserted both measurements as most other reporters used the face-to-face method of recording diameters on these beads.

5. Harris and Liu (1982: 3) said that "Fairbanks and Goggins" (sic) applied the term to both the solid and three-layered varieties, but since then "popular usage" has applied the term to only the layered beads. They thought this was "useful" and limited their remarks to the layered varieties. I don't think it is particularly useful and do not alter Goggin's original definition here.

6. Goggin (n.d.: 25) was apparently going to call these "Peruvian cornered faceted beads." Virtually all have dark blue outer coats. Most writers refer to them as "small Nueva Cádiz beads."

7. The larger variety, measuring 13 to 14 mm corner-to-corner is a much later product. It is found on a sample card presented by Mr. Levin, a bead dealer of London, to the Pitt-Rivers Museum at Oxford (Springett and Springett, 1987: left plate between pp. 19 and 20). The card lists the address of the company as 1 Bevis Marks. The company was at this address from 1851 to 1893 (Karklins, 1982: 8).

A similar large bead, though it is difficult to see if it is of compound construction, is shown in Neuwirth (1993: 25, third from left, top row) and tentatively attributed to Ferrari and Barbini of Murano (Venice) before 1818. It is also this newer bead that was reported by Meggers and Evans (1957: fig. 11a) from Valentim, Brazil.

8. This quotation has been on a page on my web site (www.thebeadsite.com/FRO-SPB.htm) for some time. Having seen it, Mark Rosacker, the General Curator at the Living Desert Zoo and Gardens State Park in Carlsbad NM, got in touch with me, informing me that some American peccaries have a scent gland on their back, often mistaken as a navel by the Spanish. "It appears that both the White-Lipped and Collared Peccary are native to the whole northern two thirds of South America, making either one of them likely candidates [of Herrera's observation]. White-Lipped Peccaries seem to prefer more dense, jungle type habitats, while Collared Peccaries inhabit those areas plus more open scrub country." (Mark Rosacker, email to Peter Francis, Jr., 20 August 2001; insertion mine). Hererra's observation is one of the first (if not the first) references to this animal.

9. There is also a Dundas county in northeastern Ontario. The National Geographic Interactive map set shows no place near Dundas named Beverly.

10. Many researchers do not consider the red twisted variety to be Nueva Cádiz beads (Smith, personal commun.: 2006). [EHB]

11. Only the small, dark blue ones (one faceted at the corners, the other not) are in the Type Collection of the Philippine National Museum, but I have seen other types in private collections.

12. The Jamestown Rediscovery web site of the Association for the Preservation of Virginia Antiquities at http://www.apva.org/ngex/c3bead.html says that "to date" 78 Nueva Cádiz beads have been found. The page is copyrighted 1997, 1998. My last visit was in August 2001.

13. Types 53–69 are complex *a speo* finished beads. Of these, Francis attributes Types 57, 58, 59, 61, 63, 66, and 67 to Venetian manufacture. Types 54, 56, 60, 64, 65, and 68 are attributed to French manufacture (see Chapter 8, this volume). Francis does not speculate on the origins of Types 53, 55, 62, and 69. [EHB]

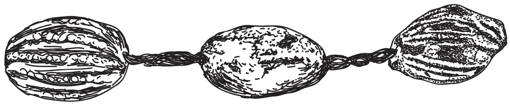
14. Exactly why this was done has not been determined. It probably had something to do with the relative temperature of the bead, the mosaic cane slice, and the adhesive glass. For glass to be added to glass, both must be hot. However, it might be that a small amount of hot glass could be applied to a cold (or warm) bead to allow a cold (or warm) cane slice to fuse to it. This would be a good project for experimentation.

15. In addition to the composite beads discussed in the text—Types 70 and 73—Types 71, 72, and 74 are also included in this category. [EHB]

16. Karlis Karklins (1994, personal commun.) has informed us that not all the beads in this picture were on the "Manilla" wreck, though gooseberries were.

17. Brain (1979: 107) mistakenly attributed this work to Burke and Burke.

18. Seven gooseberries are also found in the *Jardins du Caroussel* collection in Paris and have been attributed to French manufacture (Turgeon, 2001: 58-82). [EHB]



CHAPTER 8
THE GLASS BEADS OF THE *PATERNOSTRI* OF THE NETHERLANDS AND FRANCE

Peter Francis, Jr.

GLASS BEADMAKING IN THE NETHERLANDS

The Venetians were so successful with their beadmaking industry that at one time or another nearly every other European power attempted to start one to rival that of the Republic (Francis, 1988: 44–45). Of those, the best known is the Netherlands. In most cases, save for Venetians helping Bohemians make furnace-wound beads (Jackson, 1927), the beadmakers leaving Venice were *Paternostri* members. Seed beads were made by the *Margaritari* method only in Venice and the Netherlands until France (Francis, 1988: 49) and Bohemia (Francis, 2000: 7–8) began making them subsequent to the St. Catherines Spanish occupation.

The literature on Dutch glass beads is considerable, beginning with Huding's documentary evidence in 1923. Van der Sleen (1962, 1964, 1973) brought world attention to the Dutch industry, while Karklins (1974, 1983, 1985) and Baart (1988, 1991) have done detailed work on documentary and archaeological material. Other studies have been done by van der Made (1978) and, in the context of Dutch trade to America, by Huey (1983), as well as Karklins (1983).

Glass beads are known to have been made in Middleburg, Amsterdam, Rotterdam, Haarlem, and perhaps Zutphen. The factory in Middleburg is first documented in 1597. It was run by Govaart van der Haghe and made tubes for beads, among other glass objects. In 1606, Zuan Antonio Miotti, of the famous Venetian glassmaking family, took over its management, backed by the wealthy merchant Dirk van Os of Amsterdam. By 1610 Miotti owned the factory and remained there until 1619, when he was persuaded to go to England. The factory closed in 1623 (Thorpe, 1935: 121–122; Karklins, 1974: 65; 1983: 111; van der Made, 1978: 3; Baart, 1988: 67). Apparently, there is no archaeological evidence of beads made at this factory.

The first documented reference to glass beadmaking in Amsterdam dates to 1619, but documentary and archaeological evidence suggest much earlier production, at least by 1590 or so (Baart, 1988: 67–69, 70). Three Italian, possibly Venetian, glassmakers were in Amsterdam at the time, one of whom successfully petitioned for building a glass factory in 1597 (Baart, 1988: 67).

In 1601 or 1602 the trader, Jan Jansz Carel, opened the first glass house known to produce beads, managed by his son-in-law Jan Schryver Soop.[1] Soop managed to smuggle beadmakers and their tools from Venice. The factory is reported to have closed between 1623 and 1629 or even later (van der Sleen, 1973: 108; Karklins, 1974: 65; 1983: 111; van der Made, 1978: 3–4; Baart, 1988: 69). Abraham van Tongerloo made mirrors and probably beads from 1613 (Baart, 1988: 69). Claes Rochusz[2] opened a factory in Amsterdam in 1621 and sold it to Nicolas Jaques[3] in 1656, who ran it until at least 1665; beads were major products of both factories (van der Made, 1978: 4; Karklins, 1974: 65–66). Claes Claesz Jacquet[4] opened a "*nive glas en cornelblasery*" (a new glass and bead factory) in 1657, implying that he also made beads at his old glass factory, established in 1621; he employed workers from Venice and Liege (Karklins, 1974: 66; Baart, 1988: 69). Archaeological discoveries of beads in Amsterdam may relate to the Soop factory, and two factories each of van Tongerloo and Jacquet (Baart, 1988: 70–72).

Karklins (1985; Baart, 1988: 70, 73) analyzed some 15,000 beads discovered in fill from a glass factory, apparently deposited before 1610. Some of the more common types match beads in the St. Catherines Island assemblage and they might have a Dutch origin rather than a Venetian one, as ascribed above. These include the clear-white-clear compound *rocailles* (Type 38), green hearts (Type 41), and the compound blue bead with three red on white stripes (Type 58).

Jacquet closed his factory in 1676, but Anthony Maire and Fredericq Rihel bought it and moved it to Haarlem in 1676. They sold it to the Italian brothers Juane and Giacomo Pallada in 1686, who continued to make beads until 1697. In Rotterdam, Hendrick van den Heuvel and Cretentius Thomer started making beads in 1615. Their charter was renewed in 1634 for 9 years, but after that we hear no more of them. It is not known if the Frenchman Matthieu Simony de Tournay made beads in the factory at Zutphen that he opened in 1689; it went bankrupt three years later (Karklins, 1974: 66; 1983: 113).

In sum, the Netherlands had a lively drawn glass bead industry spanning the late 16th to the early 18th century; wound beads may have been made after 1700 (Baart, 1988: 72–73). Such bead production involved many factories in several cities. Italians, some of whom are known to have been Venetians, played an important role in this industry. From the second half of the 16th century, until the last quarter of the 17th century, Venetians were very successful making *façon de Venise* glassware in Holland (Baart, 1991: 430–436; Henkes, 1994: 16–17, 123, 245).

Perhaps the Italians were the glassmakers and tube-drawers, with the beads finished in Dutch homes. Soop alone employed between 60 (van der Sleen, 1973: 108) and 80 (Baart, 1991: 434) or more (Karklins, 1974: 65) Dutch families. This may account for many of the beads found in domestic contexts in Amsterdam. Baart (1988: 74) found this a "surprising discovery" because of the paucity of beads in inventories and painted portraits.

Only three chevron fragments from the St. Catherines Island bead assemblage are identified as Dutch because the type is known to have been made in the Netherlands and found in Dutch contexts in New York. This type may also have been made in Venice. Conversely, identifying many of the St. Catherines Island beads as Venetian is mostly a matter of convenience; they may, in fact, have been made in Holland. Keep in mind that the Netherlands was under Spanish control for a long time, and though the United Provinces declared independence before the establishment of Mission Santa Catalina de Guale, they were not recognized as such until 1648. Moreover, trading patterns cannot be expected to follow political boundaries slavishly.

Chevrons

Easily identified and attractive, the chevron is probably the most universally recognized bead type. Chevron beads are drawn beads of compound construction[5] in which one or more layers are corrugated. When beveled on the edges, a pattern of joined chevrons appears along the edge, giving it the English name, which has been adopted by or introduced into other languages.[6]

The bead became well known after Morlot (1862; 1992) published a paper on it, asserting that its presence in Native American graves proved that Phoenicians had once visited the region. The antiquity of chevron beads was debated for several decades thereafter. The first English term for the bead (the Italian manufacturers all called them *rosettas*) was apparently "star pattern" (Haldeman, 1878), closely followed by "chevron pattern" (Brent, 1880).

Fifteenth-century rules of the *Paternosteri* guild in Venice (perhaps the original ones of 1486) required a member to be able to make *rosetta* beads (Gasparetto, 1958: 184). It is not known how much earlier these beads may have been produced, but it would seem that they were not made much before the founding of the guild (Francis, 1988: 13). The chevron apparently came to the Americas early. Bartolomé de las Casas's version of Columbus's diary has an entry for 30 December 1492 that states that a local chief in Haiti put his crown on Columbus's head and

> El amirate se quito dl pesqueço un Collar de buenos alaqueques y Cuentas muy hermosas de muy lindos colores que pareçia muy bien en toda parte: y se lo puso a el … [The admiral took from his own neck a collar of fine agates and handsome beads of beautiful colors that looked well in all its parts and put it on the king]
>
> (Dunn and Kelly, 1988: 296–297).

The "agates" are discussed in chapter 14. However, the beads that were "very handsome of very beautiful colors" were probably chevrons because no other early bead of glass or any material would have met that description. Chevrons, along with Nueva Cádiz beads have been found or recognized in the literature from early Spanish contact sites in Mexico (Francis, 1987a), Peru (Smith and Good, 1982), and the Philippines (Francis, 1989: 15), as well as many sites in the American Southeast. Kelly (1992: 138–139) made a strong case for the early Spanish trade term for these beads being *margaritas*, reinforcing an earlier, similar argument (Francis, 1987a).

The earliest chevrons, including those discussed above, generally had seven layers of glass (commonly from the inside out: translucent green, opaque white, blue, white, red, white, and blue) corrugated into a 12-pointed star.[7] These layers were made by casing (adding exterior layers) the original glass gather one or more times. After a few layers were built up, the gather was placed into a steel mold of the desired design. This procedure was often done twice. The final layer was not put into a mold, but marvered (rolled flat) so that the exterior would be smooth. The ends were then faceted.

The Chevron Beads from Mission Santa Catalina de Guale

The three fragments of chevron beads found on St. Catherines Island do not belong to the early class of chevrons (described above). Rather, they were made in a common 17th-century style. They have fewer layers (five in this case), built up in three operations: one for the clear green and neighboring white layer, another for the red and white layer, and a third for the outer green layer. Moreover, the beads were finished *a speo* rather than being faceted.

Beads of this type are given Kidd numbers IVk. The closest bead in the Kidd and Kidd (1970) system is IVk6, but it has a white center layer of glass, rather than one that is dark green. Parallels to the St. Catherines Island beads are found on two chronologically overlapping New York sites, Factory Hollow (1590–1610) and Dutch Hollow (1595–1615; Wray, 1983: 43).[8]

The beads of this type from New York are all but certainly Dutch in origin. The same bead has also been found in Amsterdam and was undoubtedly produced locally (Karklins, 1974: 78).[9] Karklins noted furthermore that "the ridges of the second layer show through as straight stripes," matching the St. Catherines Island examples. These parallels are strongly suggestive that the Mission Santa Catalina de Guale beads were made in Amsterdam in the early 17th century, though identical beads may have been made concurrently in Venice. The Dutch glass bead industry received a great deal of technical input from the Venetians.

PATERNOSTRI BEADS MADE IN FRANCE: BUBBLE GLASS[10]

One of the most common beads recovered at St. Catherines Island is a drawn dark-to-light blue bead finished by the *a speo* method (Type 18; Kidd and Kidd no. IIa40). This bead type dates ca. 1560 to 1750. These beads are not only numerous at Mission Santa Catalina de Guale, but they were one of (if not *the)* most prevalent bead types found along the Atlantic and Gulf of Mexico coasts and as far inland as Ontario and Quebec. European colonial powers, including the French, the English, the Dutch, and the Spanish traded this kind of bead extensively.

It seems likely that this bead features in the Spanish cargo lists of goods bound for America as *turquí*. The term is not found in the cargo lists from the early 16th century (1509–1529), but it does appear in the mid-16th century (1534–1586) lists (Torre Revello, 1943: 780), agreeing with the archaeological chronology. In the late 16th century, they are often listed as bound for Nueva España, Nombre de Dios (Isthmus of Panama), Tierra Firma (Venezuela), Cartegena (Colombia), Honduras, Campeche (Yucatán), Margarita Island, Santo Domingo, and Havana (Kelly, 1992: 219, 232–233, 246–247).

Kelly (1992: 147, 149) did not try to equate *turquí* with any bead known archaeologically, but I believe that the name refers to this blue bead. *Turquí* in Spanish can denote two things: something that is from Turkey and a particular shade of blue.

It is unlikely that the Spanish would have handled Turkish beads during the 16th and 17th centuries, for several reasons: Turkey is not known to have made glass beads at this time; Spain had no commercial contacts with the Ottoman Empire; the European power with rights to Turkish trade was Venice. Perhaps this bead was simply assumed to be from Turkey, when it really was not. Such a faulty assumption explains how the bird called a "turkey" and the stone called "turquoise" were named.

The other meaning of *turquí* refers to a shade of blue, not light blue, as one might expect, paralleling the English color *turquoise*—but a dark, indigo blue.[11] While these beads are often described in the bead literature as light blue or turquoise in color, this applies only to beads dated after about 1600. Earlier, such beads contained more copper and are noticeably darker, some even indigo in color (Hancock et al., 1994: 261).

The cargo lists also refer to black, green, crystalline (clear), and golden *turquí* (Kelly, 1992: 220, 246–247). The black (Type 17), clear (Type 26), and white (Type 23) varieties are present at St. Catherines. Green has yet to be identified (perhaps Type 21), but the reference to green in the cargo lists may actually refer to what others would call blue.[12] The golden variety has not been recognized.

Two shipments of these *turquí* beads are said to have come from France (Kelly, 1992.: 219,[13] 233). That might indicate the source of the beads, but as is demonstrated on the section concerning Spanish beads, much transshipping occurred within Europe for products used in the American trade.

Identifying the Beads

This ubiquitous bead has been given at least seven different names: Early Blue (Heisey and Witmer, 1962: 116–117); Estaufa Blue (Whitthoft, 1966: 206 n. 5); Jamestown Blue (ibid.); Childersberg Opaque Blue (Penman, 1972: 3); Sugarcane Blue (G. B. Fenstermaker, 1979, personal commun.); Itchtucknee Plain (Goggin, n.d.; 34[14]); and Itchtucknee Blue (Deagan, 1987: 171). At one time it was thought that this bead was made at Jamestown (Northend, 1942: 15).[15] This suggestion has been rejected since the bead predates and far outlasts the establishment of Jamestown, and despite the intention to make beads, no evidence for beadmaking was found once the glasshouse was excavated (Harrington, 1952: 15).

Of these names, "Early Blue" has gained some acceptance. However, to refer to a bead as "early," some reference must be made to the relative time span of its introduction. This is not the earliest blue bead in the American trade (the Nueva Cádiz bead probably deserves that distinction). It is also certainly not the earliest blue bead in the African trade, where it was also an important element. There are also very similar beads in colors other than blue, and it would be no more appropriate to refer to, for example, "early black" than "early blue, black variety" or some such locution.

Aside from "early blue," the only name that has achieved any level of acceptance—but then only in a limited region—is Ichucknee in parts of the American Southeast. Indeed, none of the names given to this bead are satisfactory. If it is necessary to name all important beads, then it would seem appropriate for this bead to be given a suitable name.

There is a distinctive, easily recognized characteristic of these beads that separates them from all other glass beads in the American trade, a trait often ignored in reports except those from Texas.[16] The earliest known and one of the most satisfactory descriptions of them is that of Watt and Meroney (1937: 63; insertion ours): "BUBBLE GLASS. SKY BLUE. The glass is full of air holes, is easily crushed and [the] surface heavily striated. Color deep greenish blue when moistened, iridescence in various colors to a dull dirty when dry."

Duffield and Jelks (1961: 43) described the beads in this way:

> These are of a translucent, robbins-egg-blue [sic] color, although when the exterior is highly frosted the color is considerably lighter. Just beneath the exterior surface innumerable air bubbles can be seen. Occasionally bubbles appear also on the surface, where they produce small but fairly deep pits. In lateral view, the bubbles form striations which have a slight twist in a clockwise direction.

R. King Harris, often in conjunction with his wife Inus Marie Harris and various archaeologists, devised a bead type collection for Wichita sites excavated in Texas and Oklahoma. The collection, now in the Smithsonian Institution, is often referenced. In the earliest publication discussing this bead type, Harris et al. (1965: 309, type 9) described it this way: "The glass has fine lines running lengthwise with the bead, giving it a texture reminiscent of stripped sugarcane." Identical wording was used for subsequent reports, but their description would seem better suited to the term "surface resembling spun sugar."

The common characteristic of this bead is not its color, nor even the striated surface, but the large amount of tiny bubbles (glassmakers call them "seeds") within the glass. All but the most carefully, scientifically prepared glass has some bubbles, but contemporary trade beads of this period generally have far fewer than this group of beads, whether they be light blue, dark blue, greenish-blue, black, clear, white, or whatever color, decorated or plain.

If we have to give it a name, given its priority and because it is uniquely descriptive, we propose calling all beads of this type "bubble glass beads." For specific types, we use terms such as "blue bubble glass," "black, decorated bubble glass," "clear bubble glass," and so on.

Bubbles or Seeds?

Bubbles form in glass because carbon dioxide, nitrogen, and other gases between the grains of the ingredients (in this case, sand, soda ash, and lime) escape into the glass, especially if it is incompletely melted or not heated sufficiently. If the bubbles are large they rise to the surface of the melt and join the atmosphere within a few hours of heating. Very tiny seeds, however, ascend through the glass much more slowly. A seed 0.01 mm in diameter can take as much as a year and seven months to rise a meter (Scholes and Green, 1975: 216–217).

It becomes necessary either to heat the glass for a long period of time or to "fine" the glass by driving out the bubbles chemically. The most important fining agent for soda-lime glass, the type we are considering here, is salt cake (sodium sulfate; Scholes and Green, 1975: 217–220). Nicholas Le Blanc introduced the first viable method for extracting soda from seawater in1794 (Angus-Butterworth, 1948: 27).

Antimony and arsenic are also important fining agents. Antimony was well known to early glassmakers, but it was used only as an opacifier; arsenic was not used in glass for this purpose until much more recent times (Turner, 1956a: 42T–43T; Turner and Rooksby, 1959: 27). I have not found any early modern primary or later secondary references to the introduction of either as a fining agent. Analyses of European trade beads do not indicate the use of arsenic or antimony, except for arsenic in some beads of the Victorian era (1840 to 1900) (Kenyon et al., 1995: 325). Arsenic was also recommended as a fining agent in an article on the manufacture of glass of the same period (Paton, 1879: 657).

Why would there be so many bubbles in this glass? Several possibilities come to mind:

(1) The bubbles, produced chemically, were used to form a special optical effect in the glass. A large number of small, elongated bubbles are used in what is commonly known as "satin glass" ("atlas glass" in Bohemia) in order to promote such a result. The style dates to at least 1800 in Bohemia (Francis, 1988: 39). This effect is not seen on beads in the St. Catherines Island assemblage.

(2) The bubbles were meant to make the glass opaque. A large number of bubbles do render glass opaque and this effect is seen on the blue beads of this type. But this makes no sense in the case of either the black or the clear beads. Black beads (actually very dark violet) are already opaque-looking enough and would need no bubbles. "Clear" is supposed to be as translucent as possible and the bubbles hinder this.

(3) The bubbles result from the constituents used to make the glass and were accidental, rather than planned. Dirty sand and especially impure soda, along with a certain lack of sophistication in glassmaking, are the most likely culprits. This would appear to be the reason this glass is so full of bubbles.

Analyses by Hancock et al. (1994) show that the glass in these beads is unusual in several ways. The earlier beads had very low calcium content of $\leq$ 2% that affected the stability of the glass, making many of the beads crumble. There was also an unusually high level of chlorine, from about 1% to 2%. It appears that the ingredients of the batch were not well prepared and that the recipe for the glass was not well thought out.

Origin of Bubble Glass Beads

We naturally want to know the origin of the beads. Several possibilities exist.

Venice: This is the default origin for any glass trade bead, but seems unlikely for the bubble glass beads. It is very hard to imagine that a glasshouse operated for two centuries in the technological glass capital of the world using such poor methods and materials. While it is always possible, it seems most unlikely.

The Netherlands: Holland is known to have made drawn glass beads and to have used the *a speo* method to finish them. However, this type of bead has not been recorded from there (Karklins, 1974; 1983; 1985).

Turkey: As discussed above, I believe these are the beads the Spanish called *turquí* either because of their color and/or because they thought they had come from Turkey. The earliest glass beads known to have been made in Turkey date to around 1880 and are wound beads (Francis, 1979b: 2). It is unlikely that a European technique would have been transferred to the Ottoman Empire and just as unlikely that all European colonial powers would be buying the resulting beads from Turkey in large quantities for two centuries.

SPAIN: In this volume, the beads considered to have come from Spain are nothing like the bubble glass beads. It is possible that Spain had a drawn glass beadmaking industry, but it is unlikely that rival European powers would have bought beads in such quantity from Spain. A Spanish origin would also be incompatible with Spain buying *turquí* beads from France, assuming that the *turquí* beads are the bubble glass beads.

FRANCE: For some time it has been suggested that, given its large colonial empire and its leadership in science and technology, France must have been a major beadmaker (Kidd, 1979: 29–32; Francis, 1988: 47–50; Turgeon, 2001). There is historical evidence of French beadmaking, much of it from Barrelet (1953), but he admits to not knowing much about the minor glass products, such as beads, made in France. Kidd (1979: 29) recorded numerous shipments of beads from France to England in the 17th century. Few were distinctive, but some were called "crystal" and another group "perpetical."[17]

The following facts suggest that the bubble glass beads were made in France:

(1) France was keen to attract glassmakers, giving them a high status and even ennobling them. Any Venetian who could get to France was assured of naturalization and permits to build a factory (Scoville, 1950: 82–84). Between 1501 and 1640 many Italian glassmakers went to France from Venice and Altare (Scoville, 1950: 21–22). Altare (near Genoa) was Venice's bitter rival in glassmaking, though there is no record of beadmaking in Altare.

(2) At least some of these glassmakers were beadmakers. In 1551 Henry II invited Theseo Mutio of Bologna to set up the first Royal Glass Factory near the castle where Henry was born in Saint-Germain-en Laye outside Paris. Among the products he was to make were *canons* or canes. At Nevers between 1565 and 1577 "enamelers" had the right to make beads. A guild of *Patenôtriers* (*Paternosters*) was given the right "to make paternosters and buttons of enamel and of glass, chains, collars and bracelets," both "by the fire and the furnace"[18] and to make their own ingredients (Barrelet, 1953: 91–92, 178).

(3) Recently, Turgeon (2001: 65), using Parisian notarial archives, has identified 37 French beadmakers from the period 1562–1610. He writes that "France became a major center for the manufacture and trade of beads during the 16th century. Glass factories were established in Lyons, Nevers, Paris, Rouen, Nantes, and Bordeaux. These glass factories produced colored glass in the form of rods and canes on a large scale and sold them to paternosters who worked them into beads of different forms and sizes" (2001: 70). These beads were described as Venetian imitations, with Turgeon noting that the shop of Jeanne Gourlin had "43,000 'turquins' of the manner of Venice'" (2001: 67).

(4) The frequent mention of paternosters and the establishment of the *Patenôtriers* Guild must mean that their beads were finished by the *a speo* method. Seed beads, the products of the *Margariteri* guild, do not seem to be made in France until the 18th century (Barrelet, 1953: 118–119, 166). Although Haudicquer de Blancourt used the word "*rocaille*" (chap. 6, this volume) in 1697, it is by no means certain that the beads involved were French made. If French beadmakers used only the *a speo* method of finishing beads, this would help explain the presence of so many small blue bubble glass beads on St. Catherines Island. Had these beads come from Venice, for example, the small beads (seed beads) would have been made by the *Margariteri* guild and would have been finished *a ferraza*, by being stirred while on a plate being heated by a fire underneath. Several of the small beads are faceted, echoing the Venetian charlottes (chap. 6, this volume).

(5) The dates during which the bubble glass beads circulated (1560 to 1750) correspond to the known history of glass in France. By 1560 canes were being made and being formed into beads by the *a speo* method. The end of trade of these beads is contemporaneous with the change in fashion away from Venetian and toward Bohemian glass products in France (Scoville, 1959: 113), a change that also happened in the Netherlands. There was also the increasingly capital-intensive, quickly expanding French glass industry as a whole (Scoville, 1959: 150, 160–170). The relatively small bead industry may not have survived the accelerating changes in the industry after 1740 and especially 1750.

(6) Assuming that the Spanish *turquí* does refer to these beads, we have one or two instances in which they were shipped from France to Spain for export to her colonies (Kelly, 1992: 233). Additionally, Parisian notaries of the second half of the 16th century designate "turquin" as a particular category of glass beads made in France. Turgeon argues that these are "undoubtedly the

round turquoise beads, IIa40 in the Kidd classification … [and] are in a category of their own, perhaps because of the very particular chemical makeup of these beads" (Turgeon, 2001: 66).

Analyses of Bubble Glass Blues

Although three beads of this type were analyzed and published by Davison and Harris (1974: 211), no particular attention was paid to them, except for identifying some of their constituents. Ron Hancock, Ian Kenyon, and their associates (Hancock et al., 1994; Kenyon et al., 1995; Hancock et al., 1996) have published the most important scientific papers on these beads. Using the results of neutron activation analyses, these investigators explore the chemical components of blue beads (of different types) found in New York, Ontario, and Quebec from the 16th through the 20th century. Hancock et al. (1994) deal most heavily with blue bubble glass beads.

Hancock et al. (1994: 254–255) found that the blue bubble glass beads had a bimodal distribution, being quite common on Ontario and New York sites from1580 to 1600 and then again from 1620 to 1650. Only one site from the 1600 to 1620 interval was represented, but its beads were more like those of the later period than the earlier one.

The level of several ingredients (Hancock et al., 1994: 261–265) distinguished the beads of the two periods. Some of these are "trace elements" that do not affect the appearance of the beads.

The calcium levels were low, generally under 2.0%, in the earlier beads. Such low calcium levels render glass inherently weak, and the beads made from it were often found to have disintegrated. By 1600 or 1620 the calcium content was raised to between 2.0% and 5.0%. The low calcium content is unlike that of contemporary Venetian beads.

The raising of the lime content after 1600 was probably not done because it was recognized that the glass was weak. Neither Christopher Merret, translating Antonio Neri, in 1662 nor Haudricquet de Blancourt in 1697 wrote about the inclusion of lime (the most common calcium source) in glass. It is not specifically mentioned until Johann Kunckle's translation of Neri in 1689. Apparently, glassmakers were unaware of the stabilizing role played by calcium in glass until the end of the 17th century (Turner, 1956a: 45T–46T). The change in the bubble glass probably signals a change in the source of sand, containing more lime (from powdered dolomite or seashells, for example).

Sodium was in the range of 7.0% to 11.0% in the beads before 1600 and elevated to 10.0% to 13.0% in the beads after that date. This would not make much of a difference in the appearance of the beads, except perhaps to encourage more leaching of the sodium in the later beads, resulting in more corrosion on the surface. These beads are often corroded, though the sodium values are within the range of typical glasses. The earlier disintegrated beads were very heavily leached due to the paucity of calcium.

Less copper was used in these beads after 1600, dropping from a range of 1.0% to 1.6% to a range of 0.7% to 1.1%. This makes the later beads noticeably lighter in color, as copper is the coloring agent for this blue glass.

The level of chlorine, generally an impurity, was high in the blue bubble glass beads and correlated closely to the sodium levels. This suggests that the glass was different from other cobalt-colored (likely Venetian) beads (similar to our Type 20) that were analyzed and published in the same paper. Hancock et al. (1994: 263) suggested the difference was "fundamental" and due either to "the type of plant ash used as a flux or the melting conditions of the glass batch."

Considering the group of bubble glass beads as a whole, only a few colorants were used to make them. One of the most important was manganese to make the black (actually deep purple) beads and to decolorize the clear ones. The other was copper, the coloring agent in the blue beads, for opaque red decorations, and probably for green beads if such was made. The red decorations (eyes and stripes) also employed white, and there are also white beads of this type (e.g., Type 23). It is not yet known what was used to form this color nor do we know what was used for the "golden" bubble glass beads.

Faceted Bubble Glass Beads[19]

As discussed above, a number of the smaller bubble glass beads have been faceted. This was done by grinding, but where it might have been done is not known. France has water power, so there would have been no need for the beads to have been exported, as the Venetians did.

Nearly all of these beads fall within the size range established in chapter 6 for seed beads. Faceted seed beads made by the *Margariteri* are known as charlottes. The Venetian *Margariteri* guild did not finish the beads by the *a speo* method, but rather by agitating them over heat, originally with a paddle. The fact that these small beads were finished *a speo* strongly argues against them being Venetian.

Complex Bubble Glass Beads[20]

As with the complex beads made by the *Paternostri* of Venice, these beads are decorated with simple or compound stripes, "eyes," and in one instance a combination of "eyes" and stripes. Most of these designs echo complex beads made in Venice. As with the Venetian "eye" beads, a swath of hot glass was put onto the bead before adding the mosaic chip. Both the bead and the chip would have had to be warm for this operation to succeed.

An indication that these beads are different from their Venetian counterparts, however, is the nature of the mosaic slice used for the "eyes." Those on Venetian beads are much more regular than eyes on bubble glass beads. The Venetian ones might have been molded, but those on the bubble glass beads are certainly built up layering one element at a time onto what would become the final cane.

Here is how this may have occurred: A gather of red glass was cased with white glass and the whole made cylindrical. Six grooves were made down this cylinder. Into each groove, the tip of a triangular-sectioned strip of hot red glass was placed, with white glass being put between each of the red elements. During the operation, the glass must be kept hot. When the pattern is built up, the cylinder is stretched into a long, mosaic cane. This is essentially the method used to make mosaic glass in the Hellenistic through the Early Islamic period in Egypt and we have observed and documented this method in Purdalpur, in northern India (Francis, 1982b: 15). The difference in these mosaic chips is visible in the color plates in Kidd and Kidd (1970: 58); IIg3 is like the Venetian "eye" bead (Type 66) discussed in the complex *Paternostri* beads section (chap. 7), while IIh1 is evidently a double complex bubble glass bead, similar to one in this section (Type 64).

NOTES

1. He has also been called Jan Hendriksz Schryver (Soop) (Karklins, 1974: 65; 1983: 111), Jan Heinrixszn Soop (van der Sleen, 1973: 108), and Jan Hendriksz Soop (van der Made, 1978: 4). We have opted for Baart's rendition.

2. Baart (1988: 69) refers to him as Claes Rochusz Jacquet.

3. Karklins (1983: 111–113) says that Jaques founded a glasshouse in 1656.

4. Karklins (1983: 113) says that C. C. Jacquet owned the glassworks built by Rochuaz.

5. Some chevrons also have stripes, making them composite in structure.

6. For example, in "Note sur l'âge et l'origine des perles à chevron" by Mauny (1957) and "*Die Aggryperlen* = Chevron Pattern Glass = *Rosettaperlen* = Star Beads" by Haevernick (1961).

7. The number of layers (I have seen one with 10 layers in the National Museum in Copenhagen, Denmark) and the number of points on the star varies.

8. Wray listed them as IVk6, but in fact they are a new variety not found in Kidd and Kidd.

9. The beads discussed in this paper were in the van der Sleen collection, which he surface gathered from two bead-producing areas in the city. They are both considered to be early 17th century.

10. Francis believed that some or all of the beads of Types 17, 18, 19, 20, 21, 22, 23, 24, and 26 belong in this category. [EHB]

11. At least in modern Spanish. All Spanish dictionaries that I have consulted list *turquí* as a deep shade of blue. In earlier Spanish this may not have been true, but I have not found any earlier historical citations of the word. As explained in the text, there is, in fact, no need to postulate that a lighter shade of blue was ever meant.

12. People do not see the same color when looking at an object, and the area of most confusion is the line between green and blue, for which the terms "grue" and "bleen" have been coined.

13. Kelly (1992: 219) has only the name *turquí* recorded for bead type number 17aa. However, on page 271 type number 17aa is ascribed to France.

14. In his manuscript Goggin did not describe the "Ichucknee Plain" bead. He describes "Ichucknee Inlaid Black," without, however, mentioning its striated surface. "Ichucknee Plain" and "Ichucknee Inlain (*sic*) White" were "TO BE ADDED."

15. While beadmaking was a principal goal of the glassworkers sent to Jamestown (Earle and the Company, 1906: 144), it never happened. Nonetheless, Northend's widely read book goes so far as to recount, "So popular with the native tribes were these necklaces, and so far-reaching was the news of this venture [glass beadmaking], that Indians came long distances through the forest [to Jamestown] in the hope of securing even a single string." (Northend, 1942: 15).

16. However, to be charitable to most authors of these reports, the bead is so ubiquitous and so seemingly indistinguishable that its analysis becomes monotonous.

17. The meaning is unclear.

18. The translations from the French are ours.

19. These are Types 30, 31, and 32. [EHB]

20. Francis includes Types 54, 56, 60, 64, 65, and 68 in this category. Some of the Type 60 (Ichucknee Inlaid Black) specimens do not have particularly bubbly glass. Mitchem (2008, personal commun.) notes that most Ichucknee Inlaid beads are *not* very bubbly. He comments that "it is unfortunate that Goggin gave the Ichucknee name to both the Plain and the Inlaid Black types, as they are drastically different and not at all related technologically." [EHB]

CHAPTER 9
THE GLASS BEADS OF CHINA

PETER FRANCIS, JR.

Until recently, China had not been viewed as a major glassmaking center by Western scholars. It was thought that China had little need for glass, having substitutes for the many uses glass fulfilled in the West. Recent investigations have proven that notion wrong (Francis, 1986a; Francis, 2002: 53–62).

W.G.N. van der Sleen (1962: 82–83; 1973: 99, 102) reported that Chinese museum officials told him that China never exported glass beads,[1] but this report has proven to be inaccurate. China had been making glass and glass beads since at least the Late Zhou period (473–256 B.C.). Except for the complex eye beads made at that time, imitations of jade and some other precious stones, and the court chains of the Qing period, the Chinese themselves had little use for glass beads. Chinese glass beads were principally exported. It is likely, though not yet investigated, that beads went in some numbers to the non-Chinese living in eastern China and Central Asia in the Tang and earlier periods. The first Chinese beads found in Southeast Asia were uncovered in Barus, Sumatra during the Northern Song period (A.D. 969–1127). Barus was an important port for the export of camphor, highly desired by China's elite. During this early period, the Chinese themselves were not going to Barus, but intermediaries carried on the trade.

During the Southern Song period (1127–1279) and the succeeding Yuan period (1279–1368), China became a major sea power, building the world's best ships and trading with mainland and island Southeast Asia, India, and Sri Lanka. Beads were an important part of the export trade of China at this time (Francis, 2002: 67–69). However, in 1372 the first Ming emperor declared a moratorium on Chinese shipping, making his decree part of the "Ancestral Laws," to be obeyed by all succeeding emperors. He renewed the prohibition several times, "not even allowing a wooden plank to drift to sea" (Blusse and Zhuang, 1991).

Yet maritime commerce and the bead trade did not stop. The Southern Chinese, with the tradition of the mariner Nan Yue ("southern people," non-Han Chinese) and their long association of trade within Southeast Asia, continued to trade illegally. In addition to local smuggling, the Spanish Manila Galleon Trade became a lucrative outlet for Chinese glass beads.

The Galleon Trade was established as a result of Alexander VI's papal bulls that drew a "Line of Demarcation" across the Atlantic and later extended around the globe (issued 4 May 1493; Francis, 2002: 169). The bulls gave Portugal the right to trade everywhere west of the line, and Spain the right to everything east of the line. While other countries ignored the "Pope's Line," the Iberian powers adhered to it, shaping the history of European colonization.

Soon after Magellan found a route across the Pacific to the Philippines, Spain recognized that the archipelago was an entryway to trade with China. The Philippines was technically in Portugal's half of the world, but the smaller country could not wrest it from Spain and gave up its claim. For 250 years, galleons (mostly built in the Philippines) left Acapulco in *Nueva España*, laden with silver from the mines of Taxco and Potosí, Bolivia. By the time they reached the great bay at Manila there were scores of ships originating from Korea to India, but especially from China, to greet them. Silver was worth more against gold in Asia than in Europe. The Spanish milled dollar (minted in México and Lima) was common currency in Asia for centuries. All kinds of Asian goods were exchanged for silver. After the goods had been declared (almost always below value) or secreted on the galleons, the great ships headed back to the New World.

The return journey was much longer and more arduous than the outward journey due to the nature of the Pacific currents. When the galleons reached California, the friars of the missions sent their charges out in small boats to bring much needed oranges and lemons to the demoralized, scurvy-ridden crew and passengers. The ships then continued to Acapulco and the goods were carted over the hazardous "China Road" to México. Many of the finest goods remained among the elite of *Nueva España*, with rich consignments going on to Veracruz. There they were loaded onto another galleon that converged with ships from the Caribbean and Southern Hemisphere at Havana, forming an armada to sail to Seville (see Schurz, 1939).

Glass beads were among the goods exchanged at Manila. In 1609 Antonio De Morga enumerated the goods brought to Manila by the Chinese, including "*tacley*, which are beads of all kinds, strings of cornelians, and other beads and stones of all colours." (Cummins, 1971: 306). *Tacley* may be a transliteration of *tsáu chú* or *tú chú*, Chinese trade terms for "glass beads" (Williams, 1966: 20). Two kinds of Chinese glass beads, ruby red (see below) and a dark blue one, were found at the site of the shipwrecked *Nuestra Señora de la Concepción*, off Saipan, making its way back to Mexico (Francis, 2002: 170). The Spanish had no use for glass beads themselves, but did distribute them to Native Americas. Some are heirloom beads among the Mixe from the villages of Mixistlan and Yacoche, Oaxaca, Mexico. Others are the "Padre" beads of the American Southwest; similar beads were sent to Alaska and penetrated as far as the Colombia River, but they were distributed initially through Russian channels.

Given this background, it is not surprising that some Chinese glass beads were found on St. Catherines Island. Three similar beads (Type 93) can certainly be identified as Chinese because of their ruby red color (see below). Six other beads—a translucent green-blue melon (Type 33),[2] four translucent green beads of different shapes (Type 75), and a translucent greenish yellow sphere (Type 77)—are tentatively identified as such. The melon looks very much like some Chinese melon beads in the Collection of the Center for Bead Research. The other beads resemble beads made in and around Boshan, Shandong province, which, beginning in the 14th century, became the leading glass and beadmaking center in China. Unlike earlier Chinese glass, Shandong products were always lead-free. Typically, such beads have large perforations and some powdery perforation deposits. The beads are rarely symmetrical. They typically have small "tails" at one end, a result of the low-temperature glass from which they were wound. The identification of these six is preliminary, based on visual comparison only. It could be that other wound beads in the St. Catherines Island assemblage are also Chinese.

The greenish yellow sphere (Type 77) has a copper tube in its perforation. We do not understand how this came to be.

CHINESE RUBY GLASS: BACKGROUND

Several metals can be used to achieve the translucent red, hereafter called "ruby red" (Francis, 2002: 75–76). Gold produces a deep wine-red color; copper yields a more dusky red shade; and the more recently discovered selenium produces a garish, bright red.

This highly desirable glass color was achieved sporadically (usually as dichroic[3] glass) in Roman times (Harden, 1987: 246–247; Henderson, 1991: 73) using complex formulas that included gold. During the 12th through 14th centuries a copper ruby glass was made for some cathedral windows[4] (Turner, 1956b: table VII), but the technique was lost during the Reformation.

Copper ruby glass was not used in Europe for centuries until 1836, when France's George Bontemps and one de Fontaney claimed a prize offered by the French Société d'Encouragement for its development (Thorpe, 1935: 239; Sauzay, 1868: 212–213).[5]

Ruby glass colored with gold was first mentioned by Antonio Neri in 1612 (Mentasti, 1980: 108–109) and became increasingly employed in European centers through the 17th century (chap. 11, this volume).

The story in China was different.[6] The first dateable copper ruby red glass beads are on a reliquary pillar dedicated by Fan Yunsheng, a finance minister of the Northern Song Province. It was encased in two wooden boxes in the pagoda at Ruiguangsi, Suzhou, in the year 1013 (Beijing Review, 1980: 29; Yue and Liao, 1985: 1813). It is likely that the beads were made in Suzhou, a known center of glassmaking.

Copper ruby beads account for more than 14% of all excavated beads in the Philippines between about A.D. 1450 and 1600 (Francis, 1989: 14). They have also been identified in mainland Malaysia and Sarawak (East Malaysia), western Java, Singapore, and even in East Africa and Egypt. Copper ruby beads have also been identified on two shipwrecks. One was in the Philippines dated to between 1573 and 1620. The other is that of the Galleon *Nuestra Señora de La Conception,* discovered off Saipan.

COPPER RUBY BEADS IN AMERICA

The importation of Chinese ruby glass to Spanish America was firmly established with the occurrence of such beads on *Nuestra Señora de La Conception*. Beads of this glass found in archaeological contexts in Spanish sites in the Americas tend to confirm this. But the best evidence comes from St. Catherines Island.

Deagan (1987: 179) mentioned some ruby red beads found in a few sites in the Southeast, becoming "much more abundant in the bead assemblages of the post-1780 period." Barnes[7] (1976: 164) reported a "transparent red bead with white applied glass decoration" (type 7) from Mission Guevavi, a Jesuit mission near Nogales, Arizona (but it is the only bead type he did not illustrate). Barnes referred to Sorensen and Le Roy (1968: 47–48; p. 47, plate 2), who dated the bead to the early 18th century and said it was a rare type in the West. The bead figured by Sorensen and Le Roy (1968: plate 2: 21) has an unstructured white decoration; whether the bead from Mission Guevavi had the same sort of decoration is difficult to tell. Most of the beads from Guevavi are European, including seed beads and those with a "squiggle" decoration, made by combing through a series of circles (his type 4). Without additional information, it is not possible to distinguish between a Chinese or European origin for these beads.

Ruby red glass beads are also reported from sites in Louisiana: Trudeau (Brain, 1979: 111), Lawton (Gregory and Webb, 1965: 26), and several varieties at Colfax Ferry (Gregory and Webb, 1965: 35–36). None of them seem to be similar. Trudeau is thought to have been occupied between 1731 and 1764 and to have traded with the French (Brain, 1979: i). Lawton (1700 to 1836) and Colfax Ferry (1787 to 1820) traded mostly with the French, but also with the Spanish, though the French are said to have provided most of the trade goods (Gregory and Webb, 1965: 15–16). The sites date before the earliest known use of ruby red glass in Venetian beads, put at around 1830 (Francis, 1999a: 8). Ruby red glass was known earlier than that in Bohemia (chap. 11, this volume), but was not used for wound beads. Perhaps some or all of these are Chinese; most, at least, seem to be wound.[8]

The three beads from St. Catherines are hexagonal bicones in shape (Type 93). The glass was initially wound and then the facets were paddled into them while still hot. This precise bead is not in the Type Collection of the Philippines National Museum, but other faceted ruby red beads are (Francis, 1989: 14). The beads found at the Philippines National Museum date to the period when there was heavy trade with China (currently dated 1450 to 1600). Blue and red square bicones are found in Alaska (e.g., Fitzhugh and Crowell, 1988: 49, item 48); I have suggested that, being translucent and faceted, these are the beads Carl Merck (1980) called "garnets"[9] during his visit there in the 1790s (Francis, 1994c: 290).

NOTES

1. His original statement on this was: "The Peking museum tells me that glass beads never were an export article in [sic] China and most of the so-called Chinese beads in the European Musea [sic] are very much like Syrian beads and may have come to China along Marco Polo's silk route!" (van der Sleen, 1962: 82-83). There were a number of Middle Eastern, probably Syrian, eye beads in China during the Han period, long before Marco Polo, but then and earlier China was also making eye beads. However, their export at that time was quite limited.

2. A "melon bead" is gadrooned from end to end.

3. Dichroic glass refers to glass that has different colors when viewed by reflected and refracted light.

4. Previous to that time, all stained glass windows requiring red were made of clear panels painted red.

5. This is the official story. Lardner (1832: 221–222) wrote of a copper ladle accidentally dropped into a glass batch at the works of St. Gobain producing the color. One could discount this, as he is not always very reliable, but it was published four years before Bontemps won the prize. Eball published the first scientific investigation of copper ruby glass in 1870 (Weyl, 1959: 423-425).

6. The information about the occurrence of these beads in Suzhou, throughout Southeast Asia, in Egypt (but not East Africa), and on the shipwrecks was all confirmed or first recorded as a result of personal observation.

7. Deagan cites this as (Robinson, 1976). The paper was by Robinson, but Barnes wrote the section on "non-Indian material," including the glass beads.

8. All three ruby red beads suspected of being Chinese were subjected to analysis by x-ray fluorescence spectroscopy. Each tested positive for lead and copper, lending credence to the argument that they are examples of Chinese ruby red glass. [EHB]

9. He also sometimes referred to "melted garnets" and "glass garnets." The term would have stood in contrast to the usual Russian name for glass bead (korolek, pl. korol'ki), cognate with "coral," and indicating an opaque bead.

CHAPTER 10
THE GLASS BEADS OF SPAIN

PETER FRANCIS, JR.

Although a great deal of information exists about Venetian beadmaking, we know virtually nothing about Spanish beadmaking. It seems only logical that glass beads were made in Spain, a world power during the occupation of Mission Santa Catalina de Guale. Seventeenth-century Spain had a viable, even lively, glass industry, and beads were commonly shipped to her colonies. Mercantilism was the ruling economic pattern of the time. These facts would suggest that Spain must have had a bead industry, but none has been identified as of yet.

Several approaches could possibly identify such a Spanish beadmaking industry. The first would be a search of archival data in Spain, an approach pioneered by John Goggin (n.d.) and followed up by Charles Fairbanks (1968) and Isabel Kelly (1992).

A complimentary, but ground-up approach would involve archaeologically uncovering specimens from the Spanish colonies and attempting to identify beads made in Spain.[1] Thus far, only a single bead type, a small wound annular (ring), most commonly yellow or green, has been found in contexts dating to the earliest years of exploration (see discussion below).

The quantity and variety of glass beads from St. Catherines Island offers an opportunity to review and possibly extend our knowledge of the Spanish glass bead industry. Goggin (n.d.) was convinced that the Spanish Crown controlled trade so closely that it was unthinkable that glass beads sent to the colonies were anything other than Spanish:

> While beads are not mentioned as being made [by the Spanish glass industry], it is unlikely that a major native [Iberian] industry would fail to meet the demands of its local entrepreneurs. Considering the tightly controlled Spanish trade policy, even taking into account the widespread evasion of it through smuggling, it is very likely that the bulk of the beads found in New World Spanish sites were in fact made in Spain, very likely in Andalucia
>
> (Goggin, n.d.: 6–7)

Later scholars were not as positive about this conclusion. In her major summary of artifacts from Spanish colonial sites, Deagan (1987: 159) cited Goggin's thesis, noting that Spain did make some beads, and that the bulk of beads in cargo lists were cited without provenience. These, then, might have been Spanish.

The Spanish control over trade goods was not as tight as Goggin suggested. As discussed in chapter 2, lists of cargo shipments during the 16th century often mention the non-Spanish origin of goods. It may be that those not so specified are Spanish, but that is not necessarily the case. It is clear that many items came from outside Spain. Occasionally, the origin of beads is mentioned, such as French rosaries[2] (*rosarios de Francia*) (Deagan, 1977: 777) or "Venetian crystalline" (Kelly, 1992: 158). While it is true that Ferdinand and Isabella forbade the importation of foreign goods in 1497, their successor Charles (reigned 1516 to 1556) encouraged imports (Frothingham, 1963: 14).

The historical record is conspicuously silent on the origin(s) of most beads Spain shipped to her colonies. Goggin (n.d.) took this as a sign that these beads were locally made, and perhaps he was right. On the other hand, this omission could have various causes. Maybe the scribe did not know where the beads came from. Perhaps it became tedious to handwrite the origins of everything being shipped. It could also be that it was such common knowledge that glass beads were from Venice that it was deemed unnecessary to record.

Keep one caveat in mind. If Spain succeeded in building a glass bead industry in the same manner as Holland, that is, by smuggling workers out of Venice, her beads may be as indistinguishable from Venetian beads as are the Dutch examples. No evidence has surfaced to suggest that this happened, but it may have. Glass analysis could help sort this out, but to date the immense program this would require has not been launched.

Let us look at the available data documenting the Spanish glass industry. While glassmakers were scattered around Spain, there were three centers of major importance: Ferdinand's Castille, Isabella's Aragón, and the Muslim sultanate in the south—Andalucia.

In the south, Frothingham (1963: 13) notes that Ibn Sa'id in 1272 commented on glassmaking in the provinces of Málaga, Almería, and Murcia, henceforth called Andalucia[3] here. She postulated that the industry had been there for quite some time.

In Aragón, glassmaking was concentrated in Barcelona and surrounding towns in Cataluña, going back at least to the 11th century (Frothingham, 1938: 155). This is the only area for which we have a definite reference to beadmaking. In 1615 Cristóbal Suárez de Figueros published a Spanish translation of Tommaso Garzoni's *La piazza universale* in Madrid. The book had originally been published in Venice in 1595. Suárez de Figueros added to the text:

> These are the various colors from which are made threads to decorate the crystal glasses, forming also buttons, stones for rings, rosary beads, charms and a thousand other trinkets. At the present time in Murano and Barcelona, so precise is this work that everything imaginable may be done with glass and crystal.
> (Frothingham, 1963: 15)

In Castille, the center of glassmaking (from at least the 16th through the 18th century) was Cadalso de los Vidrios, east-southeast of Madrid. *Vidrios* is the plural of "glass" and *cadalso* in modern Spanish means a scaffold, especially for executions. But its original meaning was "a high place," from its position in the mountains that gave a good view of approaching enemies (Ayuntamiento de Cadalso de los Vidrios, n.d.). The town may have been making glass as early as the 12th century; glassmaking was certainly being practiced at least from 1450. In 1692, it imported Catalonian workers. Elsewhere in Castille, at the royal castle at El Escorial, Domingo Barovier, scion of a famous Venetian glassmaking family, was invited to oversee glassmaking there in 1608. Castillian glass was generally considered to be intermediate in quality between the best (Cataluña) and the poorest (Andalucía) of Spanish glass (Ramirez-Montesinos, 1993).

Specific beads will be discussed in the relevant sections, but a short overview of the current working hypothesis can be offered here. Even a quick reading of what follows will suggest how much work remains to be done.

Columbus brought several different sorts of beads on his first journey, knowing the importance of trade beads from his experience with the Portuguese working along the West African Coast as far south as São Jorge da Mina (El Mina, Elmina)[4] in modern Ghana (Morison, 1942: 41–42). The first Columbian voyage included nonglass beads such as carnelian and amber and at least three glass types: small yellow or green annulars (rings; discussed below); what appear to be similar, though larger (and probably differently shaped) beads; and chevrons.

It is highly unlikely that chevrons, called *margaritas* by the Spanish (Francis, 1986c: 37; Kelly, 1992: 138–139) or Nueva Cádiz beads, called *diamantes* by the Spanish (Kelly, 1992: 139) were made in Spain (for reasons discussed in chaps. 7 and 8, this volume). The other two types, the smaller and larger monochrome green or yellow beads are much more likely to be Spanish. If the larger beads can ever be identified, chemical analysis could determine whether they are made of the same lead glass as the smaller ones. If so, this evidence could help pinpoint the origin of these beads within Spain, as any of the three regions could have produced them.

Several bead types recovered from St. Catherines Island suggest Spanish origins because of their styles and manufacturing techniques. The largest grouping of glass beads suspected to have been made in Spain is a set that is complicated and, no doubt, expensive (because most of them are gilded and difficult to make). These include beads with incised decorations (Types 101–107), flat spacers made by the same workshop (Type 108), and two varieties of fragile glass crosses (Types 109 and 110). All types were laboriously handmade. The crosses, especially the larger variety (Type 110), conjure up fancy lamp work, so often associated with Venice and Cataluña. None of these beads are found in contexts other than Spanish (with a lone exception that can easily be explained). The crosses of this group would appear to have been made in Cataluña. The gilded, incised beads are not so easily pinpointed.

Segmented beads (Types 111–117), including some gold-glass beads (Type 115), are closely related to the Middle Eastern bead industry, specifically the Hellenistic Egyptian branch (Francis, 1999b: 4–6). Beadmakers from the Middle East are known to have traveled, during the 9th and 10th centuries, to continue their trade in areas as remote as Southeast Asia to the East and the Viking region to the North[5] (Francis, 1999b: 8–9). A similar movement westward to Spain may have occurred at the same time, or it may have happened later. In either case, by the time the beads were brought to Mission Santa Catalina de Guale, these segmented and gold-glass beads (a subtype of segmented beads) were most likely being produced in Andalucia by converted descendants[6] of the original beadmaker(s). We shall consider each of these bead types in turn.

SPANISH WOUND ANNULAR BEADS

On 12 October 1492, Christopher Columbus recorded his first encounter with the people he called "Indios," in what was to later be called the New World. Fray Las Casas, the editor of Columbus's diary, recounts the meeting in this manner:

> I, he says, in order that they would be friendly to us—because I recognize that they were people who would be better freed [from error] and converted to our Holy Faith by love than by force—to some of them I gave red caps, and glass beads which they put on their chests and many other things of small value, in which they took so much pleasure and became so much our friends that it was a marvel
>
> (Dunn and Kelly, 1988: 65; insertion by the translators).

The beads are not described at the first encounter, but the accounts from subsequent days are more informative. On 15 October he gave away "some small green glass beads" (Dunn and Kelly, 1988: 81). He gave away small beads on 21 and 22 October (Dunn and Kelly, 1988: 107, 109). On 3 December at Punta Rama (Cuba), Columbus gave away small beads (Dunn and Kelly, 1988: 197) and "ordered bells and brass rings and [small] beads of green and yellow glass to be given to [the natives]" (Dunn and Kelly, 1988: 193; insertions ours).

Interestingly, the value of these small green or yellow beads seems to have fallen in the estimation of either Columbus or Las Casas. On 15 October they are described as "*[cuentas] de vidro verdes pequeñas,*" (Dunn and Kelly, 1988: 80; the adjective *pequeñas* meaning "small"). During the two encounters of 21 and 22 October, the beads are described as "*cuentezillas*"[7] (Dunn and Kelly, 1988: 106, 108), the suffix making *cuenta* (bead) diminutive. But by the time the expedition had reached Cuba, the beads were being described *contezuelas* (Dunn and Kelly, 1988: 192, 196), another diminutive-forming suffix, which, at least in modern Spanish, is also derogatory.[8]

The archaeological evidence surrounding the so-called "Columbus beads" is equivocal. In July 1983, a report was made to the Government of the Bahamas by a field study team under the auspices of the College Center of the Finger Lakes in New York. It reported finding four green and yellow glass beads along with a few other Spanish artifacts on the island of San Salvador. Marvin Smith, then a student at the University of Florida, confirmed a date for the beads between 1490 and 1560 and was quoted as saying,

> They are the type of beads Columbus was using, according to his journals. It looks very possible that they were his [Columbus's].
> (*The New York Times*, 1983; insertion ours).

Smith and Good (1982: 3) noticed the presence of these beads in Peru (their #105, 106) and the likelihood that these were beads described by Columbus. They said, "both are wire-wound[9] types, a method of manufacture which is not common in beads of this small size, particularly in later periods."

Returning to San Salvador, a total of seven beads and two fragments have been recovered. Brill and Hoffman (1985) analyzed the two fragments, along with a similar green bead from Nueva Cádiz

(Venezuela) and three unprovenienced beads from Peru. Each bead contained considerable lead, and the lead isotope analyses "are consistent with the hypothesis that these objects were all made in Spain, although possibly at two, three or four different locations."[10] (Brill and Hoffman, 1985: 392).

M. T. Smith (1983: 150), referring to these beads as "wound seed beads" said that they "appear to be excellent time markers for the first half of the 16th century." If the similar beads from St. Catherines Island are indeed Spanish, that period will have to be extended.[11]

GILDED GLASS BEADS

A total of 437 gilded glass beads have been recovered at Mission Santa Catalina de Guale (Types 98–108). Most are wound, either plain or incised. The assumption here is that these beads are Spanish-made, partly because of the presence of gold and partly because these beads are known only on Spanish sites (with one explainable exception).

The Spanish and Gold

It is no secret that the Spanish were hoping to find gold in the Americas. This mission began during Columbus's first voyage, when he or his men gave away beads and hawks bells for the precious metal (Morison, 1963: 123, 131, 137). The world was on a gold standard, a situation that has lasted a very long time. As Karl Marx (1906: 80) put it, "The particular commodity, with whose bodily form the equivalent form is thus socially identified, now becomes the money commodity, or serves as money .... Amongst the commodities ... this foremost place has been attained by one in particular—namely gold."

Gold was the thrust for the expansion of empires, whether it was the Roman, Portuguese, or Russian and produced "rushes" that put California, South Africa, and Alaska on the economic world map (Clark, 1986: 53–53). Gold drove the Spanish Empire as well, but more gold was found in Portuguese Brazil than in all the Spanish holdings (save the Philippines). Spain, however, had a near monopoly on silver from its mines in Taxco, Mexico and Potosí, Bolivia.

Given the high value placed on gold, it may seem odd that remote, presumably austere and poor St. Catherines Island has so much gold. On reflection, this is not quite as astonishing as it may at first appear for several reasons.

(1) The gilded beads, including some of the glass crosses, may not have initially been destined for the Guale, but for the missionaries as parts of rosaries. As the beads on a rosary broke, as the gold flaked off the beads, or as the rosary had to be replaced, the orphaned or damaged beads may have been handed down to the Guale to wear as they pleased.

(2) The amount of gold on any one bead is minuscule. Given the extreme malleability of the metal, gold leaf can be very thin and little actual metal went into gilding.

(3) During the 16th century, the price of gold in Spain was depressed. The influx of gold and silver into Europe in the years following the Spanish and Portuguese colonization of the New World brought the relative value of these two metals down by a third (Smith, 1937: 32). The situation was exacerbated in Spain and Portugal. Portugal prohibited the export of the metals and Spain taxed their export very highly. The two Iberian states became awash in these metals and they were deeply devalued, leading eventually to the collapse of their economies (Smith, 1937: 478–479).

Plain Gilded Beads

These beads (Types 98-100) were made by winding a translucent bottle green glass into a round, oval, or ring shape. They were then gilded. Gold leaf was dissolved in mercury and the resulting liquid was poured over (or brushed on—there is no gilding in the perforations) the beads. This would penetrate every little dot and dash (see below) on these beads. The beads were then heated (not very high and not enough to distort the glass) and the mercury was driven off.[12]

Incised and Gilded Beads

These beads (Types 101–107) are similar to those discussed above, with the addition of incised lines, dots, and/or dashes, usually taking the form of alternating lines and rows of dots.

These beads are not found very often (in fact, Mission Santa Catalina de Guale has the largest number of them reported anywhere), but are often discussed in Southeastern archaeological literature because they are spectacular. Goggin (n.d.: 33) named them "Seven Oaks Gilded Molded" beads, an unfortunate term since only the "gilded" part is appropriate.

Goggin (n.d.: 32–33) described these beads as "short to long, oblate, barrel and ellipsoidal" in shape, noting that they had been found at six or perhaps seven sites in Florida. While admitting that the method of manufacture was "not completely clear," he thought that the beads were made from a reheated section of a drawn cane and "clearly pressed in a mold to create the surface," even though the patterns of the bubbles suggested other manufacturing methods to him.

Despite Goggin's reservations, the name "Seven Oaks Gilded Molded" passed into the archaeological literature on Spanish Florida fairly early, such as in the report of the Philip Mound (Benson, 1967: 125). Smith's (1983) summary of Spanish Colonial trade beads noted a few other places where they were found. Deagan (1987) did not discuss the type because she had specifically excluded discussion of molded beads and beads made by other methods, types that were "absent or extremely rare on Spanish colonial sites of Florida and the Caribbean" (Deagan, 1987: 159).

The bead is certainly rare. Mission Santa Catalina de Guale contains more of this type than any other site (a total of 99). Next in frequency is a Narragansett burial site in North Kingstown (Rhode Island), described by Turnbaugh (1984: 42, type 37) as "of probably wire-wound construction." Although it might seem odd that these beads were found in Rhode Island, one must remember that this site had considerable Dutch connections, and the Netherlands was then under Spanish control (however uneasily).

The Manufacturing Method: These beads are clearly wound, as the orientation of bubbles (encircling the axis of the perforation) show, and as Goggin noted. But there remains the question as to whether the beads are actually molded.

Glass beads can be molded in several ways. An open mold will allow only one side to be decorated. Blowing into a mold requires that the glass be expanded and the resulting bead would be hollow. Two-part molds (usually arranged as tongs) are by far the most common, and the only type that might have been used for these beads.

Two-part molds would leave a seam. This may take the form of some glass squeezed between the two parts, called "flash," or may form more subtle seams, such as the interruption of designs, utilized in more sophisticated modern molds. No seam is visible on any of the beads recovered from St. Catherines Island. Nor is there any indication that seams were removed.

Additionally, if a mold were used to decorate these beads, the designs would be similar from bead to bead, as each would have been made in one or more molds. With such a small number of beads, one would expect that only one or perhaps two molded designs would be found on the beads.

To test whether a common incised design was found on the beads, I examined six features on eight (of the 11) oval beads with 10–12 lines and rows of dots (Type 104).[13] I also examined 10 spherical incised beads (four of six from Type 105 and six of six from Type 107; see also tables 10.1 and 10.2). An explanation of these features follows:

1. Lines: the number of lines and corresponding number of rows of dots on each bead.

2. Crooked: lines that have a distinct bend in them, as opposed to lines which slowly arc in one direction toward one or both ends of the bead.

3. Unfinished: the ends of lines that do not go all the way to the end of the surrounding rows of dots, stopping two or more dots away from the end of a bead. Since each end was examined separately, each line could be counted twice if both ends exhibited this.

4. Into dots: whenever a line veers into a row of dots at the end of a bead. Each end is counted separately.

5. Into lines: whenever a row of dots veers into a line. Each end is counted separately.

6. Dots touch: whenever a row of dots touches a neighboring row.

These 18 beads differ considerably in design features. Indeed, no two beads are exactly alike. This means that unless molds had been prepared for each bead (a highly unlikely situation), the beads were not molded. Instead, the incisions must have been made manually, incised with something resembling the common glassworkers' paddle. Either the end of the paddle was pressed into the beads or a corner of the paddle was dragged along the surface of the semimolten bead.

The lines were apparently incised first. If so, then the lines should leave small ridges between them, that could then be incised with rows of dots. Bead 28.1/5049.0003 confirms this. At one point on the bead are two lines unusually close to each other and a deep, crooked line. Between the two close lines a row of dots was incised. They cut into one of the lines. A row of dots also cuts into the nonparallel part of the crooked line. In both cases, the dots overlap the lines, not the other way around.

The rows of dots were incised with a toothed device, referred to here as a "comb." The comb probably consisted of a short handle with metal teeth arranged so that when pressed into the hot

TABLE 10.1
Incision Characteristics of Oval Incised Gilded Glass Beads

Catalog no.	Type	Lines	Crooked lines	Unfinished lines	Lines into dots	Dots into lines	Touching dots
28.0/4631.0001	104	11	—	2	1	—	1
28.0/6040.0001	104	10	—	6	4	—	4
28.1/4878.0001	104	12	2	3	—	—	4
28.1/4887.0003	104	12	—	2	1	—	2
28.1/5007.0001	104	11	—	3	4	3	—
28.1/5023.0001	104	11	1	4	4	—	1
28.1/5036.0001	104	11	2	6	5	5	2
28.1/5049.0003	104	12	2	9	3	—	—

TABLE 10.2
Incision Characteristics of Incised Gilded Spherical Beads

Catalog no.	Type	Lines	Crooked	Unfinished	Into dots	Into lines	Dots touch
28.1/0933.0001	105	12	—	—	2	—	—
28.1/2929.0001	105	12	—	3	1	—	1
28.1/2929.0002	105	13	—	4	—	—	—
28.1/3722.0007	107	8	—	4	—	—	—
28.1/4071L.0009 (L/367.5)	107	8	—	3	2	—	—
28.1/4071(GG/387.1)	107	9	—	—	2	—	—
28.1/4071(GG/387.4)	107	9	2	1	1	—	—
28.1/4071 (U/375.8)	107	9	1	—	1	1	—
28.1/4994.0003	105	13	—	5	—	1	—
28.1/6875.0013	107	9	—	1	1	—	—

glass it left a series of dots.

Use of the Comb: Three other bead types (103, 106, and 108) were decorated with combs, along with the oval and spherical incised gilded beads (Type 104, 105, and 107, discussed above). There were 15 beads (Type 106) similar to the oval beads (Type 104; described above) except that they had significantly fewer lines and rows of dots, seven in ten cases and eight in two cases. One of these, however, was oddly shaped and its decorative scheme was difficult to determine.

Five spherical beads (Type 103) were found with seven, nine, or 12 lines and short dashes rather than dots between the lines. In one of these, the dashes are oblique rather than perpendicular to the perforation.

Finally, there were six spacer beads (Type 108; see below). These were incised with rows of dots without any lines between them.

Only two combs were used to make all of the incised rows of dots, both fairly uniform in the placement of the teeth. But there were small imperfections on each, as the teeth were slightly rounded at their tips.[14]

Comb A had seven teeth in alignment, followed by a small gap. The tooth below the gap aligns with those above, but the next tooth down is slightly smaller (its tip was not quite on the same plane as the other teeth). The tooth below the small one and the following seven teeth are aligned with each other but slightly offset from the line of the upper eight teeth.

Comb B lacked a gap between any of the dots, and the dots were well aligned. But around the middle of the row of teeth were two dots smaller than the others (the teeth were not quite on the same plane) and are closer together than any of the other dots.

Before considering which comb was used on which beads, something must be said about the way in which the rows of dashes (as opposed to dots) were put on these spheres. One could postulate that this was done with a comb having wide teeth; but the specimen with dashes oblique to the perforation and lines could not have been made with such an instrument. It must have been produced with a comb having teeth resembling the others, being dragged along the surface of the bead a short way.

Tabulating the combs used on these beads reveals several patterns. For one thing, the spacers (described below), have large central black bosses in their center, and it was difficult to discern the comb used on all but four specimens because the bosses obscured much of the rows of dots.

The beads decorated with Comb B are the simplest of this group, having fewer lines and rows of dots (and hence requiring the least work). One may be tempted to call this the work of the "apprentice."

The "master," on the other hand, used Comb A. His spheres and ovals are more complex because they have more decoration on the same amount of surface as the "apprentice's" beads. The "master" was also responsible for making dashes rather than simply dots with his comb and produced the technically more difficult spacer beads (see below).

Perhaps, the reality was somewhat different than suggested above. Perhaps there is a yet-unknown chronological difference among these beads. Maybe a worker began with comb B, eventually became more skilled, and replaced it with comb A (but in that case, one would expect at least some overlap between the two groups). Other possibilities exist, but doctrine of parsimony (Occam's Razor) suggests that these beads were produced in a single shop, and I believe the most likely explanation is that of a master and an apprentice (son/daughter?) producing a specialty product, made for only a generation or so (see table 10.3).

Incised, Gilded, and Decorated Spacers

These beads (Type 108) have not previously been reported from any other contexts. They are technologically sophisticated and have a special use in a strand of beads. They are made of the same glass as the beads above, gilded in the same manner, and decorated with one of the combs just discussed, specifically Comb A, the "master's comb."

This type of bead is called a *spacer* because it has multiple holes (in this case, two), meant to space out more than one string of beads in a necklace or other complex strand. To make the two holes, the beadmaker wound the glass onto two wires. The wide variation in distance between the two holes among these beads indicates that the wires were held apart by hand rather than with any device that separated them. Indeed, in one case, the two wires were too close together and a "double" hole resulted rather than two separate holes.

After winding a sphere in this manner, the bead was flattened by being pressed down onto a marver (a heat-resistant surface) with the flat part of a paddle,[15] then decorated with the comb (on only one side) and gilded. A black dot of glass was then placed in the middle and flattened atop the bead. Finally, five or six small white dots were put around the edge of the bead, roughly parallel to the perforation.

TABLE 10.3
Combs Used to Decorate Incised Gilded Beads

Type	Description	Comb used
103	Spherical with dashes and lines	All Comb A
104	Oval with 10 to 12 lines	All Comb A
105	Spherical with 12 to 13 lines	All Comb A
106	Oval with 7 to 8 lines	All Comb B
107	Spherical with 8 to 9 lines	All Comb B
108	Spacer beads with dots only	All that can be seen, Comb A

GLASS CROSSES

These are thin crosses with loops at both ends (Types 109 and 110), apparently unique to Mission Santa Catalina de Guale. It is not possible to discern what their function was, although the Christian symbolism is evident. They could have been worn as pendants, leaving the bottom loop empty or with some small beads strung from it. The crosses are undifferentiated in terms of a "top" or "bottom."

Crosses were commonly placed at the end of a rosary. They may also have been used as links, either joined to each other or to beads. A small metal "jump ring" would have been used to link them together. If they were linked to a chain of beads (serving, for example, as the *Paternoster* bead of a rosary), all the beads would most likely have been strung on short wires, ending in loops on both ends. But there is no evidence for this.

These crosses are quite fragile and many were found as fragments. It is thus impossible to make an exact count, but there are at least 11 crosses represented in the St. Catherines Island assemblage.

There are two types of such crosses. Type 109 is smaller and less elaborate than Type 110. Including fragments, the St. Catherines Island assemblage contains at least five Type 109 and six Type 110 crosses. Both types were made in much the same way and the differences are principally decorative. They were evidently made by the same hand or at least at the same workshop. As mentioned above, this type of fancy "lamp work" was a hallmark of Venice as well as of Cataluña, which aped Venice. Cataluña is the most likely origin for these crosses.

Both types of crosses began with a base made from black glass colored with a heavy amount of manganese that appears violet in transmitted light. As noted elsewhere, this a common method used to produce black glass. The worker began by trailing a shape, best described as a dumbbell or elongated figure eight, onto a flat surface. The two loops at the end of this trailing served as the loops of the finished crosses. The center of this figure was then reinforced and made thicker with several more passes of the glass. At this point, this base was most likely flattened into the platform for building the crosses. Atop the platform, drops of the same manganese-black glass were applied and they were then flattened into discs.

On the smaller (Type 109) crosses, the five discs consisted of three placed along the center of the base and two adjoining the central one to form the arms of the cross. The worker then placed a thin cane of white glass along the edges of the upper, lower, and arm discs, to form four decorative wavy lines connecting two adjacent discs. The purpose of this line was probably more than embellishment, since it would reinforce the two arms of the cross, joining each to the upper and lower discs (initially they were attached only in one spot to the central disc). The arms were further decorated by having two drops of white glass placed at their outer edge and a drop of blue glass put at the end of the white line.

Type 110 crosses have six discs arranged in two triangles with their apices pointing to either loop, leaving room at the center of the platform. In the center, a drop of blue glass, slightly larger than the black glass discs, was allowed to settle into a dome shape without being flattened. Encircling the dome was a fibrous "string" of gilded glass. It is still unclear whether this glass is, in fact, gilded or the gold is inside the glass. White dots were placed at the four outer junctures of the black triangles and two each were placed on the central area of the gilded "string." Between them and projecting outward, a blue dot of glass was placed on both of these pairs. The two white dots and the blue dot on either side of the center of the piece form the arms of the cross.

SEGMENTED BEADS

Thin-walled, hollow glass beads, evidently made in a series, are found in a variety of contexts, including early and later Spanish contact or colonial sites. Although all have been described as "blown" beads in the literature, only some are properly named (and these are described separately below). Three methods are known for making hollow glass beads. The products are superficially similar, but have several distinguishing characteristics.

(1) *Individually Blown Glass Beads*. A worker heats the end of a tube until it is soft and blows into the tube to expand the heated end into a bubble. This bubble is then detached from the tube and will become a bead. The end of the bubble nearest the operator inevitably has a slight taper, resulting in a larger aperture than the other end. There are true blown beads found on St. Catherines Island (chap. 11, this volume). The best-known beads of this type are "Roman pearls," an artificial pearl

made in and around Paris from the mid-17th to the mid-19th century (Francis, 1988: 47–48). Plates showing their manufacture were published in the *Grand Encyclopédie* in 1761 (reproduced in Gillispie, 1959: pls. 427–428).

(2) *Sequentially Molded Blown Glass Beads*. A worker (or a machine) blows air into a tube that is already hot (or a worker may blow a new tube on the spot) and snaps it into a long mold from which emerges a series of connected, molded beads. The finished beads have a seam (or flash) that has seeped between the mold halves. These machine-blown beads are the types recorded by Gregory and Webb (1965: 39) and cited by Deagan (1987: 180). Beads of this type were produced principally in Bohemia and at Lauscha, Germany (Busch, 2000). In time, the technique passed to Japan and thence to India. The beads cited above would have been from European centers. No beads of this type were found on St. Catherines Island.

(3) *Segmented Beads*.[16] These were made from a tube (likely blown initially) that was heated for all or part of its length, put on a wire, and then rolled along the grooved side of a stone block. The grooves in the stone mold made a series of bulges separated by constrictions. The bulges became single or multiple beads after being separated from the tube. There is no difference in the sizes of the apertures and there are no mold marks. Additionally, the constriction will usually show at least some amount of twist, as the tube was run over the stone mold (see Spaer, 1993: 12, fig. 4).

Segmented beads are described below.

Gold-Glass Beads

Gold-glass beads (also known as gold-in glass, gilt glass, goldfolium, gold foil, and sandwich gold-glass beads) are a subtype of segmented beads. They were made in the same manner, except that two tubes of glass were involved. A thinner tube was coated with gold foil and slipped into a wider tube before the whole construction was segmented. The result is a golden bead, with the thin foil protected by the outer casing of glass.

There are several variations on these beads, including the replacing of gold with silver, the use of different colored glass on the exterior and a combination of whitish inner tube and an amber-colored outer one to make a good simulation lacking any metal. The beads are well known, with a considerable literature (e.g., Astrup and Anderson, 1987; Boon, 1966; 1977; Francis, 2002: 91–93; Joensson and Hunner, 1995; Spaer, 1993; 2001: 130–139).

One whole and two fragmentary beads of this type were found on St. Catherines Island (Type 115). Enough are preserved to confirm that they are made of two layers of glass with gold foil between them. Those making the plain segmented beads almost certainly also made the gold-glass beads (or at least were closely allied). This was the situation in late Roman Alexandria, where this industry apparently began several centuries earlier (Rodziewicz, 1984: 241–43).

Historical Background

Segmented beads have a long, rich history, not in Europe but in the Middle East. Our understanding of glass beadmaking in the Middle East remains preliminary, but we can now hypothesize how it developed (Francis, 1999b). Only some of the events important to segmented beads are mentioned here.

Although the earliest discovered factory for making these beads (3rd to early 2nd century B.C.) is on the Island of Rhodes (Davidson-Weinberg, 1971), it is very likely that they were first produced in Alexandria, Egypt. Only at Alexandria have the stone molds for forming the tubes into series of bulges been found (Rodziewicz, 1984: 241–243).

Segmented beads are one of several glass bead styles introduced in the Hellenistic period in Egypt. Some of these types, including segmented beads, continued to be made for some 1500 years after their establishment. The center of production was Alexandria during the Hellenistic and Roman periods, shifting to Fustat (old Cairo) after the Arab conquest. Segmented beads were important exports from Egypt during all three periods. These spectacular gold-glass beads were spread all over Europe, Asia, and parts of Africa for 1500 years. The technology for making these beads disappeared in their homeland after the locally decreed destruction of Fustat ahead of the invasion of the Crusaders in 1168 (Francis, 1999b: 4–9).

The Crusaders (with some help from Tamerlain) demolished the Middle Eastern glass bead industry, the world's oldest and for long one of the most important. It survived only in remnants at Hebron, in various cities in Uzbekistan, and at Armanaz, Syria.[17]

But before the demise of the Middle Eastern glass bead industry, there was an emigration of beadworkers from Egypt (and perhaps in one case, Syria) to other parts of the Old World. At least three sites in Norseland (the Viking territory) and four in South and Southeast Asia suddenly had small beadmaking industries using techniques that had been totally foreign to those regions until the 9th or 10th century[18] (Francis, 1999b: 7–9; Francis, 2001a: 96–99). Each place shared two characteristics. For one thing, they were trading centers in contact with Middle Eastern traffic. They also had indigenous glass bead industries.

The beadmaking techniques that diffused to these places included segmented beads and false gold-glass segmented beads. Spain was part of the Islamic world at that time, and it quite likely received Egyptian beadmakers, though perhaps at a different date. The makers of segmented beads would have settled down in a glass-producing area of Spain, likely Andalucia. If so, they clearly survived the *Reconquista*. They may even have originally been Christian Copts, following the Eastern Rite. They would eventually have had to at least publicly adopt the Western rite.

After the 12th century destruction of the Egyptian branch of the Middle Eastern glass industry, there were no known makers of segmented or gold-glass beads anywhere. The only evidence for such beadmaking is found on early Spanish contact sites and later colonial sites. One likely conclusion is that Egyptian immigrants into Spain made these beads during the Caliphate and into the early colonial period.

Segmented Beads in Spanish Colonial Sites

The segmented beads from St. Catherines Island are made of thin-walled glass of several colors, including blue, green, white, and clear. They were made in a series, with several beads initially joined together, then cut apart as single or multiple beads. Apparently similar beads have been reported from other Spanish mission sites. Mitchem (1991b: 4, 8) reports five fragments of colorless blown beads from Feature 6 in the Spanish village at San Luis de Talimali; he also notes another two colorless blown beads from the Apalachee village portion of this site—one with the interior coated in red "ocher" (Mitchem 1993a: 22). Six similar segmented beads, also with red powder on the interior, are reported from the O'Connell site, another Spanish mission in Apalachee province (de Grummond, 1997: 64, figure 5). In both cases the red "ocher" or powder is likely cinnabar (see below).

In addition to the normal description, it is useful to describe the nature of the "score" of segmented beads. This is the shape of the gap between beads, which tells us something about the mold used to shape them. Most of the segmented beads from St. Catherines Island seem to have U-scores, while a few have V-scores.

Cinnabar in the Beads

The clear glass beads (Types 112 and 114) were coated inside with a red pigment, to change their color. Translucent red glass is difficult to produce and the coloring of clear glass was once a common practice (as already noted). The pigment has been analyzed by Sari Urichek of the American Museum of Natural History and has been determined to be mercuric sulfide (better known as cinnabar).

The history of Spanish cinnabar is long and rich. The only sources of this mineral in Roman times were the mines near modern Almadén, Ciudad Real province. The Romans used the red powdery cinnabar as a dye, paint, and a cosmetic as well as to extract "living silver," or mercury. This was a major industry for the Hispanic province, recorded by Pliny the Elder, Strabo, and other ancient writers (UCLM, n.d. a; n.d. b).

Under the Visigoths, mining in general fell into a depression. During the Muslim Period, the search for mineral wealth was again an important activity and cinnabar extraction was revived. The name of the town where the mineral is located is associated with this period, Almadén being derived from the Arabic for "the mine." After the *Reconquista* and the discovery of the Americas, mercury became a critical ingredient for the extraction of gold and silver from their ores (UCLM, n.d. a; n.d. b).

CONCLUSION

The presence of segmented beads of different colors, including gold-glass beads, at Mission Santa Catalina de Guale, is quite astonishing. They are only known from Spanish colonial sites, strongly indicating that these beads were made in Spain (at least into the 17th century). There would have been no barrier for Egyptian segmented beadmakers to move to Spain anytime during the period of the Caliphate.

These beads were very important in the ancient and medieval bead trade. Small, monochrome, segmented beads were some of the most common beads around the Mediterranean for centuries. Many other colors, sizes, and types of segmented beads were used in the Middle East and far beyond. Especially popular were gold-glass beads, found throughout the Old World for 1500 years. The industry had been thought to have been destroyed in the 12th century. The evidence from St. Catherines Island extends the use of the process by half a millennium.

NOTES

1. This technique is not as novel as it may sound. We have used it to identify and date styles of beads produced in Venice (Francis, 1999a) as well as details about the Chinese glass bead industry (Francis, 2002: 72–84).

2. Although the term "rosary" (*rosario*) generally connotes a strand of prayer beads, I agree with Kelly (1992:142) that it could also have been applied loosely to strung beads, perhaps to strings tied in a circlet.

3. Murcia is not part of Andalucia, but is the next region on the Mediterranean Coast going northwest.

4. Morison (1942: 41) incorrectly identified this fortress with Cape Coast Castle, which was built by Sweden in 1652. The two fortresses, both eventually involved in the slave trade, are only a few kilometers apart, but quite distinct.

5. That is, unless Vikings and Southeast Asians who traveled to the Middle East learned to make beads and returned home with the skills and raw materials. Several factors, not least of which is the deep secrecy that usually enshrouds glass- and beadmaking, make this unlikely.

6. Certainly, after the reconquesta, the beadmakers would have been at least nominally Christians. There is the possibility that they were Coptic Christians when they fled Egypt. In that case, they would have adopted the Western rite.

7. Actually in the second encounter the term is recorded as *cuēntezillas*.

8. This suffix is also used in the name Venezuela, which Alonso de Ojeda titled after Venice, Italy, due to the stilt houses he saw. It apparently did not compare to the splendor of the original city.

9. The term "wire-wound" generally refers to lamp-wound beads. If these had been wound around a wire, the wire would have had to be quite thick. They are probably better described as "mandrel-wound" or simply "wound."

10. Glazed ceramics and metal items were also analyzed. The beads clustered into three locations.

11. Preliminary x-ray fluorescence spectroscopy analysis of the yellow and green annular beads found on St. Catherines Island (Types 82, 84, and 85) confirmed that several of the beads contained significant quantities of lead. Further, quantitative and lead isotope analysis of the beads remains to be completed. [EHB]

12. The use of mercury is also suggestive of a Spanish origin for these beads, due to the presence of cinnabar (mercury ore) deposits in Spain and the known use by the Spanish of mercury to remove gold (and silver) from ores in the New World.

13. The other three had lost most of their gold and it was very difficult to see incised dots and lines without gold in the depressions.

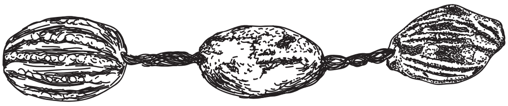
14. It is always possible that these were two ends of a single longer comb, but the way in which their distribution falls suggests two separate combs. My use here of "above" and "below" in describing the positions of the teeth is, of course, entirely arbitrary.

15. This process results in a series of concentric "waves" on the flattened end of the glass, which is visible on the bottom of these beads as well as on the black boss on the top. Some earlier commentators suggest that this was a pattern on the paddle used to flatten the beads. However, it results from the flattening of a spherical form, as I have discovered upon observing such work (particularly in Gorece, Turkey) and via experimentation.

16. The term "segmented" has been used to describe many sorts of beads. These include wound beads joined to each other, a certain style of faience bead, and even beads cut from various materials. Without any adjectival qualification, the term is used for the glass beads described in this section.

17. The beadmakers of Tyre went to Hebron and Armanaz. Armanaz had not made beads for a generation when I visited in 1979. Tamerlain took glass beadmakers from Damascus, along with many other artisans and soon small factories were established in his capital at Samarkand. Samarkand was nearly abandoned in the 18th century and beadmakers moved to Bukhara and Tashkent. There are still some around Tashkent. Those in Bukhara left with the Emir in 1920 when the Communists became ascendant and settled in Heart, Afghanistan, where I visited them in 1978. Due to the intense, lengthy fighting around that city, it is likely that they have moved again, perhaps across the nearby Iranian border (Francis, 1990: 20-23; 1999b: 9-10).

18. It is not known what caused this exodus. More precise dating for it is a desideratum. The history of glass beadmakers in general shows that they changed the place of their operations on occasions, usually because they were exiles of some sort (Francis, 1994a). What event might have precipitated this phenomenon is not yet understood.



CHAPTER 11
GLASS BEADS FROM OTHER MANUFACTURING CENTERS

Peter Francis, Jr.

MOLDED GLASS BEADS FROM BOHEMIA

Bohemia, the principal state in the Czech Republic, has a history of glassmaking that goes back to the 8th or 7th century B.C. (Venclová, 1990). The first known modern glasshouse was at Vimperk in 1359 (Weiss, 1971: 334). By the early 17th century, there were eight glasshouses in the area, four of them *Betelhütten* or "Bead-houses" (Dillon, 1907: 292). Beyond these southern Bohemian glass houses, we must look to northern Bohemia, particularly the region around Jablonec nad Nisou (on the River Nisou) for the origin of the Bohemian beads found on St. Catherines Island. Northern Bohemia grew in importance in the world bead market and, by the 1860s, outsold Venice. It remains one of the, if not *the*, world's major beadmaker (Francis, 1979a; 1988: 30-43; 1996a; 2000).

In Northern Bohemia, the Queysser factory in Sklanařice was first taxed in 1376 (Hejdová, 1966; Hetteš, 1958: 6). The village of Sklanařice was, in fact, named for glassworkers; *skla* is Czech for glass. The 16th century saw a boom in glassmaking in the area. The Schürers opened a factory at Falknov in 1530 and during that century built seven more, including one at Mšeno, now a suburb of Jablonec (Čhenský, 1966; Urban, n.d.: 1).

Leopold Wander first described beadmaking in the area in *Physical Description of the Mt. Boleslav District* in 1786.[1] It reads in part:

> This invention [of *composition*] was a carefully guarded secret in Venice. Two persons from Turnov, the Fischer brothers, went to Venice and returned five years later in the belief that they had solved the secret. The work did not make progress but by constant trials they became acquainted with the material and by chance, in 1711, they made their fist composition of sand, saltpetre and cinnabar with the addition of gold(?).
>
> (Vávra, 1954: 182; insertion ours)

Turnov is a village near Jablonec, where the principal occupation has long been cutting the local deep red pyrope garnet. The garnet cutters viewed Venetian imitations as a threat, so Turnov undercut the imitations with what they called *composition*, a type of glass (that was kept secret). Garnet cutters worked at home in rooms at street level, but the glass was worked in their basements, away from prying eyes. Guild rules of 1792 spoke of hard and soft work, but only insiders knew that the former meant garnet and the latter indicated glass (Vávra, 1954: 182–184).

The word "composition," used for Bohemian glass, refers simply to strongly colored glass, the most important being translucent red ("ruby red"); it imitates the color of pyrope garnets. This glass was made with sand, saltpeter, cinnabar, and gold. The sand furnished the silica and the saltpeter (saltpetre), either soda or potassium nitrate, the flux. Cinnabar, in this case, is not the mercury ore, which plays no role in ruby red glass (Weyl, 1959: 384–387). Rather, "cinnabar" is a term used loosely to mean any red coloring agent (Bailey and Bailey, 1929: 57). In fact, Vávra's (1954: 184) account of the beadmaker Anton Pacit refers to "lead … in the form of cinnabar." Either Vávra or Wander was unsure of the gold content or if gold was, indeed, the coloring agent.

A crude recipe for making ruby red glass was published in 1612 in *L'Arte Vetraria* by the Venetian Antonio Neri (Mentasti, 1980: 108–109; LIX). Although Neri is today regarded as the "father" of scientific glassmaking, his work received little attention until late in the 17th century, when translations of it in German and English began to appear. In the meantime, in 1685, the German Andreas Cassius published *De Auro*, with a formula for the desirable, elusive ruby red. Neri suggested using lead to dissolve the gold in the glass, a formula adopted by the Bohemians. Cassius had the gold dissolved in a tincture of tin, which came to be known as "Purple of Cassius." This formula became dominant for making ruby glass in Europe, with only the Bohemians using lead.

This begs the question of when the Bohemians began making ruby red composition and when they started using it for beads. Wander in 1786 attributed the beginning of Bohemian beadmaking to the brothers Fišer (Fischer) developing red glass in 1711, after they had stayed in Venice for five years. Virtually all histories of Bohemian glass repeat this tale. But it is now clear that the story is mythical, not historical fact. In a glass conference in Prague in 1970, Anton Gasparetto (dean of Venetian glass historians) cited a petition from Venetian glassmakers in 1709 requesting protection from Bohemian glass "similar to ours but more attractive" (Maternova, 1991: 371). Maternova said that composition was well developed by 1711, not invented at that date.

My initial reaction when first seeing the two ruby red molded beads in the St. Catherines Island assemblage was that they might have been intrusions, since Mission Santa Catalina de Guale is known to have been abandoned by the Spanish in 1680 (several decades before the presumed beginning of Bohemian beadmaking). But given that the beads were arranged on a necklace buried in the cemetery beneath the nave (and overlain by the fallen wattle-and-daub walls of the church), they must predate the 1680 abandonment.

A Bohemian origin seems more certain because the red beads are molded. Over the past several centuries, the Bohemians invented several devices to mold beads. The most characteristic one is the tong mold, an invention once attributed to Václav Rybář, who lived from 1726 to 1790 (Vávra, 1954: 182; Urban, n.d.: 4). Jargstorf (1993: 50) cites a treaty between the guilds of stonecutters and glasscutters in 1764 that indicates that two-part molds were then in use; unfortunately, she does not cite the pertinent passage. Tong molds were being marketed by 1786. In 1774 Count Zensendorf of Turnov wrote, "Some years ago a certain Fischer [Fišer][2] has developed a tool which allows [workers] to produce the artificial jewelry much more easily and at much lower costs. The glass is drawn and squeezed into the desired shape with the help of a tong including a mold" (Jargstorf 1993: 50; insertions mine). These early bead tong molds left conical perforations because the tong closed onto the bead in an arc, and the part of the mold that pierced the bead was conical in shape. Such molds were known as "mandrel" or "Dörnel" molds (Neuwirth, 1994: 246).

Before tong molds, unperforated "stones" meant to be mounted in jewelry were molded in clay (Vávra, 1954: 182). However, clay molds would not be practical for making beads. The earliest technique for beadmakers involved small metal molds mounted on wooden handles. Two workers were required, one to squeeze the mold and form a bead, and a second to push a pin through a hole in the mold to make the perforation. Neuwirth (1994: 246) quotes a report produced "locally" (apparently in Germany) by someone named Labau with the help of four leading glassmakers. The typescript is now in the Gablonzer Archiv und Museum in Neugablonz (Kaufbeuren, Germany), the town where German beadmakers resettled after they were expelled from Bohemia following World War II. This manuscript discusses the earliest means of molding glass beads in Bohemia:

> The production of hand-pierced beads required 2 people, a molder and a piercer, who sat opposite each other at the molding furnace. The molder guided the melting end of the glass rod, the 'Schmelz', into the mold and the piercer who had screwed the needle into a hand vice, knew exactly how long to wait for the precise moment when the presser pressed the mold together, to pierce with the needle at the same time. This cooperation demanded considerable skill of both workers. To make sure the needled pierced in the right place, a so-called 'snout' was attached to the mold. It is astonishing that it was possible to make up to 20 or 25 bundles, that is 24,000 to 30,000 single beads a day in this complicated manner.

Beads made this way would have straight holes, made by the second worker pushing a pin between the two metal molds. This would result in a seam running from hole to hole (longitudinally) on the bead, whereas the Dörnel molds and all subsequent molds developed by the Bohemians leave equatorial seams. The two beads from St. Catherines Island have longitudinal mold seams; they are multifaceted with three rows of six facets, which were molded.

These two beads from Mission Santa Catalina de Guale, recovered from a well-dated context, have important implications for the history of Bohemian beadmaking because they date several decades prior to the presumed age of ruby red glass beads. The St. Catherines Island evidence also demonstrated that beads, not just unperforated "stones," were made from this glass at an early date and that a form of molding was used to make the beads. Given the global importance of the Bohemian bead industry, St. Catherines Island's contribution to its early history is most welcome.[3]

BLOWN BEADS OF UNKNOWN ORIGIN

As discussed in chapter 10, most thin-walled, hollow glass beads from St. Catherines Island (Types 118–122) are not blown beads, but segmented ones. There are, however, 40 beads (and a number of fragments) from Mission Santa Catalina de Guale that were blown individually. Two whole beads (and 10 fragments), all in very poor condition, were blown individually and manufactured from compound glass (Type 120).

The second largest group of blown beads (Type 119) is technologically quite adroit. The beads were made from a black tube of glass that was closed off at one end, heated just after the closure, then blown into through the other end. This produces a bubble at the distal (away from the person blowing the bead) end of the tube that can be cut off to form a bead.

The bubble is quite round, but not perfectly so. Once the distal end of the tube was closed off, a short length of the tube was left. At the proximal end, the tube flares slightly before it is formed into a sphere. When the bubble is cut free, this end will have a larger, more jagged aperture than the distal end.

The characteristics described for the blown beads from Mission Santa Catalina de Guale are common for the majority of individually blown glass beads. The St. Catherines Island beads are outstanding because of the care with which the ends were finished. At the distal ends the remnants of the tube were removed or greatly reduced by reheating so that the remnant was melted back into the bead. The proximal ends have been finished in an even more elaborate fashion. A small "cap" of glass was added, consisting of a short tube projecting externally from the center of a small, round bowl-like structure the size of the end of a finished bead. The added "cap" hid the large aperture and made the proximal end resemble the distal end. The "caps" may have been formed especially for this purpose, or they may have been the recycled ends of similar beads that had been broken or spoiled in the workshop. Of the 13 decorated beads of this type from St. Catherines Island, one is fragmentary and another never had (or lost) its "cap." Of the remaining 11, the "cap" is not the same black color as the bead; nine are dark blue and two are white.

In addition to the capped ends, the surface of the finished beads was further decorated with 70–80 greenish yellow small glass points scattered over the surface of the beads.

The beads range in size from 9.5 mm to 11.2 mm in diameter and from 8.8 mm to 11.7 mm in length. The apertures are rarely over 1.2 mm in width, except for the one that lacks a "cap." That aperture is 2.0 mm wide.

In sum, these beads were extremely elaborate and painstakingly produced. They must have been very expensive, not to mention fragile, and are perhaps some of the most valuable pure glass beads found at Mission Santa Catalina de Guale.

I know no other examples of such decorated blown beads. Nor can I even hazard a guess as to their origin, other than assuming that they are European. The only parallel industry recorded in the 17th century is that of imitation pearls ("Roman pearls") made in France. Details on the origin of the imitation pearl industry are apparently lost. The process is thought to have been begun by one M. Jaquin, whose first name (perhaps Moise) is recorded only once. The date of the beginning of this industry is variously placed at 1656 and 1686 (Francis, 1988: 47–48).

The fabled Jaquin did not invent blowing pearl glass beads, but only developed a way to extract *essence d'Orient* from fish scales. Certainly, blown beads were being made in a rather sophisticated manner by 1680, as we have the products to attest to that at St. Catherines. By the end of the century, Blancourt (1697) described several different ways that false pearls were produced. The origin of blown glass beads is apparently not now recoverable.

Type 118 beads (4 complete and 13 fragments) were made in much the same way as the Type 119 beads (described above), except that they are of clear, undecorated glass.[4]

WOUND BEADS OF UNKNOWN ORIGIN

The origins of most wound beads cannot be pinpointed. Winding, especially furnace-winding is the oldest and most common way to make a bead. Unless some special glass, technique, or decoration is employed, it is very difficult to ascribe an origin to many wound beads. The technique developed in the Middle East during the third millennium B.C., spread to India by 1250 B.C., to Europe by 1000 B.C., and to China a few centuries later. Since beads found on St. Catherines Island originate from all these regions (the Middle East being represented by segmented beads, which were probably produced in Spain), little is gained by speculating on the origins.

But a few words are appropriate about individual beads. The green pendant (Type 92) is drop shaped and has four facets running its length, with six facets at the base. The facets were paddled while the bead was still hot. Once the bead was facetted, it was reheated, which rounded off the edges of the facets somewhat and gave the bead a very shiny coat.

Bead 28.0/4627.0001 (Type 78), a white ellipsoid with zonal striations, is an example of a Venetian barleycorn bead, one of the earliest and most popular wound Venetian beads, generally dated to 1750-1840. The specimen from St. Catherines Island is either an early example of this type, or, more likely, a later deposit (because it was found on the surface of the site).

The yellow annulars (Type 86) may be examples of the "Columbus beads" (chap. 10, this volume). Due to their extremely small size, the method of manufacture is difficult to determine.

The green incised fragments (Type 95), which might be part of a single bead, were incised with a hollow tool, leaving rounded bumps or eyes on its surface.

The melon (Type 90), with incised dashes, has six lobes, two of which have two parallel oblique incisions. Although I cannot cite any parallels, it might be Chinese.

The only complex bead in the group, cobalt blue with white dots (Type 97), is represented by nine fragments; neither the size nor the shape, of the bead can be determined.

The largest type (Type 94) in this group, transparent to translucent manganese violet faceted, has between 7 and 10 irregular facets that were paddled onto the bead while it was still hot.

NOTES

1. Translated by the translator of Vávra.
2. This would certainly appear to have been an inventive family.
3. After Peter Francis passed away, the beads discussed here were analyzed with x-ray fluorescence spectroscopy. The beads were both made of leaded glass; however, no gold was detected. It appears that copper was used in both to create the ruby red color. While the method of manufacture clearly seems to indicate a Bohemian origin, we are unsure how this glass chemistry fits within the above narrative. [EHB]
4. Beads similar to Type 118 are reported from two early Spanish contact sites. Ewen (1990a: 86-88, fig. 6-1; Ewen and Hann, 1998: 85-86, fig. 5.15, 5.17) reported finding seven blown glass beads from the village of Anhaica (the Governor Martin site). This site was visited by the de Soto expedition (1539–1540) and also has a mission period component. Smith's (1989: 1) analysis of these beads, however, indicates that they may date to the late 19th or early 20th century. They also differ from the beads found on St. Catherines Island in that they were apparently blown into a two-part mold—leaving longitudinal seams. Similar beads are also reported from the Poarch Farm site in Georgia, which also lay along de Soto's route, as well as that of the 1560 de Luna expedition (Langford, 1990: 139–140, 147–149; Ewen, 1990a: 88; Ewen and Hann, 1998: 86; Smith, 2000: pl. 2, B). [EHB]

CHAPTER 12
LOCALLY MADE BEADS FROM ORGANIC MATERIALS

Peter Francis, Jr.

SHELL BEADS

As used in this book, the term “shell” refers to the hard outer covering of various mollusks, composed principally of calcium and aragonite. Marine shells are the earliest known bead material (Kuhn et al., 2001; Bar-Yosef, 1991) and among the oldest bead materials in Asia, Europe, and America (Francis, 1981b; 1997a).

Two shell disc beads (likely from the freshwater bivalve *Unio* sp.) have been found at the Powers II site, a Paleoindian ochre mine, in Sunrise, Wyoming.[1] These are possibly the oldest known American shell beads. The earliest bead assemblage, from the Folsom site of Lindenmeier (Colorado), includes a marine shell bead, the spire of a univalve similar to *Conus*. Lindenmeier is nearly 900 km (straight-line distance) to the nearest possible marine source. The bead seems to have been worn a long time. Even under strong magnification, no traces of the manufacturing process were visible (Francis, 1997a).

Shell beads and other shell ornaments were honored throughout the New World for millennia. Given the focus on the Guale people and Southeastern archaeology, we will restrict this discussion to the role of shell beads and ornaments from Alaska to the Andes and from Maine to California.[2]

During the Middle and Late Woodland period, shell beads began to serve important social, political, economic, and ideational functions both in the northeast and the southeast United States. The northeastern Algonquian- and Iroquois-speaking people developed a small tubular bead form (wampum or proto-wampum) over a long period of time, beginning in the Archaic period, expanding in the Middle Woodland period, and becoming codified, especially within the Iroquois League, at about European contact (Ceci, 1988).

In the Southeast there was a distinct shift during the Late Woodland period from the wide variety of burial offerings that had been favored in the Middle Woodland period to the almost exclusive use of shell ornaments, presaging the emergent Mississippian period (Steponaitis, 1986: 384–385). During the Early Mississippian (ca. A.D. 800 to 1300), shell beads became valuable tokens of personal prestige and, “presented as gifts, they could be used to build alliances and inflict social debts. Exchanges of such items, especially among budding elites, were instruments of political strategy as much as, if not more than, purely economic activities” (Steponaitis, 1986: 392; see also Yerkes, 1988).

During the Mississippian period, a semispecialized craft developed in the Southeast, producing shell beads from large *Busycon* and other whelks, mostly brought to inland sites. Microlithic industries developed especially to work the shells. This craft complex has been identified at Cahokia (near East St. Louis, Illinois), Zebree (Mississippi County, Arkansas), Maximo (in St. Petersburg, Florida), West Bay (Bay County, Florida), Palm Court (near Panama City, Florida), possibly Jaketown (in west central Mississippi; Sierzchula, 1980: 5–10; Morse and Morse, 1983: 222–224, fig. 11.6), Lubbub Creek and Moundville (Alabama; Yerkes, 1988: 116; Pope, 1988); and at sites along the Tennessee and Savannah Rivers and in the Smoky Mountains (Steponaitis, 1986: 392).

Beadmaking was one semispecialized craft that spawned another one, a specific lithic industry. I use "semispecialized craft" here to avoid any misunderstanding that terms like "specialized" or "cottage industry" might imply about the degree of social complexity within Mississippian society (see Yerkes, 1988: 118–120). Beadmaking was certainly done by those who did it best and thus specialized in it. On the other hand, ethnohistoric evidence suggests that, at least in the case of wampum, anyone could make it (Williams, 1973: 210). People other than the beadmakers made the microlithic beadmaking tools or at least worked in areas where beadmaking was not conducted (Yerkes, 1988: 116–118).

The use of shell beads was widespread east of the Mississippi River. These were more than mere decoration, serving a variety of social functions in gifting, tribute, trade, and ceremony. Beads were also important status symbols among southeastern groups influenced by the Mississippian culture as well as the more northerly Algonquian- and Iroquoian-speaking groups. Bead use signaled increasingly complex social, economic, and ideational societies. This situation was sometimes recognized by the European newcomers, sometimes ignored, and sometimes exploited.

As Europeans began exploring the Americas, accounts of the use of shell for beads became numerous. The first was by Jacques Cartier in 1535, who described *esurgny* being used along the St. Lawrence River as "the thing most precious that they have in all the world." (Cartier, 1580: 51). He told us it was found in the river, but did not discuss the exact form of *esurgny*, whether it was a whole shell or a bead cut from shell. There have been many speculations ever since, but they remain conjecture.

The Northeast and Wampum

Of all shell beads the Europeans encountered, the most significant was wampum (also called "peak," both short for *wampumpeak*, Algonquian for "white shell bead"). Wampum is probably the most written-about bead in the world. Wampum was sacred to the Iroquois, who believe that Hiawatha, the founder of the Iroquois League, introduced it to them. It was used as a mnemonic device when strung up into "belts" which were required at all public events. It was used to declare war, to call a council, to seat the council, to depose council members, in adoption ceremonies, at times of mourning, and on other occasions.

Wampum came in two varieties, both in the form of small cylinders, about 6 mm long and 3 mm wide. White wampum was cut from various shells, especially the columellae of several whelks. The more valuable "black" or "blue" (actually violet) wampum was more difficult to manufacture, as it had to be made from the violet patch of the quahog (*Mercenaria* [*Venus*] *mercenaria*) clam. It was usually valued at two to three times the white wampum. Both were commonly circulated by being strung and measured in arm lengths.

The Dutch and later the English discovered that they could obtain wampum produced by the natives along the shore from New Jersey to Massachusetts. They could then ship it from New Amsterdam/New York up the Hudson River to Ft. Orange/Albany, where the beads could be exchanged for beaver pelts, then in great demand in Europe for hats.

Moreover, since European powers did not send coins to the American colonies (they thought they would be lost), the beads came to fulfill a monetary function.[3] Wampum was legal tender in all 13 original states, and into the beginning of the 18th century in New York. Two wars were fought over the control of its trade; Linnaeus recognized its importance by naming the quahog clam *Mercenaria mercenaria*, after its use for money (see Francis, 1986b; 1986c: 22–27). In time, it was manufactured in European-run factories in New York, Pennsylvania, and New Jersey. Wampum eventually lost its monetary value and became merely a trade item.

The Middle Atlantic (Roanoke)

The situation in the American Middle Atlantic States (Maryland, Virginia, and at least parts of the Carolinas) was similar to that in the Northeast, but a different type of bead was involved.

The prolific John Smith often wrote of "beads" or "white beads" in conjunction with his early observations in Virginia. They were always differentiated from pearls. In 1607 he mentioned the use of such beads for human ornamentation (Smith, 1906: 440), in religious buildings and ceremonies, in trade, as tribute, and in a storehouse to be used after the death and burial of Powhatan (Smith, 1906: 455, 448–456). Contemporaries in Virginia (Percy, 1906; Purchas, 1906) verified the importance of shell beads. Ralph Hamor, the secretary of Virginia, was apparently the first person to record the name of these beads in 1615: "two bushels of *Roanoake* (a small kinde of beads) made of oystershels, which they use and passe one to another, as we doe money (a cubits length valuing sixe pence)" (quoted in Slotkin and Schmitt, 1949: 231).

In a work first published in 1624, John Smith also made it clear that the ubiquitous white bead was called "roanoke." In discussing trade prospects he mentioned his desire to

> search what furrs, the best whereof is at *Cascarawaoke*, where is made so much *Rawranoke* or white beads that occasion as much dissention among the the [sic] Salvages, as gold and silver amongst Christians ... (Smith, 1966: 58).

In the same work, he included an abbreviated glossary gathered from the Powhatan federation, as well as a few sample sentences, the last of which reads:

> *Kekaten Pokahontas patiaquaghningh tanks manotyens neer mowchick rawrenock audowgh*, Bid Pokahontas bring hither two little Baskert, and I will giue her white Beads to make her a Chaine. (Smith, 1966: 40)

In 1635 Cecil Calvert (Lord Baltimore) wrote of both roanoke and wampum then circulating in Maryland:

> It fell in the way of my discourse, to speake of the Indian money of those parts. It is of two sorts, Wompompeag and Roanoake, both of them are made of a Fish-shell, that they gather by the Sea side, Wompompeag is of the greater sort, and Roanoke of the lesser and the Wompompeag is three times the value of Roanoake; and these serve as Gold and Silver doe heere. (Calvert, 1966: 36; Hall, 1959: 90)

Calvert was clearly differentiating roanoke and wampum, while the Virginia settlers spoke only of roanoke. He also noted that beads were used for special purposes, including burials and as bride price:

> If the husband die, he leaves all that he hath to his wife, except his bow and arrowes, and some Beads (which they usually bury with them) … The manner of their marriage is this: he that would have a wife, treates with the father, or if he is dead, with the friend that take care of her whom he desires to have his wife, and agrees with him for a quantity of Beads, or some such other thing which is accepted amongst them .... (Calvert, 1966: 28; Hall, 1959: 85)

While these two passages do not specify what the beads were, another, discussing the payment for shedding blood, specifies more about how roanoke are used. "It is the manner amongst us Indians, that if any such like accident happen, wee doe redeeme the life of a man that is so slaine, with 100 arms length of *Roanoke* (which is a sort of Beades that they make, and use for money) . . . (Calvert, 1966: 35–36; Hall, 1959: 89–90; interpolation Calvert's).

It must be remembered that wampum (peak) was an import to Maryland (and later Virginia). Roanoke was the native shell bead and wampum gained strength because Europeans favored it. As an example, Henry Fleet was given a license to trade in 1637 in the vessel *Deborah* to Maryland residents. His cargo included: "seventy-four trading axes, twenty-six hoes, nineteen yards of Dutch cloth, sixteen pairs of Irish stocking, two yards of peak [wampum], and a chest containing beads, knives, combs, fishhooks, Jew's harps and looking glasses." (Rountree, 1997: 87; insertion mine). Unfortunately, he managed to sell only the cloth.

In 1705, the historian Robert Beverly wrote about the beads used by the natives in Virginia. He differentiated between both colors of wampum, runtees,[4] shell pipes,[5] and then roanoke:

> They have also another sort which is as current among them, but of far less value; and this is made of the Cockleshell, broke into small bits with rough edges, drill'd through in the same manner as Beads, and this they call *Roenoke*, and use it as the *Peak*. (quoted in Swanton, 1946: 482)

Beverly has been cited by many writers, including Wiener (1922: 259–260), Swanton (1946: 482), Taxay (1970: 107–108), and Becker (1980: 3). However, Beverly took much of his material, including the passage about shell bead use, from unpublished manuscripts written by John Banister.[6] The Englishman Banister, a natural scientist and Anglican minister, went to Virginia in 1678 and was the first university-trained scientist to send floral and faunal specimens and drawings back to England. He was accidentally shot in 1692 before he was able to publish most of his discoveries (Ewan and Ewan, 1970: xii–xxvi). His discussion of the shell beads in Virginia is not widely known and deserves to be quoted in full:

> The women go bareheaded, & and so do the men too unless it be those of the better sort, who sometimes pit on a border or Coronet of black & white Peak prettily wrought, but more for ornament than for use, being open at top like the Peruvian feather-crown. The beads of which this crown is wove are small Cylinders about [1/3] of an inch long, & [1/4] of an inch through with a whole drilled in the center. They are made out of a large kind of Cockle, whose figure is exhibited No. 33 [no period.] The black out of the lip, the white out of the rest of the shell, these strung among us [by our Indians] are worth 9 d <pence> [;] those 18 d [for] a yard; they are made by the Indians to the Northward, & and are call'd Peaque & Wampom-peaque. About their neck they wear a broad belt, or rather collar of the same, as also a round tablet of about 3 or 4 inches wrought out of a large Cuch <conch> shell, & some too wear a bracelet of great bulging beads made of the same shell, which the Southern Indians call Rantees; in their ears they hang a pipe about the bigness of the stem of a tobacco pipe smoothly worked out of the string or middle part of a Chunk drilled from end to end, or else a fingers length of smooth Roanoak, which is a kind of bead mony <sic> also, about the bigness of a large spangle: it is the new is rough or cragged on the edges, & tis not so much esteemed as that which is new & worn; it s value is about 6 d a yard. (Ewan and Ewan, 1970: 373; insertions in square brackets by the Ewans, in pointed brackets by the present author)

This remarkable passage presents several important facts about shell beads in Virginia around the 1680s. Wampum had found its way into Virginia (it is recorded earlier in Maryland) and was being used as a semi-currency along with roanoke (runtees and the pipes for the ears do not seem to have played this role). The wearing of shell beads was a matter of status. Unlike Beverly and earlier writers, Banister described roanoke as a thin disc ("the bigness of a large spangle"). It also seems, though it is not quite clear, that roanoke was initially worn with broken edges and attained prestige as its edge was smoothed by wear.

In 1709, John Lawson published his adventures in the Carolinas. In the interior, he observed the use of dark and white wampum and of roanoke. He discussed the problems the English had in replicating these beads:

> But the Drilling is the most difficult to the *English* men, which the *Indians* manage with a nail stuck in a Cane or Reed. Thus they roll it continually on their thighs, with the Right-hand. Holding the Bit of Shell with their Left, as in time they drill a Hole quite through it, which is a very tedious Work; but especially in making their *Ronoak*, four of which will scarce make one length of *Wampum*.

This passage is curious. Lawson had previously said that wampum was the more valuable bead, having noted the use of shell beads as "species" down to the Gulf of Mexico that, "we call *Peak* and *Ronoak*, but *Peak* especially". In the passage cited above about drilling, Lawson appears to be saying the roanoke was the more tedious bead to make. Yet, if it were only a quarter as long as wampum, it should have been much easier, rather than more tedious, to drill. Perhaps he had never seen wampum being made.

We must also ask what sort of wampum Lawson was comparing to the size of roanoke. Was it made by natives or Europeans? Early European-made wampum was not as large as later European-made beads, which were about twice the size of native-made ("council") wampum in both diameter and length. The earliest known date for a wampum factory is in Albany, New York. In 1748 Peter Kalm observed, "Many people at Albany make wampum for the Indians, which is their ornament and money" (Benson, 1966: 343). The one known wampum-making site in Albany, perhaps begun shortly after 1720, made beads corresponding to "council wampum" size, about 7 mm long (Peña, 1990). Hence, even if Lawson was observing European-made wampum, it was probably about the same size as council wampum.

Swanton (1946: 483–484) took Lawson at his word and assumed that roanoke would have been more valuable than wampum, contrasting what Beverly had said. Swanton concluded that "roanoke" was not a particular type of bead, but rather a generic term for shell beads.

Slotkin and Schmitt (1949: 232) quoted D. I. Bushnell describing a "Virginian Purse" that was "most likely collected by John Smith." D. I. Bushnell said, "Several of the smaller beads … have a length much greater than their diameter and are therefore similar to the true wampum," concluding that wampum was in general use in Virginia in John Smith's day and that the roanoke he referred to was nothing but wampum. He failed to note, however, that the bulk of beads were disc beads, unlike wampum.

"Powhatan's cloak," today curated in The Ashmolean Museum at Oxford, was listed in 1656 as "*Pohatan*, King of *Virginia's* habit all embroadered with shells, or *Roanoke*" (Piper, 1977: 25; pl. 2). The garment, whether Powhatan's or not, is decorated with filled-in circles, and a human and two animal figures. These are formed not with cut shells but with small whole shells (probably *Marginella*). They do not fit any other description of roanoke.

Roanoke continued to be used, especially by or paid to the natives, throughout the 17th century in both colonies for a wide variety of purposes. In Virginia, roanoke was used to secure land in 1643 (Rountree, 1997: 550), to settle a small armed conflict in 1651, to pay the English for damaged livestock, to buy native children in a short-lived and ill-fated scheme for servants in 1670, and as the bounty for the return of slaves in 1665 and 1675 (Rountree, 1997: 68–79, 81).

In Maryland, roanoke also remained in circulation, especially among the natives. In 1686, it is recorded as burial goods that were stolen (Davidson, 1997: 120). In Virginia, as in New York, the principal item traded for was beaver skins. Per pound, a beaver was worth thirty pounds of tobacco or eight shillings in 1637. By 1643 beaver was worth 72 to 100 pounds of tobacco or 10 to 15 shillings. The same amount of beaver then cost 10 arm lengths of roanoke. Prices dropped slightly against tobacco and money the next year, but 10 arm lengths of roanoke remained steady. In 1668 the prices had dropped to their lowest level. Tobacco is not recorded, but a pound of beaver then cost only five shillings or 10 arm lengths of roanoke (Davidson, 1997: 88). This represents a little less than a two-thirds devaluation of roanoke against the British pound.

This much can be concluded:

(1) Roanoke was made and circulated in the mid-Atlantic, not the Northeast, and was thus distinct from wampum.

(2) Roanoke was a native-made disc bead, continuing the form used during the Mississippian period.

(3) Roanoke was in common use in Maryland and Virginia and perhaps beyond by the time of early contact. Its use continued, principally among the natives or in dealings with them, through the 17th century, at the end of which few natives were left in the area.

(4) Roanoke was not merely decorative. It fulfilled various social functions among different peoples, including trade, tribute, bride price, mortuary goods, blood money, and in religious ceremonies.

(5) At least among some Europeans, the term "roanoke" had a wider (misunderstood?) meaning including beads properly classified as cylinders and whole shells.

Roanoke is often equated with a "disc bead." Discs are round, flattened objects, but there is no standard proportions in common speech to distinguish a disc from some other shape. In bead nomenclature, a disc bead has a length one-third or less than the diameter of the bead (Beck, 1928: 4). That definition will be retained here, but earlier (and later) writers need not be criticized for not following this formula.

The roanoke discussed by Banister and Lawson fits Beck's definition of a disc bead and is thin, probably no more than 2 mm in length. Shell disc beads are common on many mid-Atlantic and southeastern sites. A Rappahannock burial site in Richmond County, Virginia yielded "Twenty-odd thousand shell beads of several types, the majority of which are very small disc beads [that] range in diameter from 2 to 4 mm and from 1 to 2 mm thick" (McCary, 1950: 14).

Even more intriguing are two sites in the Carolina piedmont: the Wall site and the Fredricks site. The latter is believed to have been the village of Occaneechi, visited by John Lawson in the early 18th century, where he may have seen roanoke being made. At both sites, small shell disc beads make up some 90% of the bead assemblages (Hammett and Sizemore, 1989: 126, 130).

In contrast, disc beads of this type were rare in New York until the late 16th century (Beauchamp, 1901: 365–368). At least among the Seneca, the frequency of shell beads in mortuary contexts declined from ca. 1600 to 1640, then grew rapidly. However, in this later period shell beads were dominated by wampum (Sempowski, 1988: 90). It would appear that in the late 16th century there was wider distribution of both roanoke toward the north and wampum toward the south, with wampum eventually becoming the dominant "money" bead type.

The Third Bead

South of the Middle Atlantic States—that is, in *La Florida*—a third (unnamed) bead type circulated. After contact, this third kind of bead did not become as firmly established as wampum or roanoke. It was not necessary to monetize local shell beads in this region as it was in English, Dutch, and French colonies because the thriving mints of México and Lima provided Spanish colonies with coinage. After the natives of the region had been decimated and dispersed, the use of shell beads ceased.

There is no known record of the use of this bead in Spanish documents. The Spaniards were mostly government officials, military men, or missionaries—very different from the English and other settlers to the north. The few traders generally confined themselves to St. Augustine. They interacted with the local natives but, except for the missionaries, not in the complex ways that the farmers and adventure-traders did further north.

We have no historical records of the use of shell beads among the Guale people of the Georgia coast. Yet, there seems no reason why shell beads would not have been as important to them as they were to the Iroquois, Algonquian, and other people living to their north. While these people were not closely related to the Guale, there was a general similarity in lifestyles among native groups. We can tentatively extrapolate Guale use of shell beads from the records of more northern people.

The beads used in the more southern regions were short cylinder and short barrel in form. Examples of their use are numerous, but the following locations circumscribe the area. Beads of this type have been found strung in a pot in a Nodena Phase (Late Mississippian, ca. A.D. 1400 to 1700) site in Mississippi County, Arkansas (Pecotte, 1972) and on a string associated with a burial (perhaps along with glass beads) at Marmet, West Virginia (Barnett and Paxton, 1955). They are present, though in the minority, at the Wall site on the Carolina piedmont (Hammett and Sizemore, 1989: 129, 131, fig. 6a). They are also among the shell beads from Calusa territory in southwestern Florida (Marquardt, 1992: 215–216).

Other indications of the wide use of shell beads thicker than discs in this area are the early depictions of natives along the Atlantic coast. The drawings by John White of Virginia natives and those of Jacques le Moyne of the Timucuas of Florida were both popularized through engravings based on them by Théodore de Bry. Both groups, living to the north and south of the Guale, show the use of strands of beads; most were likely short barrel and cylinder shell beads.

Shell Beads from St. Catherines Island

The extended introduction above provides a background for understanding the shell beads found on St. Catherines Island. The working hypothesis here is that the Guale gathered local shells and fashioned them into beads. Although it is possible that some of the shell beads recovered on St. Catherines Island were imported, this would be very difficult to demonstrate. Since beadmaking is recorded at Mission Santa Catalina de Guale, we will assume that all the shell beads from mission-period contexts at St. Catherines were locally made.

In his general description of the Guale, Bartolomé Barrientos (García et al., 1902: 112) tells us that in addition to hunting, they "*a buscar palmitos y marisco*" (look for hearts of palm and shellfish). For the coastal-dwelling Guale, marine resources, particularly those in tidal waters, were a principal means of subsistence (Thomas, 1990: 361). The basic use for shellfish was as food (as discussed in the section dealing with pearls). After the animal itself was consumed, the remaining shell became a convenient raw material for beads.

It is often difficult to identify the type of shell used to make a particular shell bead. In some cases, however, the general type of shell, whether univalve (conchs, whelks, snails, etc.) or bivalve (clams, oysters, etc.) can be determined by examining the layers of the shell composing the bead. This has been done whenever possible, and is recorded in appendix 4.

Making Shell Beads on St. Catherines Island:[7]

The bead blank was removed by breaking the whole shell into suitable small pieces or by chipping at it to remove suitable blanks. This operation would have been done with stone tools in the precontact period and this tool kit may have been augmented by metal tools in the historical period.

Drilling methods are more easily recognized.[8] Lawson (1966: 194) tells us that in the early 1700s in the Carolinas beads were drilled "with a Nail stuck in a Cane or Reed. Thus they roll it continually on their Thighs with the Right-hand, holding the Bit of Shell with their Left, so in time they drill a Hole quite through it, which is very tedious Work."

In addition to a nail, awls were used to drill shell beads, in particular wampum. Drilling awls were part of the gifts given to the wampum-making natives of Staten Island to purchase their territory (Anonymous editor, 1913: 124), shortly after Manhattan had been purchased.[9] Beauchamp (1901: 330) recorded three other land transactions between natives and Europeans involving quantities of awls, all assumed to have been used for wampum-making. Roger Williams (1973: 213) noted that, for Rhode Island wampum-makers, "Before ever they had *Awle blades* from *Europe*, they made shift to bore this their shell money with stone."

Few documentary accounts adequately describe how shell beads were made. Indeed, the only contemporary description, aside from Lawson's, is that by Arnoldus Montanus (1851: 128; insertion mine) in 1671 discussing wampum making in New York, "the inside little pillars of the cockle-shells [univalve columellae] . . . they polish smooth; drill a hole through the center; reduce it to a certain size, and string the pieces on threads."

We also have the archaeological evidence from St. Catherines Island that helps us understand how the shell beads were made.[10] While it is possible that the Franciscans furnished the Guale with awls (or conceivably even drills), nails would have been much more available as the drilling point for many of the beads.

Neither the description by Lawson of roanoke beadmaking in the Carolinas nor any other contemporary reports indicate that any sort of mechanical device was used in the making of shell beads by natives along the Atlantic coast. The beads at St. Catherines confirm that.

A glance down the "Perforation" column of the shell bead tables in appendix 4 will show that many of the beads have perforations described as "wobbly," meaning that the aperture is asymmetrical compared to the rest of the perforation. Such a perforation may also be described as being "eccentric." This sort of perforation is a mark of a hand-held drill, rather then one employing a mechanical device, such as a bow drill (Gwinnett and Gorelick, 1981: 22).

Two other observations may be made before leaving this section. One is that the great majority of perforations have hourglass (also called biconical)[11] shape. This indicates that the beads were drilled from both ends because drilling them from only one end causes the distal end to shatter, leaving an unsightly large scar on that side.

The other is that a large number of perforations are off-center or asymmetric to the perimeter of their bead. Additionally, many of the beads from these areas were not ground smoothly on the sides but retained at least some facets. Both characteristics argue for the beads having been finished individually and not strung up and finished *en masse* as is done in the widely used *heishi* technique.[12]

The Use of Shell Beads on St. Catherines Island: One way in which the shell beads were employed at St. Catherines is evident enough: they were used in mortuary practices. However, the relatively small number of shell beads found in the cemetery compared to the total number of beads there leads one to wonder if shell beads may have had other uses. It is well established that the Guale were involved in long-distance trade, using beads and other goods for barter or tribute to enhance the prestige and power of high-status individuals. Someone had to make these beads somewhere, of course, and one place they were made was clearly St. Catherines Island. While it may not be unique,[13] to date it is one of the few known beadmaking sites in Guale territory, indeed, in all of *La Florida*.

Most Spanish or Spanish-contact sites in *La Florida* yield few shell beads. Twenty-four are reported from Santa Elena, 12 of which are cylindrical and of wampum proportion, and 12 were short cylinders or bicones (called "disc" in the report). Eleven of the cylindrical and nine of the wider beads were found in a Spanish feature at Fort San Felipe, a daub-processing pit (Polhemus, 1988: 443–444). They were rare in Calusa territory in southwestern Florida

(Marquardt, 1992: 214–215); none were found at the Goodnow mount (Griffin and Smith, 1948: 24). Shell beads have been found at San Luis Talimali, but have yet to be published (Mitchem, 1992: 241).

I would propose that in addition to being worn by the dead (and most likely the living) on St. Catherines Island, the beads produced there were often destined for wider circulation. St. Catherines Island may have served the Guale much as Cuscarawaoke served Powhatan's Appomattox domain, as reported by John Smith. The principal difference would have been that St. Catherines Island was within Guale territory, while Cuscarawaoke was outside Appomattox territory.

PEARLS AND PEARL BEADS

Several different sorts of mollusks cover a small irritant, such as a parasite or a grain of sand, with nacre forming pearls. Nacre is made of tiny aragonite crystals bound together by the hornlike organic material conchiolin. The orientation of the nacre (the material that makes up mother-of-pearl) scatters light as it shines on it, giving the nacre pearlescence, or the typical sheen of pearls.

Pearls and the Spanish

Pearls were the first natural resource successfully exploited by the Spanish in America. They were reported, given to, and bought by many early explorers along the Atlantic and especially in the Caribbean. Reports of very large pearls or large accumulations of pearls would have been very enticing to Europeans who were already familiar with this rare, animal-produced gem. The familiarity with pearls, however, did not always translate into a true understanding of their nature (Francis, 1986c: 14–16).

On an unauthorized leg of his third voyage in 1498, Columbus was the first European to see any part of South America, the coast that would later become part of Venezuela. The natives came in their canoes to barter with Columbus's ship: "Some women came who wore on their arms strings of small beads and among them pearls or baroque pearls of high quality . . ." (Morison, 1963: 273). Columbus tried to find out where they had come from. He was convinced that by means of signs he had learned this, but was not wholly certain that they arose from the mother-of-pearl he was shown. "Wherever they grow . . . they are very fine and they bore a hole into them as at Venice." (Morison, 1963: 273-274). Ironically, a year later Alonso de Ojeda named the coast Venezuela, "Little Venice,"[14] not for the pearls but for the stilt houses that reminded him of the Italian city.

Columbus never found the rich pearl beds and had to hurry back to Hispañiola because he had been delinquent. There he and his brother were put into chains and sent back to Spain. In 1499, Cristobal Guerra, captain and cofinancier of the expedition with his brother, and Peralonce Niño as navigator returned to the region, making a profit from the pearls and brazilwood they obtained. Soon others from Santo Domingo were making secret forays into the region (it was under license from the King to Guerra) and at least by 1509 had discovered the rich beds around the island of Cubagua; they forced the natives to dive for the pearls (Willis, 1980: 27-29).

While not large, the pearls were of excellent quality and very numerous. Under the governorship of Diego Columbus, exploitation at Cubagua expanded and in 1515 the town of Nueva Cádiz[15] was founded with 300 settlers. It was soon the richest town in the Indies, with substantial buildings and a population of perhaps 15,000 (Willis, 1980: 30). Its wealth was unimaginable. From 1520 to 1530 it sent the Crown an average of 800,000 pesos annually, for a while as much value as all other American enterprises combined (Willis, 1980: 38).

But it was excessive. The desert island had neither water nor food resources and everything was imported from Margarita or the mainland (the enslaved native workers subsisted mostly on oysters). At the usual rate of 200–300 oysters to yield a caret of pearls, it would have required the harvest of 340,000,000 to 510,000,000 oysters in the single month of January 1529 alone. The beds were soon depleted. A hurricane destroyed the town in 1541 and the island was abandoned by 1545[16] (Willis, 1980: 28, 30–31; see also Francis, 1986c: 16–17; Morón, 1964: 33–34).

The Spanish never found another Cubagua. El Archipiélago de las Perlas, on the Pacific side of Panama and La Paz, Baja California had somewhat smaller pearling beds, but the Spanish quickly exhausted them as well. Balboa, de Soto, Lane, Smith, Strachey, Calvert, and others all reported pearls, sometimes in great quantity or of large size (Francis, 1986c: 15–16). Many of them reported that the pearls were spoiled because the natives, looking for food rather than ornament, heated the shellfish to open it and consume the flesh. Pearls were a mere by-product for them.

Pearls Recovered from St. Catherines Island

Bartolomé Barrientos, who accompanied Pedro Menéndez de Avilés through Guale territory in the 1560s, writes of an encounter with a principal *cacique* at what he deemed to be an important place. Menéndez and the *cacique* exchanged gifts, the Spanish getting some hides and "*perlas quemadas, que ay muchas En aquella tierra*" (burnt pearls, which are numerous in this country).

Sixteen pearls[17] were recovered at Mission Santa Catalina de Guale. Their characteristics are reported in table 12.1. One (28.1/6960) was an undrilled "pearl button," hemispherical in shape. It was found in the area of the western bastion. One pearl was excavated in the *cocina* (Structure 2). The other pearls were found in the burials under the church.

Three of the 14 pearls from the church were found in separate burials (those found together will have the same catalog numbers, differentiated by letters at the end). Six pearls were found together in one burial. In the group of six pearls, one (28.1/7586c) was not pierced. This also occurred among the buried shell beads. In the case of shell, it seems likely that the person being buried might have made shell beads. This seems somewhat unlikely with the undrilled pearl, as there were probably not enough pearls for anyone to specialize in their drilling. It may have simply been an offering. The other unpierced pearl, the "low dome" from the western bastion, is known as a "mabe" pearl and grew while attached to the side of the shell rather than in the flesh of the oyster.

We do not know how the Guale valued pearls. They would have been occasional finds in their food and were fortuitous beads. We know the Spanish valued them highly, but that tells us nothing about what the Guale thought of them. There is no indication that there were ever enough pearls at St. Catherines to attract the attention of the Spanish or establish any sort of pearling industry.

TABLE 12.1
Pearls at Santa Catalina de Guale

Catalog no.	Location	Diameter	Length	Shape
28.1/5785	Cemetery	8.1	6.5	Knobbed oblate
28.1/6803a	Individual 208	2.9	1.4	Short cylinder, defoliated
28.1/7586a	Individual 253	5.1	4.0	Sphere
28.1/7586b	Individual 253	4.8	4.0	Sphere
28.1/7586c	Individual 253	4.7	4.4	Sphere; not pierced
28.1/7586d	Individual 253	4.2	3.8	Sphere
28.1/7586e	Individual 253	4.3	5.8	Flat barrel
28.1/7586f	Individual 253	3.7	3.8	Sphere
28.1/7643	Cemetery	4.8	3.7	Oval
28.1/6278a	Individual 208	7.6	8.2	Sphere
28.1/6278b	Individual 208	7.0	7.5	Sphere
28.1/6278c	Individual 208	8.0	8.6	Sphere
28.1/6278d	Individual 208	8.0	6.8	Sphere
28.1/6278e	Individual 208	6.4	7.3	Sphere
28.1/6960	Western Bastion	2.1	2.0	Low dome; mabe pearl
28.2/0387	*Cocina*	6.7	6.0	Sphere
Total pearls	16			

TABLE 12.2
Bone Beads of St. Catherines Island

Catalog no.	Provenience	Shape	Diameter	Length	Count
28.0/2316	9Li209	Incised bone tube: bird bone			1
28.0/3210	9Li217	Cylinder with rounded end	13.1	58.4	1
28.0/4219a	Wamassee Head	Oval: highly polished, tapered ends, drilled biconically	4.76-7.99	4.51-5.35	1
28.0/6502	Burial D	Spherical with incised diagonal lines[a]	8.43	9.17	1
28.0/6502	Burial D	Spherical with incised diagonal lines[a,b]	–	–	1
28.0/8073	Cemetery, near Burial D	Spherical with 2 distinct patterns: incised diagonal lines on one side and a circle with a central dot on the other[a]	5.35	6.56	1
28.2/8545	Structure 6	Oval: highly polished, tapered ends, drilled biconically[a, c]	4.76-7.99	4.51-5.35	1 (in 4 fragments)
28.2/8690	Structure 6	Oval: highly polished, tapered ends, drilled biconically[a]	4.76-7.99	4.51-5.35	1
28.2/8695	Structure 6	Oval: highly polished, tapered ends, drilled biconically[a,b]	4.76-7.99	4.51-5.35	1
28.2/9014	Structure 5	Sphere	4.39	5.63	1
28.4/4878	Fallen Tree	Sphere: ground, highly polished	5.78	4.76	1
28.6/4035	Back Creek Village	Barrel, polished, biconically drilled, burned	5.58	11.73	1
Total					12

[a]Possibly of European manufacture.
[b]Fragment.
[c]Fragments.

BONE BEADS

Twelve bone beads were found on St. Catherines Island. Bone is one of the oldest bead materials in Europe, Asia, and the Americas (Francis, 1981b: 138, 140–141; 1997a). Bone is an abundant material and easily worked, though it has been used less for beads than many other natural materials, such as shell. Six of the bone beads may be rosary beads of European manufacture.

Most of the bone beads from St. Catherines were made from mammal bones.[18] Three of the bone beads have been decorated with incised markings. Table 12.2 lists the individual attributes of these beads.

NOTES

1. These are reported in Stafford et al. (2003). [EHB]

2. Examples of other important shell trade networks in what is now the United States include that between California and the Great Basin (Bennyhoff and Hughes, 1987) and the dentalium trade in the Northwest (Chase-Dunn and Hall, 1998). See, also, Trubitt (2003).

3. Note that wampum was never "Indian money," as even some of the best dictionaries define it. While it was used in trade by Native Americans, its principal functions were not as a commodity or a currency. That function was assigned to it by the Europeans.

4. A runtee is a large, round shell disc, often decorated on one side, with two parallel perforations through the edges. They were popular as far north as New York.

5. These were worn in ear lobes.

6. Beverly was by no means the only historian or natural historian who plagiarized Banister's writings without giving him credit. Ewan and Ewan's (1970) remarkable work of historiography makes this abundantly clear.

7. Pearson and Cook (2006: 5-19–5-20) provide the best description of shell beadmaking during the late prehistoric in the Southeast. On Ossabaw Island, knobbed whelk were found in all stages of shell tool production, including disc and columella beads, at the "Bead Maker's Midden site." The body whorls were carefully removed in linear sections from the proximal to the distal ends (probably with another whelk or a hammerstone) and broken into segments to make disc beads. Once the columella was left, columella beads were made by incising the perimeter of the columella and breaking it off into segments, which were then polished and drilled. [LSAP]

8. The "Bead Maker's Midden Site,"on neighboring Ossabaw Island, provides evidence for the drilling of whelk shell beads with stone and petrified wood "microdrills" (Pearson and Cook, 2006). [LSAP]

9. Wampum beads were also part of the purchase price of Staten Island, but to seal the agreement and not as trade goods. It is not known what was used in the Manhattan purchase and the story of trade beads being used has no basis in fact (Francis, 1986b).

10. Sanger (2008: 754-755) discusses microblades excavated at Fallen Tree (9Li8), part of the aboriginal settlement at Mission Santa Catalina. As he notes, and as Francis discusses above, these tools are often thought to be associated with shell bead manufacture (see also Blair and Francis, 2008: 760). [EHB]

11. Although either term will do to describe the cross section of such perforations, "biconical" has another important meaning in bead nomenclature, describing a bead shape made of two cones joined at the bases. When used for perforations, the cones are inverted and meet at their apices.

12. The term *heishi* is derived from the language of Pueblo Santo Domingo, New Mexico, meaning originally shell disc beads, but now including similar beads of other materials as well. The term "heishi" should not be used to describe any beads other than those made in the Pueblo, but "*heishi* technique" and "*heishi* method" are acceptable labels for a beadmaking technique that involves stringing drilled blanks and smoothing them together against a flat or grooved rock. This technique is very old, first recorded in India from the Upper Paleolithic (Francis, 1983: 145). It is widely spread around the globe, from South Africa to Taiwan and Thailand to Early Historic India. It is not yet known when it was first used in North America, but the procedure may well have been reinvented several times.

13. See especially Pearson and Cook (2006). [LSAP]

14. The "-uela" suffix, at least in modern Spanish, connotes more than diminutive size, indicating some contempt.

15. After which the well-known glass trade bead discussed in chapter 7 was named.

16. Morón (1964: 34) puts the abandonment of Cubagua at 1543, following an earthquake the year before. Herrera (1906: 459-460), the Spanish historian, was clearly describing an earthquake, rather than a hurricane at Cubagua. Even though the sea rose four fathoms, "much salt water as blacke as inke" sprang from fissures in the ground. However, he put this calamity at 1530.

17. It is often difficult to distinguish pearls after they have been buried for some time. They tend to defoliate and disintegrate rather quickly. The ones discussed here include those not positively identified.

18. One possible exception, unavailable for analysis, is a drilled fish bone recovered from the Mission. Reitz (in press, chap. 5) writes: "Two small holes had been drilled into a seatrout (*Cynoscion* spp.) vertebra centrum, perhaps to make a bead or button." [EHB]

CHAPTER 13
IMPORTED BEADS MADE FROM ORGANIC MATERIALS

Peter Francis, Jr.

JET BEADS

Jet is a form of coal, a fossilized plant material. It is gem quality lignite, darker, harder, stronger, more resistant to cracking, and takes a better polish than other coals. Jet has long been utilized as a bead material. At Petersfels, Germany (ca. 10,000 B.C.) excavators found 133 worked pieces of jet and 450 prepared jet "sticks" (Müller-Karpe, 1966: 303). Jet was subsequently used during the Bronze Age, especially in England, and through Roman and Medieval times (Muller, 1980: 9–10).

Jet is sometimes difficult to distinguish from other coals, and it is not known exactly what makes jet so distinctive. One suggestion is that jet is derived from the woodiest part of trees (antharxylon) rather than from small branches, leaves, and other vegetable matter (Pettijohn, 1957: 490–495).

Tests made on jet pieces from various collections in the Devizes Museum in England found that much of what was assumed to have been jet was something else, commonly cannel coal, lignite, or oil shale (Pollard et al., 1981). We have not tested the jet beads recovered from St. Catherines Island. It might be that some (or even many) of these artifacts are not actually jet, but the distinction matters little to our story. Whatever the raw material; it would all have been considered *azebache*[1] by the Spaniards and taken as that by the Guale.

Although the distinction is often drawn between "hard jet" and "soft jet," they are equally "hard" on the Mohs scale of hardness. The real difference is that "hard jet" is tough, much less subject to cracking, and survives longer than "soft jet," a more brittle and easily cracked raw material when being worked or otherwise stressed. The cause of this difference is still unknown (Muller, 1980: 4). Several of the jet objects from St. Catherines Island are clearly "soft jet," as they are heavily crackled. This is consistent with a Continental source as opposed to the major English sources in Yorkshire,[2] which produces mostly hard jet. Jet is also found throughout the New World.

Jet in Spain[3]

Jet played an unusual and crucial role in Spanish history, intimately linked to the devotion of the Apostle James,[4] the Patron Saint of Spain.

This connection was an accident of geography. Spanish jet can be mined in the modern province of Asturias and came to be worked in the city of Santiago[5] de Compostella.[6] Santiago was the focus of the *Reconquista*, the Christian holy war fought against the swift Muslim penetration into the Iberian Peninsula. The city was located at the western terminus of the Kingdom of Asturias (much larger than the modern province of that name, comprising about one-fifth of the peninsula). The legend of finding the uncorrupted body of James in A.D. 812 or 814 rallied the demoralized Christians, eventually leading to victory over the Muslim forces.

The last stage of the *Reconquista* was the fall of Granada in 1492, a date that reminds us that the momentum of the *Reconquista* was a factor behind the Spanish conquest of the Americas. As spiritual commander behind the forces of the *Reconquista*,[7] St. James was honored by having cities, rivers, provinces, islands and mountains named after him (Santiago de Chile, Santiago de Cuba and San Diego,[8] California, and Matamoros[9] for example) throughout the Caribbean, Latin America, and the Philippines.

It was inevitable that a series of churches was erected over his purported burial site. The last one, considered to be the finest Romanesque cathedral in the world, was built between 1078 and 1211. Pilgrims from across Western Europe flocked to the spot, most of them first assembling at Tour St. Jacques in Paris. Half a million people made the trek annually at its peak (Michener, 1968: 720–722). The pilgrimage was equivalent in piety to a Rome or Jerusalem pilgrimage. Even St. Francis of Assisi, the founder of the Franciscan order, made the pilgrimage in 1214.

This vast movement of people and ideas from much of Europe made this western extremity a fertile ground for politics and commerce. The French actually controlled much of the pilgrimage and an estimated 80% of the pilgrims were French (Michener, 1968: 718). England and France both had their eyes on the Kingdom of Asturias, and other powers watched the situation closely.

The cathedral is unique, surrounded by not one, but four plazas. The northern plaza is named *Plaza de la Azabacheria* (Plaza of the Jet Shops). It was, in fact, under the control of the French and served as the center of exchange for all of northern Spain, supplanting Medina del Campo in this function (Michener, 1968: 758–760).

Plaza de la Azabacheria was also, of course, the center of the jet trade. As with many natural substances, jet was long considered to have magical properties and its first use as an amulet is recorded in the 11th-century Iberian-Arabic literature (Mayer, n.d.). A guild of jet carvers was formed at an early date[10] and trade was brisk with the large number of pilgrims. The jet carvers were famous for their rosaries, rings, crucifixes, and amulets, especially the *higa*[11] (a closed fist with the thumb protruding between the index and middle finger) and scallop shells, the symbol of St. James.[12]

Jet and the American Trade

Except for finger rings in 1523 (Kelly, 1977: 26), no records exist of jet importation into Spanish America until the mid-16th century.[13] Jet beads are not mentioned in the chronicles of the early *conquistadores* or the shipping lists dating between 1509 and 1529 (Kelly, 1992). But jet import items are recorded in the 1534 to 1585 accounts (Torre Revello, 1943: 777) as rosaries, carved and figured finger rings (*anillos de figuras de azabaches*), collar medallions (*medallas para gargantillas de azabache*), and plain finger rings (*sortijas de azabache*) (Torre Revello, 1943.: 780).

Working with the lists obtained by John Goggin (see chap. 2, this volume), Kelly (1977) extracted information on the imports of jet objects to the New World from Spain. The later lists, from the decade 1583 to 1593 show the importation of many jet objects to the New World. These include *higas*, rings, strands of beads, chokers or collars, rosaries, and loose beads. There were also "jet garnets," quite likely referring to faceted jet beads and "pieces," some of which may have been beads, as well as drop earrings. Despite the usual Native American appetite for colored ornaments, the jet was accepted and has become incorporated into jewelry, folklore, and magic in the Mexican context and further afield (Piña Chan, 1960: 31, 88; Davis and Pack, 1982: 102–103). Jet was well-known to precontact Native Americans at source sites including Acoma and Chaco Canyon.

Deagan's (1987: 182–183) summary of jet beads found in *La Florida* suggests that they were firmly established by the mid-17th century and popular for at least a century thereafter. She recorded only a few shapes, and St. Catherines Island adds another to the repertoire. *Higas* were not found on St. Catherines Island or the sites studied by Deagan, despite the record of 5888 being imported from 1590 to 1593 (Kelly, 1977: 25). The bulk of *higas* (84.7%) were sent to *Nueva España*.

A decline in the fame and fortune of Santiago de Campostela took place in 1589 when Sir Francis Drake assembled an armada with the declared purpose of destroying the city, "that center of pernicious superstition." The body of the saint was hidden and afterwards its location was forgotten. But this did not entirely stop activities at the cathedral. In 1681 Louis XIV of France forbade the pilgrimage from Paris, resulting in the economic ruin of Santiago until a revival in the late 19th century (Michener, 1968: 776–777).

Despite Francis Drake and his armada, the flow of jet from Santiago to the New World was uninterrupted. But it should be kept in mind that there were sources of jet other than Galacia, most notably areas in France, which produced many of the same sorts of beads and other objects (Moulis, 1975).

Making Jet Beads

Jet is soft and can be carved with a variety of tools. Two eyewitness accounts of jet working are available from Moulis (1975) for the French industry and by Muller (1980) for the English. In both cases, miners sold the jet to the workers. Moulis's (1975: 78) abbreviated account says that the pieces were cut with large blades, drilled by means of a bow drill, and polished in small "mills."

Muller (1980: 15–18) describes in more detail how the jet was prepared, first removing the "skin" or "spur" from the surface with a chisel, then chopping the pieces up with the chisel or a wheel saw attached to a lathe. The piece was then wetted, ground into a rough shape against a sandstone wheel, and passed to another worker who carved it using homemade tools formed from old files or hacksaw blades. The first step in polishing was done against a homemade lead wheel with the aid of a little fine abrasive river mud ("rotten stone"). In bead manufacture, drilling then followed, using an umbrella spoke on the bow-driven lathe. Final polishing was done with rotten stone and water using a series of wheels, called "boards," first with a pig's bristle brush and then with strips of woolen clothing. The item was then washed and dried in a box of sawdust. Next, beads were polished on boards of walrus, porpoise, or cow leather or a jeweler's rouge wheel. Jeweler's rouge was later replaced by a mixture of lampblack, paraffin, and linseed oil. The final polish was done on a "shag board," a wheel with chamois leather before the items were passed to women, who strung the beads, attached pins to the backs of brooches, and otherwise finished the pieces.

The process was simple enough, using homemade tools or modified commonly purchased tools. Something similar can be envisioned in the Spanish industry, though with the "soft jet" it is unlikely that the material would ever attain the polish of Whitby's "hard jet," and the many polishing steps were probably not required.[14]

The jet beads from St. Catherines Island were drilled by various methods. This may indicate different workshops or even different jet-working centers. Most of the beads, including those of lozenge shape (Jet Variety 3), of twisted pentagonal shape (Jet Variety 2), and the triple spacers (Jet Variety 4) were drilled from both sides with a conical drill. On the other hand, the multifaceted spheres (Jet Variety 1) were drilled with a straight drill from one side only.

As with the gilded glass double spacers (Type 108) in the Spanish gilded glass section (chap. 10), the triple spacers (Jet Variety 4) would have been used to separate three strands of beads.

AMBER

Amber, like jet, is a semiprecious fossil substance, amber being the polymerized resin of certain trees. Amber runs from 2 to 2½ on the Mohs scale. But, unlike jet, the amber from St. Catherines Island probably did not come from Spain (although small amounts are found almost everywhere). The major source of amber for millennia has been the lands bordering the southern Baltic Sea: Poland, the Baltic States, and above all, Kaliningrad (a Russian exclave, west of the Baltic States). The St. Catherines amber beads have been identified as most likely of Baltic amber (David Grimaldi, 2006, personal commun. to Pendleton).

Amber has long been admired and traded (Beck and Bouzek, 1993). While it was obvious to many that amber was made from resin, the origin was not understood for some time, being variously ascribed in the ancient West from petrified lynx urine to the tears of the sisters of Phaethon (after Phaethon had been turned into poplar trees when he was struck by lightening). By the first century A.D. Pliny the Elder wrote, "It is well established that amber is a product of islands in the Northern Ocean, that it is known to the Germans as 'glaesum.'" (Eichholz, 1962: 195). This is the root of the English word "glass." The Greeks recognized the static electrical properties of amber, which they called "electron." From this word and the property of the material, "electricity" is derived.

Imported amber came relatively late to the Americas. No amber beads are recorded by Kelly (1992) in the early years of 1509 to 1529. In Torre Revello's compilation of lists from 1534 to 1589 only one entry (Torre Revello, 1943: 777) might refer to amber, "*Rosarios leonados guarnecidos*." That is, "rosaries set with *leonados*," *Leonados* refer to things the color of a lion (*leo*) or opaque and tawny. This could mean amber, but it is more likely something else, such as amber-colored glass.

During the years 1592–1593, eight consignments of amber were shipped to *Nueva España,* three to Santo Domingo, and two to Honduras (Kelly, 1992: 258, 568). The different lots were valued at a low of 10 *reals* the pound and a high of 60 *reals* the pound. The amount was not large, but neither was it insignificant. It weighed slightly more than 27.25 Spanish *libras* (pounds[15]) or 12.57 kg plus three strings of small beads.

The term *ámber* was used for most of the shipments, but in four to *Nueva España,* making up two-thirds of the total weight of all shipments, the beads are called *ámber cuajado*. One meaning of the adjective is "coagulated," which Kelly no doubt correctly assumed meant cloudy amber. This, the kind of amber found on St. Catherines Island, is cloudy due to the small bubbles in the original resin. If the resin had been exposed to sun for a sufficient period, the bubbles would have been driven out and clear amber would have resulted. While there are local preferences for cloudy or clear amber,[16] both fetch the same price on the world market.

Amber beads were probably worked like jet, though perhaps in a less complicated way. I have seen the amber of Simojovel, Mexico, processed with a technique that adopted new tools for ones that were no doubt used in pre-Conquest times. The raw amber was cut with a large knife (replacing a stone blade), ground against sandpaper (replacing a stone), drilled with a sharpened bicycle spoke (perhaps replacing a cactus spine), and polished with a cloth soaked in gasoline (probably replacing oil) (Francis, 1987d; 1987e). The amber beads from St. Catherines Island were drilled from both sides.

NOTES

1. Mayer (n.d.) asserts that the Spanish names for jet (*azabaje* or the more common *azabache* in Castilian and *acebache* or *acibeche* in Galician) derive from the Arabic *az-zabag*. Although this word is formed like standard Arabic words, Mayer does not say what it means. Some (e.g., Kelly, 1977: 24) have suggested that the root word means "black" or "black stone." The English "jet," as well as the French *jais* and the German *gaget*, is derived from the Greek γαγάτης (*gagates*), named after the river Gagas, in ancient Lycia (southeastern Turkey), an ancient source for the material.

2. Whitby, England, is usually cited as the source for jet. It is, however, only one of some 16 known sources, but was the principal place where jet was cut and is the center of the jet industry in England (Muller, 1980: 5; Mitchem, 2008: personal commun.). [EHB]

3. The most thorough book on jet and the Spanish jet carving industry is Monte Carreño (2004). [EHB]

4. The legend is that James (the brother of John; the "greater" James) evangelized the new Christian religion in Spain and was visited by the Virgin Mary in Zaragoza. He is then said to have returned home, to be beheaded, perhaps in Caesarea, in A.D. 44. Soon thereafter, he was disinterred and his head had rejoined his body. Through a series of minor miracles he was taken to northwestern Spain and was buried. In the early ninth century a hermit discovered his burial place and the perfectly preserved body was exhumed. At the semilegendary battle of Clavijo in A.D. 844 he was seen riding a white horse and slaying thousands of the invaders (Michener, 1968: 715-717).

5. Santiago = Santo Iago = St. James. The name "James" was rendered as Jacobus in Latin and the road to the city is known as the Jacobean route. In Old Spanish the name was rendered Iago, evolving into Jacóme and Jaime. The composite form links *santo*, (saint) with Iago to produce Santiago (Michener, 1968: 716-717).

6. Also written "Compostela." The origin of this part of the name is not clear. Michener (1968: 716) suggests it comes from the Spanish *Campo de la estrella* or the Latin *campus stellans* meaning "starry countryside." Alternatively, it may have its roots in the Latin *composta terra*, "burial ground."

7. Michener (1968: 717) points out that the Muslim forces carried an arm of the Prophet Mohammed with them in their drive to conquer Western Europe. The Christians of Spain had no such relic and the "discovery" of the body of St. James was fortuitous and "proved more potent and of farther-reaching significance, if we consider his role in helping conquer the New World, than the arm of the Prophet."

8. This name and the use of "Diego" for James in Spain are quirks of false etymology. Santiago is properly divided Sant(o) Iago, not San Diego (see note 3) (Michener, 1968: 717).

9. James was known as Santiago Matamoros ("Slayer of the Moors"). There are three places in Mexico that bear this name.

10. It is unclear when the guild was established and what its name was. Mayer (n.d.), who continues this profession, says it was incorporated at the beginning of the 15th century and was known as the "Concheiros," after the scallop that is the symbol of St. James. Muller (1980: 10) says, "From the thirteenth century there was a thriving trade, the workers being organized into guilds [sic] called the Brotherhood of Jet Workers." González Cirimele (1989: 22) writes of the establishment in 1604 of the confraternity of Nuestra Señora del Rosario as a guild for the jet workers. Perhaps there was more than one organization sequentially or contemporarily or perhaps the name was changed or nicknames were used.

11. Also known as *figa* in other European languages. The name is derived from the Latin *ficus*, or fig tree. The gesture is considered obscene by some, but also prophylactic against the Evil Eye. It has been current around the Mediterranean for centuries, if not millennia.

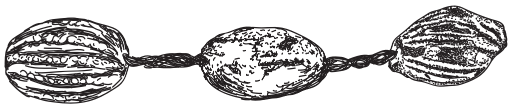
12. Various writers have referred to this as a pectin shell, a scallop shell, and a cockleshell. The symbol is a scallop, a member of the family Pectinidae; true cockles are of the family Cardidae (Eisenberg and Old, 1981: 198, 201). The term "cockleshell" is loosely used in ordinary speech and often includes scallops. At least one legend of how this shell came to be associated with Santiago is recorded in Michener (1968: 717). An alternative symbol for James is a walking stick with a purse attached (Whittemore, 1963: 35).

13. This perhaps is in contrast to the statement made by Kelly (1977: 24) that "jet was among the early imports to the New World (c.f. Johnson, 1975b: 19)." Of course, it depends upon one's definition of "early," but the reference cited states, "I believe that it is more likely that these [jet] beads were introduced around the end of the 19th century when the use of jet was widespread in Victorian mourning jewelry." (Johnson, 1975b: 19).

14. Mitchem (2008: personal commun.) writes: "I have watched jet artisans in northern Spain work, and their techniques are not nearly as complex as those recounted above. Of course, they are not involved in mass production, however." [EHB]

15. The Spanish pound is 1.014 of the Imperial pound or 0.45995 kg.

16. Americans, for example, tend to prefer clear amber, while Iranians never touch amber unless it is cloudy.



CHAPTER 14
IMPORTED BEADS OF HARD STONE

Peter Francis, Jr.

Although several methods have been recorded for making hard stone beads, the usual sequence is to chip the bead into a crude shape called a "roughout," which is then ground (or pecked) into a blank. Next, the bead may be drilled or polished. Drilling (bow drills are still often used for this) is generally from both sides, with the perforation meeting in the center of the bead. Drilling from one side only often results in the stone shattering out at the distal end. Double-tipped diamond drills have been in use (at least in India) from the last few centuries.

An important diagnostic step precedes drilling. It is called "dimpling" and is done to roughen the bead so that the drill bit can "bite" into the stone. Dimpling can be done by chipping, grinding, pecking, or making a dimple with a diamond drill bit larger than the final perforation.

Faceted beads are typically polished by abrasion: copper, teak, stones, wheels, and bamboo have been used for this process. Beads can also be placed in a leather bag along with water and agate dust and rolled between two workers or otherwise agitated. Today metal barrels are shaken by means of electricity. Beads polished by abrasion will have sharp edges on any facets and will not have their indentations, including dimples, completely polished. Those that are tumbled will have rounder edges and all surfaces will be evenly polished (for more details on these techniques, see Francis, 1982a; 2001: 103–125).

CUT (ROCK) CRYSTAL BEADS

Silicon dioxide or quartz is the most abundant mineral on Earth. The crystalline form is the type specimen for the number 7 on the Mohs scale of hardness. When clear, colorless, and translucent, it is known as "rock crystal," an admired semiprecious gem in many cultures. The quartz "family" comes in many varieties, one of which is carnelian (see below).

The rock crystal quartz beads from St. Catherines Island are all decorated by faceting. In the American Southeast, these beads (thought to be Spanish) were first reported from a cache near Leedsville, Virginia (Bushnell, 1937: 27–35). Griffin and Smith (1948: 14, 29) encountered them at the Goodnow mound and called them "cut crystal beads." H. Smith (1956: 67) simply mentions "crystal beads" from Fullers Mound A and Seven Oaks.

Goggin (n.d.: 26–30; see also Fairbanks, 1968: 13–16) named them "Florida Cut Crystal Beads" and associated pendants in the same way. This was at variance with his practice of naming beads from the site from which they were first discovered (in which case they should have been called "Leedsville Cut Crystal"). His justification was apparently that they are more commonly found in Florida (Goggin, n.d.: 27).

However, priority goes to Virginia, and they have been found at other places as well, including St. Catherines Island, Jamestown (Lapham, 2001), and even New York (Rumrill, 1991: 21–23). Rumrill found the presence of four such beads to be surprising, as they were thought to "derive from the Spanish" and were later than the Florida occurrences, dating between 1630 and 1646.

There is neither justification nor necessity to name these beads after sites in Florida. We will simply refer to them as "cut crystal beads." Although the Spanish certainly favored the beads, a Spanish origin for them has been merely asserted, with no real consideration of the problem.

Origin of Cut Crystal Beads

Cut crystal was an extremely popular material in medieval and Renaissance Europe. According to A. M. Johnson (1938: 197–198):

> Sixteenth-century craftsmen delighted in applying their skills to the making of small and delicate creations. Rock crystal, a substance highly esteemed for such purposes, was also popular with the connoisseurs of the Renaissance. Holding a prominent place among the applied arts of the Middle Ages, crystal carving reached in this period a development of even greater perfection.

The work of cutting crystal appears to have been centered in Paris and Venice from the end of the 13th century (Alcouffe, 1984a: 76). In Venice, cutting crystal beads was delegated to the *Arte Minuta*, a branch of the *Cristallari* guild, founded in 1284 (Alcouffe, 1984b: 274). We have already discussed the *Cristallari* guild and its struggle against glass beadmakers (chap. 5, this volume).

There were, no doubt, other cutting centers as well. In Europe, early crystal cutting appears in the Rhine-Maas region (Perocco, 1984: 30; Alcouffe, 1984a: 73). When Philip II was building El Escorial (1563–1584) he hired Jacopo da Trezzo, a renowned gem engraver from Milan, to be his official sculptor and jeweler. A casket given by Catherine of Savoy to her sister, the Infanta Isabel was embellished with carved crystal plaques made by the Sarachi brothers, also of Milan. Inventories of Isabel, Queen of Philip II, lists a number of rock crystal items, including earrings and a girdle adorned with 32 crystal stones (Johnson, 1938: 198).

It is not known if all the crystal items among Queen Isabel's treasures were Spanish-made or not, nor if they were cut. Neither is it known whether there were crystal cutters in Spain before the arrival of de Trezzo. After de Trezzo, it was very fashionable to make cut crystal and there is no reason to think that Spain would not have encouraged such an industry. It may not have lasted long. When citrine ("golden quartz") was discovered in the early 19th century in Salamanca, it was sent to Paris to be cut (Arroyo and Calvo, n.d.). However, the lack of gem bead cutting in 19th century Spain may simply reflect the trend of more refined glass replacing hard stone industries, first seen with lenses (Perocco, 1984: 30), then beads (Gasparetto, 1958: 185–186), and finally cups and vases (Bauer, 1968: 475).

One ingredient for such a craft would be the rock crystal itself. Bauer (1968: 476–477) states that the peaks of the Alps are the most important source of the stone in Europe and he lists a few other sources as well, but none nearer to Spain than the French Alps. Certainly the Renaissance carvers would naturally concentrate on the finest and clearest stone. The material from which the cut crystal beads are made, at least speaking of those found on St. Catherines Island, does not conform to the ideal, being full of minor cracks. This suggests that the raw material was not of the highest quality and, therefore, may have come from Spain, where crystal cutting was not as celebrated as that of other places.

The cut crystal beads from Mission Santa Catalina de Guale have another characteristic that suggests they were made by a hand not as skilled as one might expect from a well-established, important industry like that of Venice. The perforations were begun by chipping a dimple, but then the beads were drilled from one side only, breaking out a large scar on the distal end. Goggin (n.d.: 27) noticed this and correctly surmised the reason for it. The same feature appears to be true of the beads found in New York (Rumrill, 1991: 21, fig. 6a). Only an examination of European cut crystal known to have come from various sources will show whether this is a common trait or more limited to one or more lapidary centers.

At one point, I thought these beads might have come from India (Francis, 1992b). I now believe that the low quality of the raw material and the poor craftsmanship of drilling rule that out.

In short, there are several possibilities for the origin of the cut crystal beads, but they are almost always associated with the Spanish in the New World. There have also been several dozen found on the Atocha and Santa Margarita galleons, sunk in 1622 on the return voyage to Spain (D. Moore, 1990: personal commun. to Francis; C. Malcom, 2008: personal commun. to Blair). The generally poor quality of raw material and workmanship would also suggest a center other than Paris or Venice. On balance, Spain appears to be the best candidate for the origin of cut crystal beads found on St. Catherines Island.[1]

CARNELIAN BEADS

Carnelian is a mineral within the chalcedony group, technically fibrous microcrystalline quartz. It is often banded and translucent, and its hardness on the Mohs scale is 6.5, closely related to agate. Its color may range from yellow to a deep red (but it is almost never found as red in nature). Carnelian is usually a less desirable color—gray, brown, or olive—when first dug. The stones need to be heated in a muffled furnace to convert the iron within them to a reddish color.[2]

Historically, India is by far the most important source for carnelian. In the north, along old beds of the Narmada River, carnelians and agates have been mined for millennia. The places where they were made into beads differed, as did the ports that exported them, but the industry has been rooted in this small area throughout history. This industry is usually located in Cambay, the usual English spelling of the city now called Khambhat[3] (see Francis, 1982a, 2002: 103–111).

It is not known exactly when stone beadmaking began in Cambay. When Duarte Barbosa visited India around 1505, the beads were still being cut at the medieval lapidary center of Limudra, now a small village near the source of the stones. However, as early as 1630 and likely several decades earlier, Cambay was the beadmaking center. It was probably the lapidary center during the occupation of Mission Santa Catalina de Guale.

Cambay has been known as a stone beadmaking center for more than a century and a half to scholars. Before Cambay, the industry was in other places. The Romans, in particular Ptolemy and the anonymous author of the *Periplus of the Erythrean Sea,* knew the outlines of the western Indian industry. Until very recently, the existence of another major stone bead industry in southern India was unknown. Although it was the true "Treasure Chest of the Ancient World," the Romans knew only of the port from which the stone beads were exported, but nothing of the workings of the industry,[4] which remained hidden until recently (Francis, 1993a; 2002: 112–125).

The southern Indian stone bead industry was not related to western India. Though the final results often look much alike, its stone workers were different people, and the techniques used to make beads were dissimilar. The sources for the stones in the south were apparently the beds of the Godavari and Krishna Rivers. The longest-lived lapidary site was Arikamedu on the southeast coast (see Francis, 1987e). Arikamedu was abandoned around the 17th century. The village of Kangayam, Tamil Nadu, is apparently its successor (Rajan, 1997/8).

Carnelian and the Spanish

Carnelian beads are not common on Spanish colonial sites. Deagan's summary (1987: 182) shows that few such beads have been found and nearly all are from the period after ca. 1730. The one exception she noted was a fragment found at Puerto Real, Haiti. Not only do we have several earlier carnelian beads from St. Catherines Island, but there is also historical evidence from elsewhere for the importing of at least one string of carnelian beads in the 15th century.

Bartolomé de las Casas, abstracting the diary of Columbus, notes that on 30 December 1492 somewhere along the coast of Haiti a local chief put his crown on Columbus's head and

> El amirate se quito dl pesqueço un Collar de buenos alaqueques y Cuentas muy hermosas de muy lindos colores que pareçia muy bien en toda parte: y se lo puso a el ... [The admiral took from his own neck a collar of fine agates and handsome beads of beautiful colors that looked well in all its parts and put it on the king]. (Dunn and Kelly, 1988: 296–297)

We have visited this passage previously in the discussion of chevron beads.

This time we are concerned with the "agate" beads. Morison (1963: 140; emphasis added) translated the passage "and the Admiral took from his neck a collar of good *bloodstones* . . . ." The word in question is *alaqueques*. It is not Spanish, but Portuguese,[5] a term Columbus no doubt picked up when sailing for them in the West African trade. Although *alaqueques* is linguistically related to the English word "agate," and despite the fact that it is sometimes translated as "bloodstone," the Portuguese word actually means "carnelian" (Francis, 1993b). Perhaps the fragment found at Puerto Real, Haiti, was from the strand of carnelian Columbus gave away on his first voyage.

Carnelian Beads Found on St. Catherines Island

Four carnelian beads have been found on St. Catherines Island, three of them from the mission (Carnelian Variety 2). These three are the typical orange-red color of carnelians from western India. They were drilled with double-tipped diamond drills after having been chipped to dimple them. After being drilled, they were tumbled and polished.

The tumbling was no doubt done in a manner similar to that described by Summers (1851: 326) in which two men rolled a leather bag between them which was filled with beads, water, and agate dust, every day for two weeks. Modern bead polishers in Cambay have described the same process to me as having been done by their fathers before the introduction of mechanically driven drums in 1961.

The form of these beads is best described as irregular discs. Today this sort of bead is not made at Cambay, but at Jaipur, Rajasthan. Cambay may have made them in the past. These finished beads are not particularly attractive alone, though they have some charm when strung together. Nor are they easy to work with in making a piece of jewelry. For these reasons—and the fact that minimal labor is used in their manufacturing—they are not highly regarded and are usually inexpensive. The same conditions probably existed in the 17th century.

The fourth carnelian bead from St. Catherines Island (Carnelian Variety 1: 28.0/5287.0001) is quite different. It is oblate in form and relatively large, more than a centimeter along each axis. It was faceted all around its surface and polished by abrasion. The two ends were then chip-dimpled and the bead drilled from both ends with double-tipped diamond drills.

There is little doubt that the bead comes from India, most likely from southern India rather than the western industry. Although Cambay could have been the origin of such beads, the southern industry was always more inclined to make faceted beads. Moreover, in Cambay, beads are drilled and then polished, while the opposite procedure (polishing, then drilling) was followed in the south.

One of these beads was found on the surface of Kodumanal, Tamil Nadu. This is an old site and while it did make beads, this bead is likely an intrusion. It is interesting, though, that the bead was found at an old lapidary site in South India.

Carnelian beads are well known, common, though valued, in markets in Iran and Egypt (personal obs.). Van der Sleen (1973: 56) wrote this about them: "Nearly all great-grandmothers of our times possessed necklaces of beautiful, rounded cornelians mostly ground to multifaceted beads, in all coulours from milk-white to red."[6] He was in his seventies when he wrote this around 1960. A portrait of Mme. Panckoucke by Jean Auguste Dominique Ingres painted in 1811, now hanging in the Louvre, shows her wearing a necklace and a four-stranded bracelet of what can hardly be anything other than these beads (see fig. 14.1).

St. Catherines Island is the only place where this bead has been excavated to date, placing it firmly in the late 16th to 17th century.[7] The other two datable sources noted above place it in the early to mid-19th century. The bead may have been popular for some two centuries. Its use in Europe as well as in Egypt and Iran[8] strongly suggest that it was a most fashionable bead for some time.

Fig. 14.1. Jean-Auguste-Dominique Ingres. Portrait of Madame Panckoucke. 1811. Oil on canvas (courtesy of the Louvre, Paris, France).

NOTES

1. At one point it was believed that cut crystal beads dated to the period 1550–1600 (Smith, 1983: 155). They are “now know[n] to have a much longer (or simply later) period of use, being found at the 17th century San Luis site in Florida. Faceted crystal pendants have been found at the Tarver site in Georgia, 1690–1715 [Pluckhahn, 1996–1997: 45–66]. The specimens from the Leedstown Cache in Virginia would also appear to date to the early 18th century based on the presence of the large, wound beads in the cache . . .” (Marvin Smith, 2008: personal commun.). Cut crystal beads have also been found at Jamestown. These too would postdate 1600 (Lapham, 2001). [LSAP]

2. Some carnelians have a quantity of iron in them naturally and need only be heated. The lapidaries at Idar-Oberstein, Germany, import chalcedony from Minas Gerais, Brazil, and have to impart iron into them before the heating. This industry is too recent (started about 1820) to detain us here.

3. This city’s name has been spelled at least 29 different ways over the centuries (Francis 2002: 237 n. 22.)

4. A series of ancient maps detailing the Roman perception of the Indian gem industry begins at http://www.thebeadsite/UNI-MAPS.html on the Internet.

5. The root is Arabic, al-‘aqīq, meaning *agate*, precious stone, or bead. Both the Arabic and European words for *agate* are ultimately derived from the Greek ἀχάτης (achates).

6. He is correct on the color range of these beads, though the white ones would more properly be described as chalcedony.

7. This bead was not found at Mission Santa Catalina. It was excavated at 9Li91/163 (AMNH 342) during the island-wide transect survey (Thomas, 2008: chap. 20; Francis, 2008: 603–604). More recent work at this site suggests that the bead may not date so firmly to the late 16th and 17th centuries. See the discussion of this site in chapter 15, this volume. [EHB]

8. There is little documentary evidence, but my observations of the beads traded from Europe in the last few centuries to Egypt and Persia/Iran indicate that both of these countries bought beads that were fashionable in Europe and northern North America. This is in contrast to trade beads sold in sub-Saharan Africa or to most Native Americas during the last several centuries, for whom only the cheaper sorts were available.

PART IV
CONCLUSIONS

PART IV
CONCLUSIONS

In Part IV we present our discussion and conclusions, specifically examining the placement of the beads in their historic, spatial, and temporal contexts. Although focused primarily on the bead assemblage at Mission Santa Catalina de Guale, the discussion also includes prehistoric and historic beads from other contexts. We discuss the role of beads in the society at Mission Santa Catalina, with extensive consideration of the variability in the bead assemblage—both within all of Spanish Florida and within the Santa Catalina cemetery. The volume concludes with a consideration of the importance and broader implications of the St. Catherines bead assemblage.

CHAPTER 15
THE DISTRIBUTION AND DATING OF BEADS FROM ST. CATHERINES ISLAND

Elliot H. Blair

Previous chapters have described the morphological characteristics of the beads from St. Catherines Island and considered the methods of manufacture, likely places of origin, and the exchange networks that brought these beads to the Georgia coast. This chapter discusses the distribution and dating of the St. Catherines Island beads, including an overview of the precontact beads found on the island, a detailed discussion of the distribution of beads at Mission Santa Catalina de Guale, and a summary of type distributions. Figure 15.1 shows the sites on St. Catherines Island that have yielded beads.

PRECONTACT BEADS OF ST. CATHERINES ISLAND[1]

Beads of the St. Simons Period (cal 3000 B.C.–1000 B.C.)[2]

Eight shell beads (28.5/1676; 28.5/3673; 28.5/3799; 28.6/1419; 28.6/3167; 28.6/3173; 28.6/3174; 28.6/3175) from St. Catherines Island are attributed to the St. Simons period. Four were found during recent American Museum excavations at the St. Catherines Shell Ring (9Li231), perhaps the oldest site on the island (Thomas, 2008: chap. 32), while another four were uncovered during excavations at the McQueen Shell Ring (9Li1648). Such shell rings are circular- to crescent-shaped shell midden accumulations that occur along the southeastern coast during the Late Archaic. The construction and proposed functions of such sites (i.e., ceremonial mounding and feasting or gradual accumulation and residential) is much debated (e.g., Russo and Saunders, 1999; Russo, 2004; Saunders, 2004; Thompson, 2006). Ceramic and radiocarbon evidence suggest that the St. Catherines Shell Ring dates to the early part of the St. Simons period (Thomas, 2008, chaps. 20 and 32). The McQueen Shell Ring may be contemporaneous with the St. Catherines Shell Ring (Sanger and Thomas, in preparation).

The characteristics of these shell beads can be found in appendix 4. One of these, 28.6/1419, is highly unusual because it is made from an *Oliva* sp. shell. The spire was removed from this shell and appears to have been ground and smoothed. This bead is almost identical to one recovered at the Irene Mound (Caldwell and McCann, 1941: 54, pl. XIXR). Other than a Moore (1897: 85) reference to *Olivella* beads (presumably the same species) discussed below, no other *Oliva* sp. beads are known from St. Catherines Island.

Beads of the Refuge-Deptford Period (cal 1000 B.C.–A.D. 350)[3]

Evidence of bead manufacture or use during the Refuge-Deptford period on St. Catherines Island is extremely sparse. No beads dating to this period were located during the transect survey of the island (Thomas, 2008). The extensive excavations of Refuge-Deptford burial mounds on St. Catherines Island (Thomas and Larsen, 1979; Moore, 1897) turned up a single "bead," a partly drilled broken shark's tooth found at McLeod Mound (9Li47). The artifact is described as follows:

> A single, broken shark's tooth (fig. 20d) was found in the mound fill not far from the Central tomb at McLeod Mound (sq. E3, 26 cm. below datum). C. Lavett Smith of the Department of Ichthyology, the American Museum of Natural History, has examined the specimen and

concluded that it is probably from the recent great white shark (*Carcharodon carcharias)*.

The tooth has been drilled from both sides and is quite similar to the specimen illustrated by Furey (1977, fig. 1*a*). The breakage occurred along the axis of the central hole, and it seems likely that the specimen was broken in the process of drilling. The tooth fragment was examined microscopically, but no signs of wear or striations are apparent.

The tooth seems to be an artifact discarded in the process of manufacture, then included accidentally in the mound fill. We do not think the shark's tooth functioned as grave furniture. (Thomas and Larsen, 1979: 49)

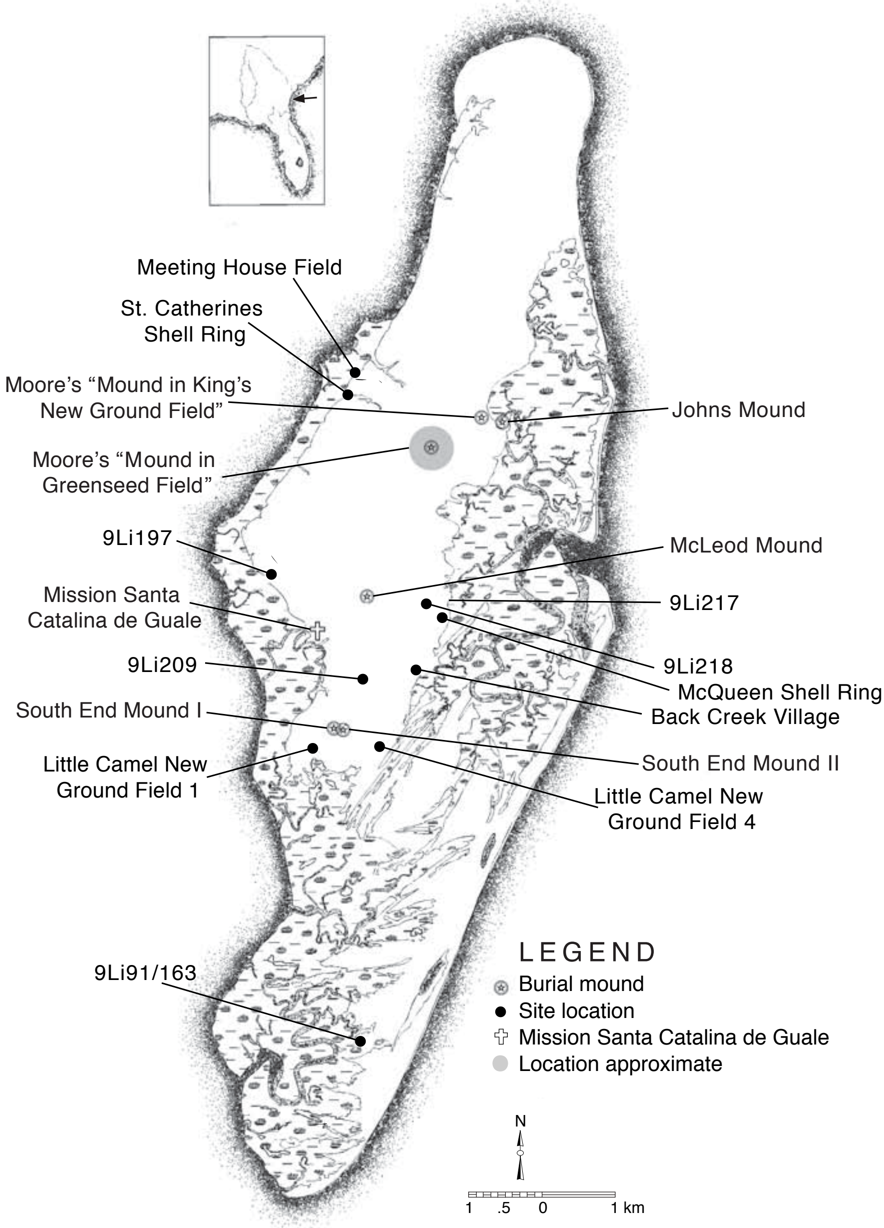


Fig. 15.1. Map of St. Catherines Island showing the location of sites from which beads have been recovered.

The attribution of this artifact to the Refuge-Deptford period, however, is somewhat tenuous. New radiocarbon evidence from the central tomb of this mound suggests that it was constructed during the Wilmington period, while radiocarbon and ceramic evidence indicate that the construction disturbed a Refuge-Deptford period site (Thomas, 2008: 696). The presence of the tooth in the fill, with Refuge-Deptford ceramics, suggests the earlier date; however, we cannot discount the possibility that it was lost or discarded during the later mound construction.

Beads of the Wilmington Period (cal a.d. 350–a.d. 800)

Two beads were recovered from Wilmington period contexts during the transect survey of St. Catherines Island (fig. 15.2); these have been described elsewhere (Thomas, 2008: chap. 21, fig. 21.3). Artifact 28.0/3210 is "a large bone bead recovered at 9Li217 (Test Pit I, 40–50 cm); it measures 59.0 mm long and 15.0 mm in diameter (fig. 21.3d). The smaller end has been extensively ground. The natural perforation has been enlarged" (Thomas, 2008: 609). Radiocarbon evidence places this site in the early Wilmington period (Thomas, 2008: chap. 20).

The second bead, "a broken, incised, bone tube (28.0/2316) was found at 9Li209 (Test Pit III, 10–20 cm), measuring 21.0 mm long and 6.1 mm in diameter" (Thomas, 2008, fig. 21.3e). "One end has been carefully scored and broken, and three additional incised grooves are evident on the shaft" (Thomas, 2008: 609). Ceramic evidence from 9Li209 suggests that this bead may also date to the early Wilmington period (Thomas, 2008: chap. 20).

Beads of the St. Catherines Period (cal a.d. 800–a.d. 1300)

All beads dating to the St. Catherines period come from mortuary contexts (Moore, 1897; Caldwell, n.d.; Larsen and Thomas, 1982; Larsen and Thomas, 1986; Pendleton, 1986b). Johns Mound (9Li18) contained one whelk columella bead (28.0/0239) and 198 shell disc beads (28.0/0234, 28.0/0238) from Burial 11, a multiindividual bundle burial containing at least seven individuals; a single shell disc bead (28.0/0236) was also found with Burial 27 (Larsen and Thomas, 1982: 300, fig. 28a and b). Figure 15.3 shows some of the beads recovered from Johns Mound.

Larsen and Thomas (1982: 309) also note the presence of ceramic abraders of Types III and VI and suggest that these abraders may have been used in shell bead manufacture. They state that it is "likely Type VI [sherd] abraders were used for finishing shell disk beads (perhaps of the type found with Burial 11). Bead blanks may have been strung after rough shaping and drilling, and then final shaping could have been accomplished by abrading the beads against the sherds" (see also Thomas and Larsen, 1979: 44–46). This is a description of the *heishi* method of finishing beads. While it is certainly possible that abraders were used this way, more recent analysis indicates that the beads from Burial 11 were not finished en masse (Francis, chap. 12, this volume).

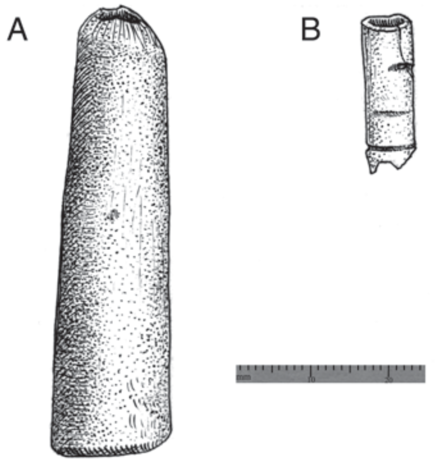


Fig. 15.2. Bone beads of the Wilmington period. **A.** 28.0/3210 **B.** 28.0/2316 (after Thomas, 2008: fig. 21.3).

Excavations at South End Mound II (9Li273) yielded no beads, though a perforated copper ear spool (28.0/3566) and a perforated ground stone pendant (28.0/3563) were found with Burial 1 (Larsen and Thomas, 1986: 31, fig. 21f; Pendleton, 1986b: 33, fig. 21a).

Several beads were found with burials at Moore's "Mound in King's New Ground Field" (9Li5; Moore, 1897: 81–86), a context apparently dating to the St. Catherines period (Caldwell, 1970; Larson, 1998: 36, 72; Thomas, 2008: chap. 24). Moore (1897: 85) describes beads associated with Burial No. 36 as follows: "On the skull were eight parallel rows of small shell beads, in close contact. Under the chin were small perforated marine shells (*Olivella*)." Other than this reference, and the *Oliva* sp. bead from the St.

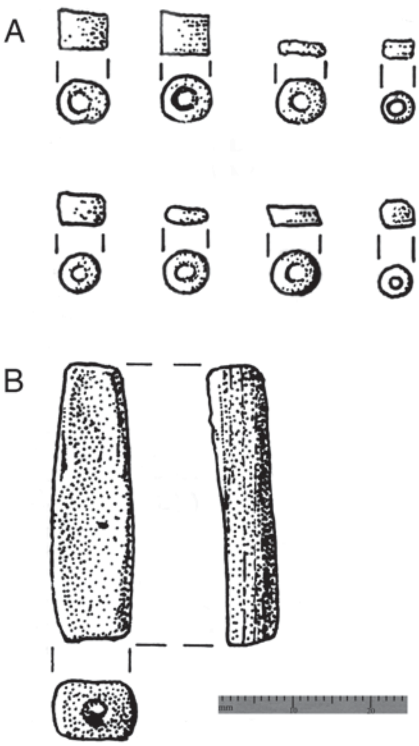


Fig. 15.3. Shell beads from Johns Mound. **A.** selected shell disc beads from Burial 11 (28.0/0234, 28.0/0238) **B.** whelk columella bead (28.0/0239) (after Larsen and Thomas, 1982: fig. 28).

Catherines Island Shell Ring, discussed above, shell beads of this type are unknown from St. Catherines Island and are infrequently reported from the southeastern coast. Moore (1897: 86) also notes "a few shell beads" (of unknown type) in association with Burial No. 38.

Moore's "Mound in Greenseed Field" (9Li6), another likely St. Catherines period burial mound, contains "numbers of tubular shell beads, the largest 2 inches in length" with Burial no. 28 (Moore, 1897: 88–89). He also notes that "a few beads … represented all additional articles met with in the mound." Larson (1998: 72) attributes the "Mound in Greenseed Field" to the Woodland period, while Thomas (2008: chap. 24) emphasizes similarities to St. Catherines period burial mounds elsewhere on the island.

Beads of the Irene Period (cal a.d. 1300–a.d. 1580 [uncalibrated])

Irene period beads have been found on St. Catherines Island in both mortuary and nonmortuary contexts. Four specimens located during the island-wide transect survey have been previously reported (see fig. 15.4; Thomas, 2008: chap. 21). These are:

Columella shell bead 28.0/3212 (Thomas, 2008: fig. 21.3a) is an ellipsoidal barrel, with the perforation drilled in hourglass fashion, off-center and not drilled all the way through. The maximum diameter is 14.1 mm and the total length is 39.6 mm. It was found at 9Li218 (Test Pit II, 10–20 cm), a small Irene-age site.

Artifact 28.0/2408 is a shell "waster" (19.2 to 30.4 mm in diameter and 3.3 mm thick), from which five bead blanks have been extracted (Thomas, 2008: fig. 21.3b). The holes were drilled with a conical, hollow drill (or perhaps punched, but not pierced). This artifact was found at Little Camel New Ground Field 1 (9Li202; Test Pit I, 20–30 cm), a large Irene period site.

Artifact 28.0/1808 (Thomas, 2008: fig. 21.3c) is a small circular shell gorget, 25.5 mm in diameter and 3.5 mm thick. On the interior face, 10 drillings adorn the periphery, with only two going all the way through (at the top); these are drilled from one side only, with the obverse side chipped away. Two similar dots were drilled with a conical drill into the center. The edge is ground, often with facets. It was found at 9Li197, a large Irene period site, located approximately 80 m east of Wamassee Road. A very similar gorget was recovered at the Irene Mound (Caldwell and McCann, 1941: 53, plate XIXG).

Specimen 28.0/2324 is a rough shell pendant (20.2 mm to 24.5 mm in diameter and 8.7 mm long), with an off-center, hourglass-shaped perforation. The margins are only minimally ground. It was found at Little Camel New Ground Field 4 (9Li205; Test Pit III, 10–20 cm), in Irene period contexts. (Thomas, 2008: chap. 21).

Four shell beads were found in Midden E at Meeting House Field (9Li21) during excavations in the 1970s and 1980s (Thomas 2008: chap. 25, table 25.1). Additional testing at Midden E in 2008 yielded another four shell beads. All eight are included in appendix 4.

Testing at Back Creek Village (9Li207), another Irene period site, turned up 28 shell beads. One was found during testing in 1991 and the rest were recovered during excavations in 2008. All are reported in appendix 4. One bone bead was also recovered (see chap. 12, table 12.2).

Shell beads from Irene period mortuary con-

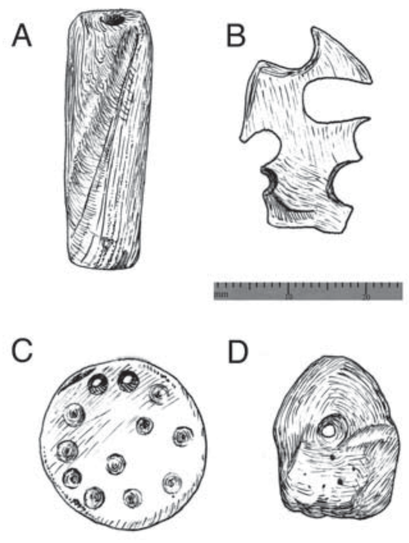


Fig. 15.4. Shell beads and ornaments from Irene Period sites. **A.** 28.0/3212 **B.** 28.0/2408 **C.** 28.0/1808 **D.** 28.0/2324 (after Thomas, 2008: fig. 21.3).

texts were found at South End Mound I (9Li3) (Moore, 1897: 75–81, frontispiece; Pendleton, 1986a: 20–21, table 3, fig. 3, fig. 11; Thomas and McNeil, 2002: 38–40, table 8; Larsen, 2002: frontispiece); a sample of these is shown in figure 15.5. Although the burial contexts of these beads have been previously reported (Moore, 1897: 75–81; Pendleton, 1986a: 20–21; Thomas and McNeil, 2002: 38, table 8), the bead associations will be reiterated and updated here.

Eleven burials (of which six are infants or children) excavated at South End Mound I had associated shell beads. Burial 3 is an urn burial of an adult that contains a number of whelk columella beads. Figure 15.6 shows a cross section of this burial (Moore, 1897: 76, frontispiece; Peter, 1986: 14, fig. 3). This vessel (17/4479, National Museum of the American Indian), still containing both the human remains and the beads, was reexamined by Debra Peter in 1985, and reported to be of the Irene Complicated Stamped type (Peter, 1986: 14, fig. 8a). This has recently been reassessed and is now believed to be an Altamaha Line Block vessel (Thomas, in press; Larson, 1998: 34). The beads were found "on top of the mass of bones at the base of the vessel" (Moore, 1897: 76). These beads have never been analyzed and are not included in appendix 4. Unlike other urn burials found within the mound, it appears that this one was not capped with another vessel.

Burial 5 is an urn burial of an adult found with "34 large shell beads." This vessel is of the Irene Complicated Stamped type (Peabody Museum 48334) capped with an Irene Plain vessel (Peabody Museum 48335) (Peter, 1986: 14, figs. 9a and 9c). These beads (Peabody Museum 48336) have not been analyzed and are not included in appendix 4.

Burial 18 is that of an infant found with "a number of shell beads" (Moore, 1897: 78).

Burial 19, a female, is reported to have been found with a number of columella beads (about one inch in length) underneath the (right?) arm (Moore, 1897: 78).

Burial 21 was an infant found with shell beads of unknown type and quantity (Moore, 1897: 78).

Burial 22, a male, was found with "large shell beads" (Moore, 1897: 78).

Burial 30 was apparently a cremation burial that was found with "numerous shell beads of different sizes, including thirteen fine specimens some over 1.5 inches in length, probably wrought from the columellae of the conch *(Fulgur)*" (Moore, 1897: 79).

Burial 40 was a child found with shell beads in the neck region (Moore, 1897: 79-80).

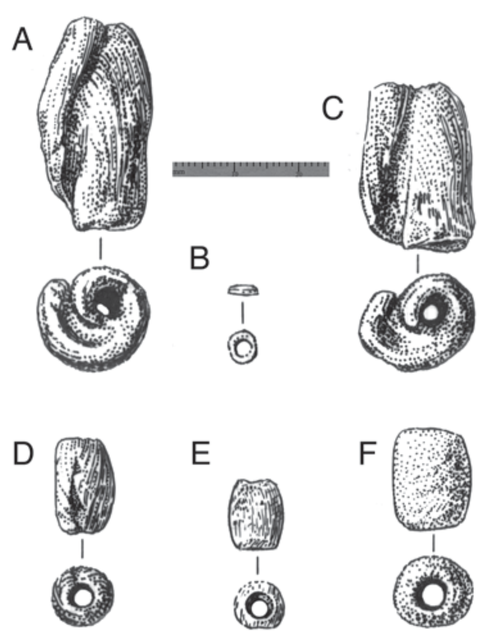


Fig. 15.5. Shell beads from South End Mound I. **A.** 28.0/4241 **B.** 28.0/6006b **C.** 28.0/6006a **D.** 28.0/3203 **E.** 28.0/3204 **F.** 28.0/4225 (after Pendleton, 1986a: fig. 11).

Fig. 15.6. Urn burial (Vessel A, Burial 3), with whelk columella beads, from South End Mound I (after Moore, 1897, frontispiece).

Burial 41 was a 6- to 7-year-old found with small shell beads by the neck and larger shell beads by the wrist (Moore, 1897: 80).

Burial 42 was an infant found with shell beads in the leg and neck region (Moore, 1897: 80).

Burial 44 was a five-year-old found with shell beads, as well as an incised and grooved soapstone pendent (Moore, 1897: 80, fig. 50).

The beads found with each of these burials were unavailable for analysis and are not included in appendix 4. Many of these are currently housed at the National Museum of the American Indian.[4] The South End Mound I beads described in appendix 4 are those recovered during the American Museum excavations at this mound (Larsen and Thomas, 1986; Larsen, 2002). Some of these have been previously reported (Pendleton, 1986a; Thomas and McNeil, 2002: 38).

THE BEADS OF MISSION SANTA CATALINA DE GUALE

The overwhelming majority of beads from St. Catherines Island were recovered during excavations at Mission Santa Catalina de Guale. As discussed in chapter 3, the mission complex itself consists of the church (*iglesia*), two friaries (*conventos*) built one on top of the other in the 16th and 17th centuries, a 17th century kitchen (*cocina*), two wells, and a central *plaza*. Associated with the church is a shell covered *atrio* and the mission cemetery (*campo santo*) (Thomas, 1987, 1988a, 1993a). The cemetery, excavated by Clark Spencer Larsen from 1982 to 1986, yielded the remains of 431 individuals (Russell et al., n.d.; Larsen, 1990). Surrounding the mission complex was the aboriginal habitation area (*pueblo),* including the sites of Fallen Tree (9Li8) and Wamassee Head (9Li13). See figure 15.7 for the site layout (oriented to magnetic north), and figure 15.8 for a detail of the mission quadrangle and identified structures (oriented along the Hispanic grid system—45° west of magnetic north).[5] For present purposes, we will discuss the beads from Mission Santa Catalina relative to known architectural remains or generalized habitation areas, including the mission *pueblo,* the Fallen Tree site, and Wamassee Creek area. Appendix 1 provides total bead counts and types for each of these areas.

The Church (Structure 1)

Structure 1, the 17th-century church at Mission Santa Catalina de Guale, was a wattle-and-daub and pine plank structure measuring 20 m long and 11 m wide (Thomas, 1988a: 96–99; see also chap. 3, this volume). Excavations into the church floor revealed a minimum of 431 buried individuals. Of these, 52.4% (*N* = 226) were in primary context and 47.6% (*N* = 205) were found in a disturbed, secondary context (Larsen, 1990: 21; Russell et al., n.d.). Primary context was defined as supine and extended, feet toward the altar, and arms folded across the chest (Russell et al., n.d.: 4; Larsen, 1990). Russell et al. (n.d.) assigned numerical designations to each individual and itemized the skeletal elements and pathologies for each, identifying age and sex when possible.

Here we begin by considering the beads associated with specific individuals, providing full descriptions for each burial with which beads were found in clear association, characterizing the general bead assemblages, discussing location of beads relative to skeletal remains, and describing any recognized patterning of bead strands. Appendix 2 provides total counts and types for the beads associated with these specific individuals. Figure 15.9 shows the distribution of human remains in the mission cemetery, and figure 15.10 identifies those burials that were found in association with beads.

Individual Bead Associations

Individual 12: This 21-year-old of indeterminate sex was found in a disturbed primary context in excavation unit J102, near the church entrance. A single turquoise blue *a speo* finished bead (Type 18) was found with the burial.

Individual 42: This primary burial of indeterminate sex and age was found in a very poor state of preservation, consisting only of unrecoverable tooth and cranium fragments encrusted with sand concretions. Individual 42 was located at the base of Pit H in units J101 and K101. Sixty-six in situ beads formed an arc pattern around, and immediately beneath, the tooth and cranium fragments. No patterning of the beads is evident and, with two exceptions, are all simple, drawn beads of varying shades of blue and green. The exceptions are a rust-brown complex bead with six longitudinal brown stripes (Type 52)—unique within the Santa Catalina assemblage—and a very small wound yellow annular bead (Type 86).

Individual 46, (372):[6] This 29-year-old male, found in primary context (located in unit K102, Pit B) exhibited osteoarthritic lipping on the lumbar vertebra and periosteal inflammation of the left fibula and left and right tibia (Russell et al., n.d.: 39). A single turquoise blue bead (Type 18) was associated with the burial, near the skull. Disturbed Individual 372, a 22-year-old of indeterminate sex, was also located within the same burial pit.

Individual 47: This primary context burial, of indeterminate age and sex, spans units K102 and L102, with numerous beads associated with the right hand/wrist area. Artifact 28.1/4756 is perhaps part of a rosary clutched in the individual's right hand; it consisted of an articulated strand of 10 cobalt blue *rocailles*[7] (Type 6) with a transparent yellow-green *a speo* finished bead (Type 22) at either end. Unarticulated beads of these same types were also found with this burial, as were four *a speo* finished white beads (Type 23) and two cobalt blue bugle beads (Type 2). These are among the few bugle beads in the St. Catherines collection.

Individual 52: This primary burial, age 30–40 years, and likely female, exhibits porotic hyperostosis near the frontal coronal suture (Russell et al., n.d.: 42). Individual 52 was located within Burial Pit A, excavation unit K102. The bead assemblage consists of 83 cobalt blue *rocailles* (Type 6) and one yellow and green compound bead (Type 42). Fifteen pieces of lead shot (28.1/4694) were associated with this burial.

Individual 59, (374): This 30-year-old male, in primary context, was associated with 72 blue beads: 64 cobalt blue *rocailles* (Type 6), seven green faceted *a speo* finished beads (Type 31), and one simple medium blue *a speo* finished bead (Type 19). The bead count perhaps suggests a grouping of eight *rocailles* separated by a larger bead. All beads were found in the head, neck, and upper thoracic regions. The disturbed dental remains of Individual 374 (age 0–1, indeterminate sex) were also found with Individual 59.

Individual 60: This 43-year-old female, in primary context, was found in units J104 (Pit H) and K104 (Pit I), associated with at least 20 cobalt blue *rocailles* (Type 6). Fourteen beads were found scattered around the burial, and five additional beads were immediately to the right of the individual's head, in association with a seed and a calcite crystal (28.1/3896). The field notes indicate that a string of beads (assumed to be of Type 6) was located under a cervical vertebra in association with the hand/neck/upper thoracic/lower cervical area of the burial, but only a single bead was catalogued from this provenience.

Individual 65: This individual (adult, indeterminate sex; excavation units L100, Pit G and M100, Pit C; see fig. 15.11) was found in primary context, associated with a large bead concentration (*N* = 575) of articulated bead strands and numerous loose beads located in the neck region of the burial. A piece of burnt glass (28.1/4081) and a quantity of burned daub were also found in the burial pit.

The beads with Individual 65 are primarily turquoise and cobalt blue *a speo* finished beads (Types 18, 19, and 20). Decorated beads consist of 11 turquoise blue beads with white stripes (Type 56), 14 gooseberries (Type 70), and 53 cobalt blue beads with red on white stripes (Type 58). Ten shell beads, many burned and/or fused together, were also recovered with Individual 65. Field notes indicate that a large number of organic beads or seeds (28.1/8758) were found with this burial; these were not recovered.

Although the excavators tried to restring the beads, in situ, many were too fragile. Field notes and photographs establish that similar beads were strung together in clusters, forming monochrome blue strands and single-type strands of the complex and composite striped beads found with the burial.

Individual 70, (71): This 35-year-old female was found, in primary context, within unit L100, Pit E. Individual 70 exhibited porotic hyperostosis on the occipital squamous (Russell et al., n.d.: 54). Several blue (Types 18 and 20) and white (Type 38) beads were scattered throughout the burial pit fill, but the actual associations are unclear due to the intrusion of Individual 71 (L100, Burial Pit H), a nine-year-old of indeterminate sex. No beads were directly associated with Individual 71 or the fill of Pit H.

Individual 77: This 35-year-old female was found in primary context (L101) with 22 white beads (Type 38) in scattered association.

Individual 86: This 33-year-old of indeterminate sex (primary context in unit L103) was accompanied by a cluster of 528 white beads (Types 23 and 38) and three cobalt blue *rocailles* (Type 6), placed near the thoracic region. Immediately to the northeast of the head were 19 cobalt blue *rocailles* (Type 6), four manganese black beads (Type 17), and 23 compound white *rocailles* (Type 38). Two incised gilded beads (Type 104) were found immediately to the south of the skull.

Individuals 88, 383: Immediately to the east of the skull of the undisturbed remains of Individual 88, an 18–25-year-old female (L103, Pit D and M103), three blue-green *a speo* finished beads (Type 21) and two compound white *rocailles* (Type 38) were found. Individual 88 was intrusive into the remains of Individual 383, a 28-year-old of indeterminate sex, found with two compound white *rocailles* (Type 38) immediately to the north of the skull.

Individual 90: This 30–40-year-old male was found in primary context (units L103, Pit B; L104, Pit F; M103; and M104, Pit A), with a large cluster of beads (*N* = 2022), evidenced as several layers across the neck/upper chest region.

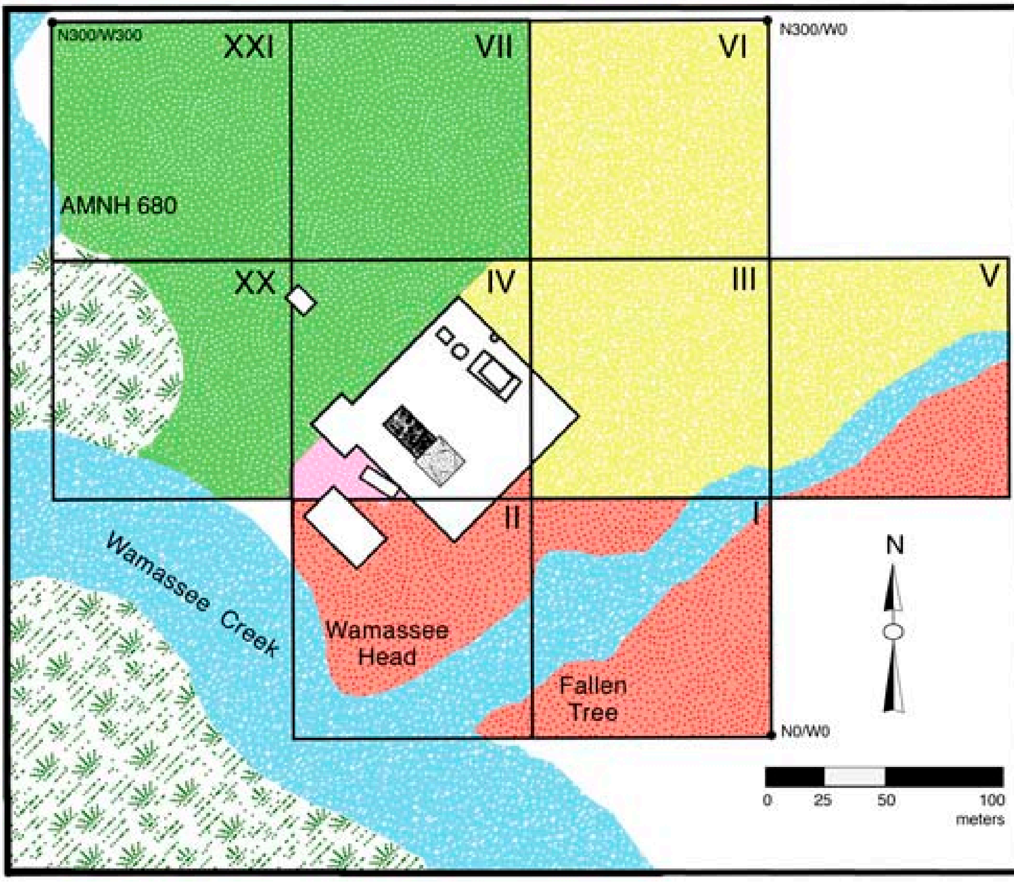


Fig. 15.7. Map of Mission Santa Catalina de Guale and *Pueblo*, oriented with true north at the top of the page.

This cluster contained 1726 blue *rocailles* (Types 5 and 6) and 289 white beads (Types 23 and 38). Field notes indicate that the white beads tend to occur in linear groupings of five beads. Several additional simple, drawn beads were found with the cluster, as was one transparent yellow wound bead (Type 79).

Individual 93: This 11-year-old of indeterminate sex (primary context, units L104 and M104) was associated with numerous beads (*N* = 4486). The bead assemblage consists mostly of blue *rocailles* (Types 5 and 6; *N* = 4209) clustered in the head and neck area. Near the vault of the cranium and the temporal region were found 218 compound white *rocailles* (Type 38). Nineteen gilded beads were found under the chin, apparently strung around the neck in association with a single cobalt blue bead (Type 20). The gilded beads are mostly spiral incised (Type 102; *N* = 15). None of the gilded beads with this burial were incised with a "comb" (see Francis, chap. 10, this volume). Other than the gilded beads, the only nondrawn beads found with this burial were 21 whole and fragmentary blown white beads (Type 121) and three transparent yellow wound beads (Type 79). A possible periwinkle shell (*Littorina irrorata*) earring was found in the left temporal region. Additionally, a lead cross (28.1/3758) was also located with the bead cluster.

The cross and the gilded beads are likely components of a rosary. Deagan (2002: 70–71, fig. 4.31) discusses and illustrates a 17th century rosary from San Luis de Talimali that may be very similar to that which was found with Individual 93. The beads are described as "barrel-shaped, twisted, and grooved green [glass] beads" (Deagan, 2002: 70; see also Boyd et al., 1951: 147, pl. 5). This description, as well as the black and white illustration, seems strikingly similar to our Type 102 beads—minus the gilding.

Individual 95: This burial of indeterminate age and sex (primary context, units L104 and M104) was found with a single cobalt blue *rocaille* (Type 6) near the left tibia.

Individual 102: This 37-year-old female (primary context, unit M100) was associated with a bead assemblage (*N* = 291) of mostly simple cobalt blue *rocailles* (Type 6) and compound white *rocailles* (Type 38). Also found were two cobalt blue bugle beads (Type 2), one complex cobalt blue bead with red on white stripes (Type 58), and one gooseberry (Type 70). This bead cluster was located in the upper thoracic region of the burial, with the white *rocailles* (Type 38) clustered around the temporal region of the head. Individual 102 suffered from a periosteal inflammation of the right tibia (Russell et al., n.d.: 70).

Individuals 107, 142, Burial A[8] (108), (387), (390): This 25-year-old male (Individual 107; primary context in M101 and N101, Pit B) had numerous beads in association. Individual 107 intersects, or is intersected by, several additional primary and secondary burials—also with bead concentrations. The oldest burial (Burial A; N101, Pit J) found beneath Individual 107, consisted of unrecoverable cranial fragments, as well as a bead strand concentration. This large bead cluster (*N* = 1165) was restrung in situ into 68 bead strand fragments.

The necklace consisted of blue beads of varying sizes, colors, and diaphaneity. Large simple turquoise and medium blue *a speo* finished beads (Types 18 and 19) were found alternating in some pattern with smaller simple cobalt blue *rocailles* (Type 6). This necklace also appears to have some strands consisting of beads of like color and diaphaneity. The strings appear to have been twisted as they rose and dipped into the soil,

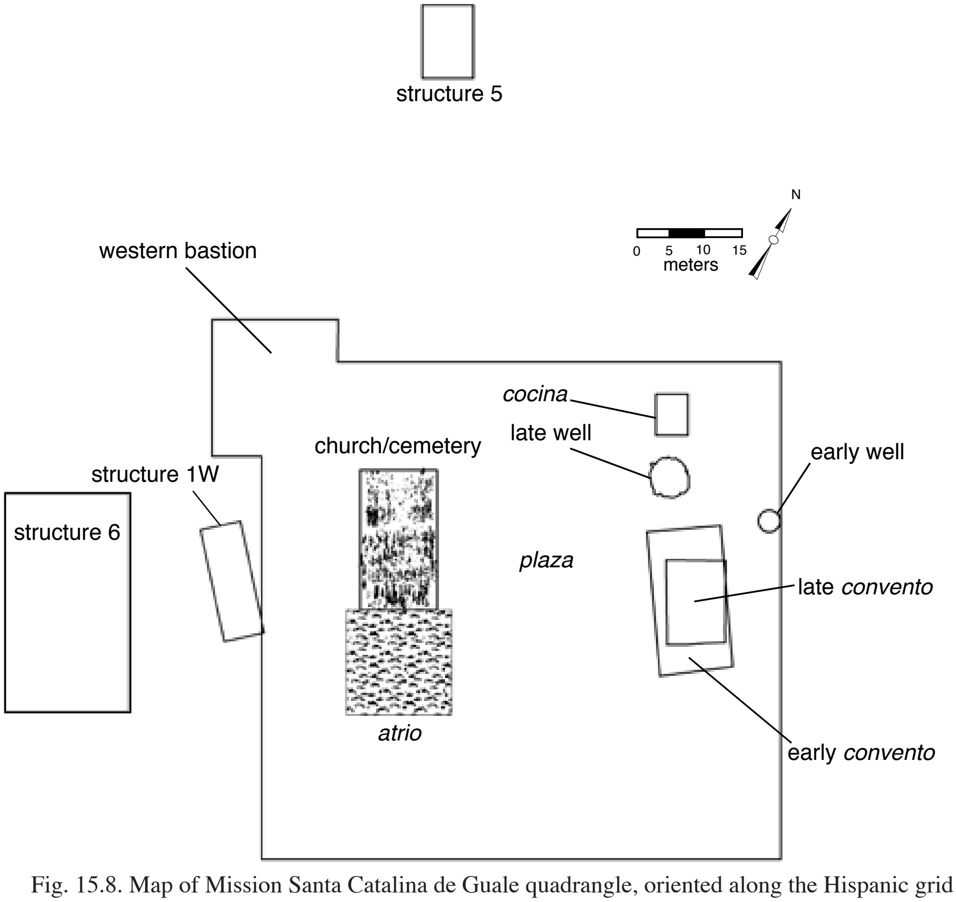


Fig. 15.8. Map of Mission Santa Catalina de Guale quadrangle, oriented along the Hispanic grid system, with "mission north" at the top of the page.

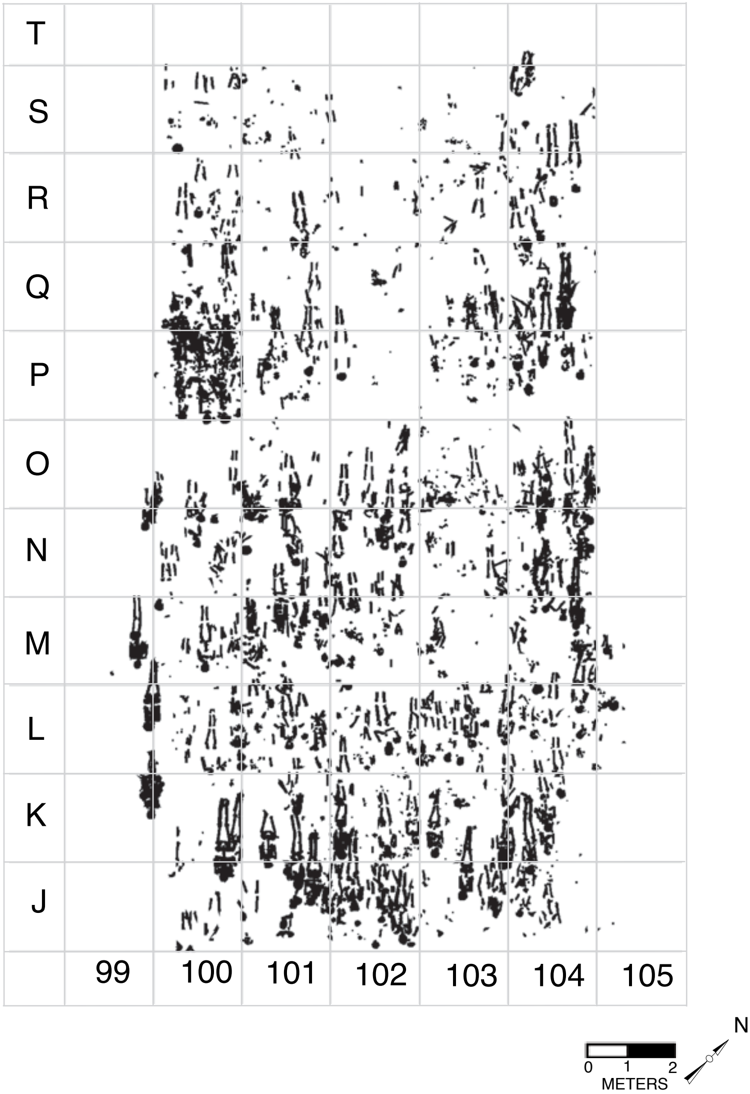


Fig. 15.9. Map showing location of human remains at Mission Santa Catalina de Guale mission cemetery, oriented along the Hispanic grid system, with "mission north" at the top of the page (after Larsen, 1990: fig. 1-3).

as if the necklace had been clutched in a hand, with only the bottommost layers lying flat.

The few cobalt blue beads observed in situ seem to be spacers between the larger blue beads, and several strings of these beads were restrung during excavation. The pattern was 3 turquoise / medium blue : 2 cobalt blue beads. The necklace contained a minimum of five strands.

Intruding into, and overlying, this burial are Individuals 107 and 142 (indeterminate age and sex, unit N101, Pit E). Bone shadows from Individual 142 were evident in Pit E, but no remains were recoverable. Associated with Individual 142 was a bead concentration ($N = 227$) consisting of 77 cobalt blue *rocailles* (Type 6) and 139 manganese black *a speo* finished beads (Type 17), as well as several other monochrome beads. A pink chert projectile point base (28.1/1558) was also found within the burial pit.

Individual 107 was associated with 10 faceted jet triple spacers (Jet Variety 4), plus several scattered simple cobalt blue (Type 6) and compound white *rocailles* (Type 38). Individual 108 (a 30-year-old male in primary context, unit M101) was slightly disturbed by the internment of Individual 107; no beads are clearly associated with Individual 108. The disturbed bones of Individual 390 were found jumbled with Individual 107 and the disturbed portion (foot/leg area) of Individual 108. The remains of disturbed Individual 387 were also found nearby, but in a shallower context, and its relationship to the other burials is unclear.

INDIVIDUAL 109: This is a 26-year-old of indeterminate sex (primary context; units N101, Pit H and M101) in possible association with one compound yellow-over-green bead (Type 42).

INDIVIDUAL 112 (118): This primary burial of a 20-year-old of indeterminate sex (excavation units M102 and N102, Pit E) was associated with a bead assemblage of 65 cobalt blue *rocailles* (Type 6), 35 ring-shaped gilded beads (Type 100), and

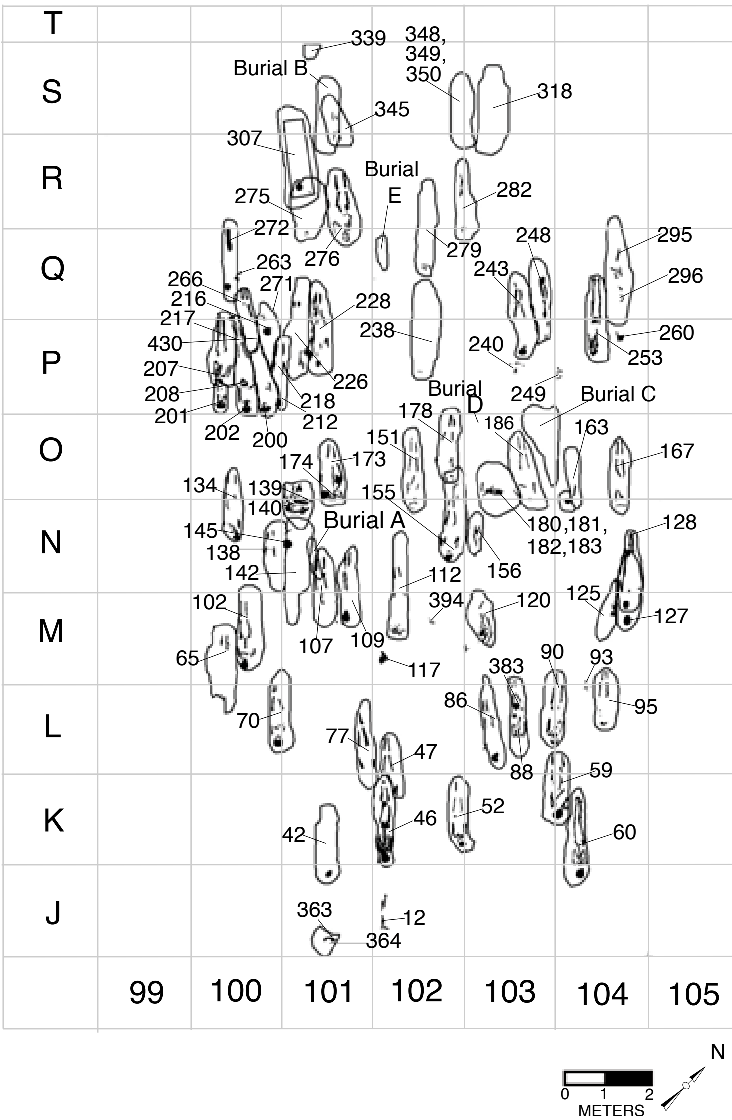


Fig. 15.10. Map showing location of human remains and burial pits found in association with beads at Mission Santa Catalina de Guale mission cemetery, oriented along the Hispanic grid system, with “mission north” at the of the page.

Fig. 15.11. Photograph showing beads found in situ with Individual 65.

one transparent yellow wound bead (Type 79). The nearly 2:1 ratio of blue beads to gilded beads suggests a strand patterning similar that found with Individual 151 and possibly 117. Disturbed Individual 118, of indeterminate age and sex, was also found within the burial pit.

Individual 117: This individual (indeterminate age and sex, unit M102) consisted of cranial and postcranial fragmentary remains and was found in association with 20 faceted and five unfaceted cobalt blue *a speo* beads (Types 30 and 20) and 11 spherical gilded beads (Types 98 and 101), one of which was incised. As noted with respect to Individuals 112 and 151, the ratio of blue to gold beads suggests the alternating bead pattern.

Individual 120: This disturbed burial of an eight-year-old of indeterminate sex (unit M103, Pit A) is associated with a single cobalt blue *rocaille* (Type 6). A plain copper ring/band (28.0/4652) surrounding a fragment of bone was also found with this individual.

Individual 125: This individual (primary context, unit M104) consists only of the cranium and teeth of a 25-year-old of indeterminate sex. Immediately north of the mandible were several copper-stained phalanges, interspersed with 47 cobalt blue *a speo* finished beads (Type 20). The beads had been strung together with small copper chaining; fragments remain in the perforations.

Individuals 127 and 128: Individual 127 is a 40-year-old female (primary context, units M104 and N104, Pit C) whose burial intruded into, and disturbed, the earlier internment of Individual 128, a 35-year-old female (units M104 and N104, Pit D). Within the fill of the burial pit for Individual 127 were five cobalt blue *rocailles* (Type 6) and one white *a speo* finished bead (Type 23). Individual 127 exhibited periosteal inflammation on the right tibia, porotic hyperostosis, and an alveolar abscess (Russell et al., n.d.: 79). Located near the cranium of Individual 128 were five cobalt blue *a speo* finished beads (Type 20), with copper chain fragments in the perforations. Individual 128 exhibited premortem tooth loss in the posterior mandibular region, with porotic hyperostosis on the occipital squamous (Russell et al. n.d.: 80).

Individual 134: This undisturbed burial of a 19-year-old female (units N100 and O100) was associated with one turquoise blue bead (Type 18) and one white bead (Type 38).

Individual 138: Within the pit fill of this adult of indeterminate sex (primary burial, unit N100, Pit F) was one white bead (Type 23) and seven simple blue beads (Types 6, 18, and 30), one of which was faceted.

Individuals 139, 140, (141), (416): An assortment of beads ($N = 124$) was found among four disturbed burials (N101, Pit A; O101, Pit F): Individuals 139 (age 21, male), 140 (age 45+, indeterminate sex), 141 (adult, indeterminate sex), and 416 (age 21, indeterminate sex). The beads appear to be associated with Individual 139 and/or 140. The assemblage is primarily cobalt blue *rocailles* (Type 6; $N = 91$), with a small number of other monochrome beads.

Individual 145: The disturbed burial of a 28-year-old of indeterminate sex (unit N101, Pit I) is associated with one white (Type 23) and two turquoise (Type 18) *a speo* finished beads.

Individual 151: This poorly preserved primary burial (age 30–40, indeterminate sex, units O102, Pit A and N102, Pit G) was found with 2562 beads, including 38 bead strand fragments that were defined and restrung during excavation. No other associated grave goods were present. The bead strands were in close proximity to the head, suggesting that the strands may have been part of a necklace. The strands appeared to have been intertwined and were primarily composed of simple blue *a speo* finished beads (Types 18 and 20), with numerous simple *rocailles* (Types 5, 6, 12, and 13) also included in the assortment. A small number of simple black glass beads (Type 17) and faceted blue and black beads (Types 30 and 32) were also part of the assemblage. The most interesting beads included with the strands are 14 gilded beads, with and without incising. The gilded beads include two Type 98, seven Type 100, one Type 104, and four Type 107.

Though many of the strings have no discernable pattern, four general patterns are apparent in a few of the restrung strands: (1) strings consisting entirely of beads of Type 18 exhibiting a high degree of devitrification; (2) alternating sequences of turquoise blue *a speo* finished beads (Type 18) and simple turquoise blue *rocailles* (Type 5); the beads in this pattern can be distinguished visually only by their size and the higher degree of devitrification evident on the *a speo* finished specimens; (3) strands of turquoise blue *a speo* finished beads (Type 18) irregularly interrupted by two to seven cobalt blue *rocailles* (Type 6); and (4) strings of two cobalt blue beads, occasionally with faceting (Types 20 and 30), alternating with one gilded (and incised) bead. The observance of this fourth pattern is what leads us to hypothesize a similar pattern for the beads found with Individuals 112 and 117.

Individual 155, (361), (406): Individual 155 is a primary burial (units N102, Pit B and O102, Pit D) of a 20–30-year-old of indeterminate sex. It was found with the disturbed remains of two other individuals: Individual 361 (age 24, female) in the leg region of the burial and Individual 406 (age 21, indeterminate sex) in the upper torso area of the burial. Eighteen beads were found within the burial pit: 12 simple blue beads (Types 4, 6, 20, and 30), two simple yellow beads (Type 24), and four gilded beads (Types 98, 101, 104, and 106).

Individual 156: This 24-year-old of indeterminate sex (unit N103, Pit B) was found in a secondary context with 14 cobalt blue *a speo* finished beads (Type 20), many of which contained fragments of copper wire/chain within the perforations.

Individual 163, (187), (411): The undisturbed burial of Individual 163 (age 30-40, indeterminate sex; units N104 and O104) was found in a grave pit with the disturbed remains of Individuals 187 (age 7, indeterminate sex) and 411 (age 20, indeterminate sex). Associated with the skull of Individual 163 was a bead assemblage mostly comprising cobalt blue *rocailles* (Type 6, N = 99). Eighteen white beads (Types 23 and 38) were also part of the assemblage, as was a single pentagonal, faceted jet bead (Jet Variety 2), and nine wound cobalt-blue-with-white-dots bead fragments (Type 97). The fragments are likely part of a single bead and are unique to this burial.

Individual 167: This 24-year-old male (primary burial, units N104, Pit A and O104, Pit A) was associated with one compound bead (Type 46) with three layers of glass (orange-yellow over white over green).

Individuals 173 and 174: Primary burial 173 (adult, indeterminate sex) was found with secondary burial 174 (adult, male) in excavation unit O101, Pit B. One cobalt blue *a speo* finished bead (Type 20) was found with these burials. A copper alloy ring (28.1/1621) with an empty setting was associated with Individual 173.

Individual 178: This individual (age 5–15, indeterminate sex), a primary burial, (unit O102, Pit C) was associated with three gilded beads (two plain–Type 98, and one incised–Type 102).

Multiple Individuals (Excavation Unit O103): Excavation unit O103, located mid-nave on the Epistle side of the church (to the right side, facing the altar), contains one primary burial (Individual 186, Pit C), 10 secondary burials (Individuals 179–185, 398, 418, and 419), and numerous unassociated human remains. A very large number of beads were found in this unit and with some exceptions, they cannot be clearly identified with a particular burial. Some of the unassociated human remains (i.e., Burial C and Burial D) are also associated with beads and other artifacts.

Individuals 180, 181, 182, 183: Individual 180 (adult, indeterminate sex) was found in Pit D in a secondary context with the disturbed dental remains of a 1, 8, and 12-year-old (Individuals 181, 182, 183). Beads found in clear association with these burials include 274 cobalt blue *rocailles* (Type 6), several blue *a speo* finished beads (Types 18, 20, and 30), one Ichucknee Inlaid Black bead (Type 60), two whole Type 109 glass crosses, and two whole and six fragments of Type 110 glass crosses. The Type 110 crosses likely originally comprised six whole specimens.

Individual 186: This individual (age 19, female) was found in primary context (Pit C), immediately east of Individuals 180–183. This quite gracile individual was buried with a lead cross (28.0/9054) clutched in the left hand (fig. 15.13). Blue and white monochrome beads (Types 5, 6, 18, 23, and 38) were found around the margins of the burial pit. Sixteen cobalt blue *a speo* finished beads (Type 20) were found with fragments of copper chain in the perforations. One turquoise blue *a speo* finished bead was found inside the cranium. The links of copper chain and the presence of the cross suggest a rosary.

Burial C: This burial association was found in Pit B of unit O103, consisting of the copper-stained finger bones from an individual younger than one year, wrapped around a gold-plated silver medallion (28.0/6503) showing a Pietà image (see fig. 15.14; see also Thomas, 1988a: 100, fig. 3.4b; 1993a: 15, fig. 1.5b; Deagan, 2002: 76–77, fig. 4.41). Copper chain links (28.3/6504), a fragment of what is presumed to be shroud cloth (28.0/6508), and beads were also found with the medallion. The beads consisted of 54 loose cobalt blue *rocailles* (Type 6), a short string (Plate 11-E) of eight (or nine) very small blown bluish green oval beads (Type 122), and three turquoise blue *rocailles* (Type 5)—in a pattern 1:4:1:4:1—found still attached to the medallion.

Burial D: This association consists of a rib fragment found with a small copper cross (28.0/6500) and a small copper alloy medal

Fig. 15.12. Photograph collage of beads found with Individual 151. Center of photograph is the in situ bead concentration. The lower left corner is a detail of the in situ gold and blue bead strand. The upper right corner shows the strand after having been restrung.

(28.0/6501) depicting James the Greater on one side and the Blessed Virgin Mary of the Immaculate Conception on the other (Ahlborn, 1991). Associated beads include five subspherical cut crystal beads (Cut Crystal Variety 2) and two incised spherical bone beads. The cut crystal beads are similar to ones found on the 1622 wrecks of both the Atocha and the Santa Margarita (C. Malcom, 2008: personal commun.). Both these, and the bone beads, are likely of European origin (see also chaps. 12 and 14).

Deagan (2002: 67) notes that bone beads, while not common, were most often used as rosaries. This, as well as the presence of the two religious ornaments, suggests that the artifacts recovered with Burial D (fig. 15.15) may have been components of a rosary.

Excavation Unit O103: This unit contained numerous beads that cannot be directly associated with a specific burial, though several association trends are apparent. Many turquoise blue *rocailles* (Type 5; N = 347) were found scattered across the eastern quarter of the unit. These may have been associated with the Burial C or disturbed secondary burials 398 (age 6, indeterminate sex) or 418 (age 14, indeterminate sex); but a firm association cannot be determined. This part of O103 also contained seven faceted jet triple spacers (Jet Variety 4) and a wound, hexagonal ruby red faceted bicone (Type 93) that is thought to come from China (Francis, chap. 9, this volume). A total of 302 unassociated cobalt blue *rocailles* (Type 6) were found within this unit, concentrated across the southeastern diagonal half of the unit. These beads could be associated with any—and some are probably associated with each—of the individuals discussed above. The 25 fragmentary segmented beads (Type 112) found in this unit cannot be associated with a specific individual, and the beads are so fragmentary that the count and typing of them should be considered extremely tenuous. An unassociated chunky stone (28.1/3597) was also found within unit O103.

Individual 200: A four-year-old of indeterminate sex (primary context, unit P100, Pit G) was found with an assortment of 39 monochrome beads, primarily manganese black, *a speo* finished (Type 17, N = 28). Four beads with this individual were faceted (Type 30 and 32), including one wound, hexagonal, ruby red faceted bicone (Type 93) thought to come from China (Francis, chap. 9, this volume).

Individual 201: One cobalt blue *rocaille* (Type 6) was found in the burial fill with a three-year-old of indeterminate sex (primary burial, unit P100, Pit I).

Individual 202: Field notes indicate that a single bead was found in the fill surrounding this 36-year-old female (unit P100, Pit J), but that artifact is not available for study at present.

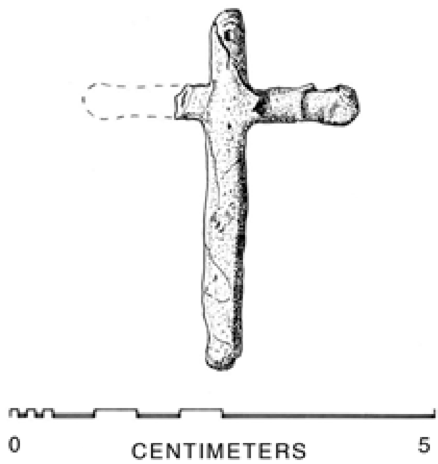


Fig. 15.13. Lead cross (28.0/9054) found with Individual 186.

Fig. 15.14. Gold plated, silver medallion (28.0/6503) found with Burial C (after Thomas, 1988a: fig. 3.4b).

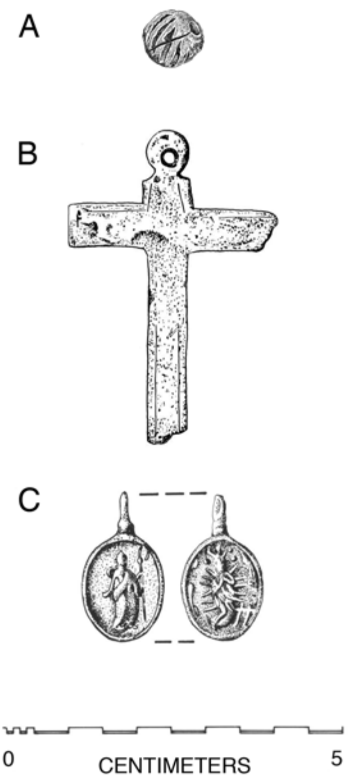


Fig. 15.15. Artifacts found with Burial D. **A.** Incised bone bead (28.0/6502) **B.** copper cross (28.0/6500) **C.** copper alloy medal (28.0/6501).

INDIVIDUAL 207: This 17-year-old of indeterminate sex (primary burial, unit P100, Pit C) suffered periosteal inflammation of the right femur and left tibia (Russell et al., n.d.: 108). The burial fill contained 26 monochrome beads, mostly simple and blue.

INDIVIDUALS 208, (222), (223), (224), (225): Individual 208 (age 20, indeterminate sex, unit P100, Pit M) was a disturbed primary burial found with two large bead concentrations (*N* = 4975) and an Ichucknee blue-on-white vessel (28.1/6656). Ichucknee blue-on-white ceramics are thought to date from about 1600 to 1650 on Spanish colonial sites (Deagan, 1987: 64–65). Detailed patterning and body associations for these concentrations are difficult to establish. Initial excavation of Individual 208 indicated that one bead concentration, identified as Artifact 73, was located in the right thoracic region, while a second concentration, identified as Artifact 74, was located in the area of the head and neck, slightly toward the left side of the body. Loose beads were collected from each concentration. Artifact 73 consisted of simple black and blue beads—mostly Types 4, 6, 17, 20, and 30. Artifact 74 included the same types, though with noticeably more Type 5 beads present. One opaque blue over transparent blue composite bead with three compound red-on-white stripes (Type 72), unique within the St. Catherines assemblage, was also found within this concentration. These two concentrations were later redesignated as FS(W)110A and FS(W)110B and completely excavated. Unfortunately the information correlating the different designations has been lost. FS(W)110A (*N* = 782) contains many gilded beads—of which six are incised. These include 37 plain spherical gilded beads (Type 98), one spherical gilded dot-incised bead (Type 107), and the only five gilded dash-incised beads (Type 103) recovered at Mission Santa Catalina. The rest of this assemblage primarily included manganese black *a speo* finished beads (Type 17) and simple blue beads—both plain and faceted (Types 4, 6, 20, and 30). FS(W)110B (*N* = 2402) contains the same types as FS(W)110A, with the exception of an absence of gilded beads and the presence of a large number (*N* = 461) of turquoise blue *rocailles* (Type 5). The large number of Type 5 beads found with FS(W)110B and with Artifact 74 suggests that these may be one and the same, while the absence of this type with both Artifact 73 and FS(W)110A suggests a correlation. No clear bead patterning could be reconstructed. The only three (whole and fragmentary) gold-in-glass segmented beads were recovered with this burial (Type 115). The majolica vessel was located in the left thoracic region.

INDIVIDUALS 212 AND 218: These two primary burials were found in unit P100, Pit P. Individual 212 is a 31-year-old female and Individual 218 is of indeterminate age and sex. The burial fill contained 100 beads. Most (*N* = 86) are cobalt blue *rocailles* (Type 6) and the rest are various types of simple beads, mostly blue.

INDIVIDUAL 216: Beneath the cranium of this 21-year-old (indeterminate sex, unit P100) was a single cobalt blue *rocaille* (Type 6).

INDIVIDUAL 217: Near the mandible of this primary burial (age 15–20, indeterminate sex, unit P100) were four turquoise blue *rocailles* (Type 5) and three manganese black *a speo* finished beads (Type 17).

Individuals 226 (431), 228 (231): The disturbed, primary burial of individual 226 (age 22, indeterminate sex) was found in P101, Pit C and Q101, Pit C. The disturbed dental remains of Individual 431, a 14-year-old of indeterminate sex, were also found within this burial pit. Parallel and adjacent to this burial (P101, Pit B and Q101, Pit B) is the primary burial of Individual 228, a 25-year-old of indeterminate sex. This amorphous burial pit contains a concentration of daub, and is likely the remnant of several individual pits—including the grave pit for Individual 231. Individual 231 (age 31, female) is located east of Individual 228 and is not associated with any beads. Beads were concentrated mostly around the crania of burials 226 and 228. A post and posthole (P101, Pit A) intrude into both burials, though they mainly disturb Individual 226. This feature, ringed in charcoal, consists of burned and unburned daub, and contains the remains of a burned post, 7 cm in diameter. The excavation of the posthole yielded a very disturbed mix of teeth, beads, metal fragments, burned wood, and burned bone. The bone is likely from Individual 226. Beads recovered from the posthole feature include 199 cobalt blue *rocailles* (Type 6), four simple white *rocailles* (Type 15), one cobalt blue *a speo* finished bead (Type 20), two blue-green *a speo* finished beads (Type 21), one compound white *rocaille* (Type 38), three compound turquoise blue *rocailles* (Type 39), and three spherical plain gilded beads (Type 98).

Individual 226 was found associated with 252 cobalt blue *rocailles* (Type 6), 11 simple white *rocailles* (Type 15), 13 cobalt blue *a speo* finished beads, two of which were faceted (Types 20 and 30), one green-blue *a speo* finished bead (Type 21), and four spherical gilded beads (Type 98).

Associated with Individual 228 were 329 cobalt blue *rocailles* (Type 6), one white *rocaille* (Type 15), five cobalt blue *a speo* finished beads, two of which were faceted (Type 20 and 30), one white *a speo* finished bead (Type 23), eight spherical gilded beads (Type 98), one faceted jet bead (Jet Variety 2), and one incised and gilded double spacer (Type 108).

Though the burial pits are relatively distinct, Individual 228 was apparently buried prior to Individual 226.

Individual 238: Individual 238 (age 21, indeterminate sex) is represented only by tooth fragments (units P102, Pit C and Q102, Pit E). Beads within the burial pit include 11 fragmentary turquoise blue *a speo* finished beads (Type 18), 40 transparent brown *a speo* finished beads (Type 25), one fragmentary white *a speo* finished bead (Type 23), 14 compound white *rocailles* (Type 38), one green heart *rocaille* (Type 41), and one yellow-brown wound bead (Type 76). A devotional medal (28.1/1623; fig. 15.16), also found in association with Individual 238, was described by Ahlborn (1991) as a "crucifix of the Eastern Orthodox type: rigid, flattened figure with crown and long skirt; cross with enlarged, curved terminals and rays from center, flanked by profile angles." The reverse shows the "Blessed Virgin Mary of Eastern Orthodox type: standing, frontal position, stiff, wide gown, crown, holds infant Jesus in proper left arm, each under an arch, flanked by vigil lamps on chains; infant raises proper right hand in blessing, orb(?) in proper left." Burial Pit B of Q102, containing Individuals 279 and 283, intrudes into the foot region of this burial.

Individual 238 was found with almost all of the simple transparent brown *a speo* finished beads (Type 25) uncovered at the mission. This bead type is the only simple *a speo* finished variety identified by Francis (chap. 7, this volume) as being of likely Venetian origin due to the high quality of the glass. Further, the fact that exactly 40 beads of this type (50 if we include the unassociated beads of this type also recovered from the excavation unit) were found with Individual 238 suggests that these may be the "decades" of a rosary formed with devotional medal 28.1/1623 (fig. 15.16). The spatial positioning of this burial is interesting in that it falls in the exact center (east/west) of the church—in a seeming "gap" between the Gospel side (to the left as one faces the altar) and Epistle side (to the right) groupings in the upper nave (see chap. 16, this volume).

Individual 240: This individual (age 21, indeterminate sex; unit P103) consists of a disturbed partial cranium and dentition. Associated beads include 10 simple cobalt blue beads (Types 6 and 20) and two gilded beads—one spherical without incising (Type 98) and one spherical with incised longitudinal lines (Type 101).

Individual 243: This 20-year-old female (primary context, unit P103 and Q103) was associated with a concentration (N = 239) of compound white *rocailles* (Type 38), found in the abdominal region. A single blue bead (Type 6) was also present.

Individual 248: This individual of indeterminate age and sex (units P103 and Q103) was

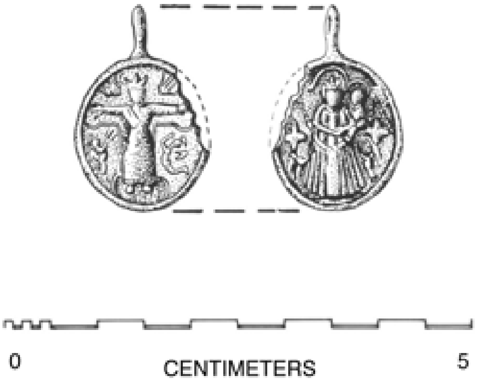


Fig. 15.16. Devotional medal (28.1/1623) found with Individual 238.

buried parallel to and east of Individual 243 and discovered in a disturbed (possibly primary) context with a large concentration of beads. The human remains consisted of long bone fragments in anatomical position. The bead concentration (*N* = 508) was primarily cobalt blue *rocailles* (Type 6; *N* = 441). The rest of the assemblage consisted of assorted simple beads, some with faceting. One complex *rocaille*, cobalt blue with five longitudinal white stripes (Type 49), all clustered on one hemisphere of the bead, was also found. This bead is unique in the St. Catherines Island assemblage.

Multiple Individuals (Units P103 and Q103): In addition to the beads found in clear association with Individuals 240, 243, and 248, a large number of beads were found scattered across excavation units P103 and Q103 without clear burial association. The beads were found in the vicinity of these three individuals, as well as with the disturbed remains of Individuals 132, 239, 241, 242, 244, 245, 246, 247, 250, 285, 286, 287, 289, and 290. The beads from units P103 and Q103 are mostly cobalt blue varieties (Types 6 and 20) and compound white *rocailles* (Type 38), with a number of plain spherical gilded beads (Type 98). The Type 98 beads were most heavily concentrated in the vicinity of Individual 243.

Individual 249: This 20-year-old of indeterminate sex (in the wall between units P104 and P103) is a very fragmentary cranium in a primary burial context; neither the burial pit nor postcranial remains were evident. The fill within the cranial vault contained three cobalt blue beads (Types 6 and 20).

Individual 253: A male aged 30–40 years, found in an undisturbed, primary context (units P104, Burial Pit B and Q104) had been buried in a very narrow, inwardly sloping burial pit with an uneven bottom. This individual exhibited possible occipital artificial deformation and the mandible was nearly edentulous (Russell et al., n.d.: 123). Near the skull were three cobalt blue *rocailles* (Type 6). Six pearls, including one that was not pierced, were found in the pelvic region.

Individual 260 (259): This individual is a 33-year-old of indeterminate sex (secondary context, unit P104). The disturbed dental remains of Individual 259 (age 6, indeterminate sex), as well as 26 beads, were also found in the burial. The beads include 20 yellow-brown olive shaped wound beads (Type 76), two complex cobalt blue beads with 10 longitudinal white stripes (Type 53), three cobalt blue beads (Type 6 and 20), and one shell bead. Individual 260 exhibits marked thickening of the left and right parietals (Russell et al., n.d.: 124). This is one of the few burials with wound beads as the majority bead component.

Individual 263: This individual (age 10, indeterminate sex) was located in excavation unit Q100 and consists of a skull with complete dentition; no postcranial remains were recovered. Arranged around the skull, near the left temporal and right mandibular regions, was a large concentration (*N* = 333) of cobalt blue beads, including five articulated, monochromatic, bead strands. Most of the beads were *a speo* finished (Type 20; *N* = 326); the rest were *rocailles* (Type 6; *N* = 7).

Individual 266: This disturbed, primary burial of indeterminate age and sex (Q100, Pit C) consists of femur and tibia fragments. Four cobalt blue *rocailles* (Type 6) were found in the burial pit fill.

Individual 271: This individual (age 29, indeterminate sex) is represented by several articulated teeth (unit Q100), associated with one cobalt blue *rocaille* (Type 6) and one turquoise blue *a speo* finished bead (Type 18).

Individual 272: The remains of this burial (age 37, indeterminate sex; primary context in unit Q100, Pit I) are restricted to teeth, enamel fragments, cranial fragments, and stains of bone meal, associated with three cobalt blue *rocailles* (Type 6).

Individual 275: This individual (age 18, indeterminate sex) was found in primary context (unit Q101, Pit E, with the burial pit extending into excavation unit R101). Only dental remains and cranial fragments were recovered. The burial pit fill contained two cobalt blue *rocailles* (Type 6).

Individual 276: This individual, a 20-year-old female, was found in primary, undisturbed context (units Q101, Pit H and R101, Pit B) with a large assortment of beads (N = 1127). The bead assemblage consists primarily of wound manganese violet faceted beads (Type 94; N = 1004), with a small assortment of monochrome blue and white beads (Types 6, 18, 20, 23, and 38), 22 oval gilded beads (Type 99), and 35 fragmentary orange-brown wound beads (Type 91). The white beads (Types 23 and 38) were found in the head and neck region of the burial, the manganese violet wound faceted beads (Type 94) came from the thoracic region, and the gilded beads (Type 99) and the wound orange-brown beads (Type 91) were discovered in an alternating pattern in the neck and upper chest region. Several of the gilded beads were still attached with a double strand of twisted copper wire (fig. 15.17).

Fig. 15.17. Photograph of gold plated glass beads (Type 99) strung with a double strand of multi-filament twisted copper wire, found with Individual 276.

The large gaps between these beads are the spaces that the fragmented wound orange-brown beads (Type 91) once occupied. This bead assemblage is intriguing because Types 91, 94, and 99 are all unique to this burial and are all wound varieties of beads. This is one of the very few burials in which wound beads dominate the assemblage. While Francis (this volume, chap. 11) has commented that winding is the oldest glass bead manufacturing method, Deagan (1987: 177) has noted that Spanish colonial bead assemblages of the 18th century (unlike earlier centuries) are dominated by wound beads. While she cautions that her sample is primarily from European occupied sites, we still might suggest that this implies that Individual 276 could be a later burial at Mission Santa Catalina.

In addition to beads, two pairs of sacred heart rings (28.1/1554, 28.1/1556; fig. 15.18) were found on the proximal phalanx of this individual (see Thomas, 1988a: 119; Deagan, 2002: 83–84, fig. 4.51; Ahlborn, 1991). A square mirror fragment (28.1/1557) was located nearby, as were metal spikes (28.1/5206, 28.1/5208, 28.1/6774, 28.1/6773). The distal end of the burial intrudes into R101, Pit A2, a possible refuse pit.

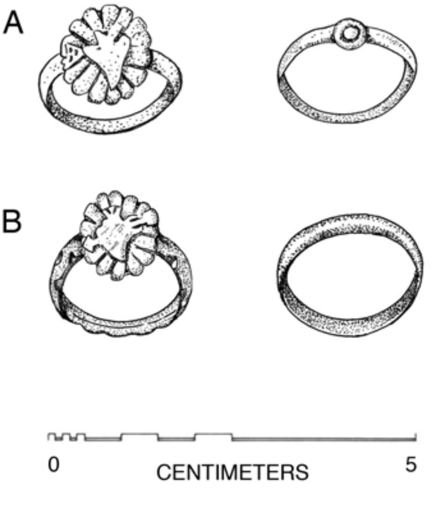


Fig. 15.18. Sacred heart rings found with Individual 276. **A.** 28.1/1554 **B.** 28.1/1556.

Individual 279: This 13-year-old individual of indeterminate sex was located in unit Q102, Pit B in a secondary context. Only teeth and unrecoverable mandibular and cranial fragments were found. Immediately to the west was a bead concentration consisting of 50 blue *rocailles* (Types 5 and 6), 13 gooseberries (Type 70), and 13 whole and fragmentary blown black beads with greenish yellow dots (Type 119). Type 119 is unique to this burial.

Individual 282 (392): Dental and postcranial fragments of this 21-year-old individual (indeterminate sex) were found in primary context near the church altar on the aisle edge of the Epistle side of the church. The disturbed dental remains of Individual 392 (age 17, indeterminate sex) were also found nearby, as was a large assortment of beads (*N* = 2798), mostly simple cobalt blue *rocailles* (Type 6; *N* = 1207) and compound white *rocailles* (Type 38; *N* = 842). Other beads of interest found with this burial include 186 segmented beads (Types 111, 112, 113, and 116), a faceted segmented bead colored with cinnabar (Type 114), 23 red-striped gooseberries (Type 73), 121 chemically unstable compound yellow-over-green *rocailles* (Type 42), and a single compound green heart *rocaille* (Type 41). Many faceted monochrome beads (both charlottes and *a speo* finished) were also found (Types 28, 30, and 32). Field notes document a pattern of yellow, green, and white, repeated several times and forming a long strand. But it is unclear which bead types were involved, and no beads were restrung during excavation. Links of copper chain were found stringing together six wooden beads (fig. 15.19). It seems likely that this was part of a rosary. This bead assemblage appears very similar to those found with Individual 307 (Part D) and Burial B. The numerous compound *rocailles* (Types 38 and 42), charlottes (Type 28), and perhaps the faceted *a speo* finished beads (Types 30 and 32) suggest that this burial may predate 1630 (see below).

Individuals (294), 295, and 296: Excavation unit Q104, Pit A contains the remains of the disturbed, secondary burials of Individuals 295 (adult, male) and 296 (age 4, indeterminate sex). The primary, undisturbed burial of Individual 294 (38, male) is also located within this burial pit, plus several disturbed, unassociated dental and postcranial fragments; no grave goods are associated with Individual 294. The numerous beads (*N* = 294) from the pit fill seem to have been associated with the disturbed remains within the pit. The assemblage is primarily simple cobalt blue *rocailles* (Type 6; *N* = 209) and compound white *rocailles* (Type 38; *N* = 73).

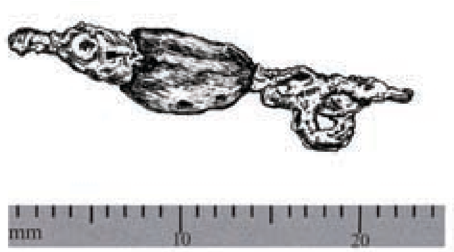


Fig. 15.19. Wooden rosary bead strung on copper wire found with Individual 282.

Individual 307: This burial (age 25, indeterminate sex) was located on the Gospel side of the church (to the left as one faces the altar), near the altar and immediately in front of the sacristy. This was the only coffin burial found at Mission Santa Catalina, and the burial contained the largest number of beads found in the cemetery—numbering 21,524 (more than 30% of the entire St. Catherines Island bead assemblage). The human remains found within the coffin were extremely poorly preserved, including only teeth, fragments of tooth enamel, and "bone shadows" thought to represent parts of the cranium and the distal portion of the left lower arm bone. A fragmented copper alloy ring with a square setting, possibly set with jet (28.1/5764), was found where the left hand should be in a primary context burial. A milky white quartz chunky stone (28.1/7498) was found within the coffin.

Two majolica plates were found on either side of the body in the thoracic or pelvic region (figure 15.20, lower right). An Ichucknee blue-on-white plate (28.1/5745) had been placed on the left side of the body, face up, and angled upward toward the side of the coffin. A Sevilla blue-on-blue plate (28.1/6657) was found face-down and cracked into seven pieces along the right side of the body. It seems likely that this plate had also been angled against the side of the coffin, but it fell and broke as the coffin deteriorated and the dirt settled. Ichucknee blue-on-white ceramics are thought to date from about 1600 to 1650 on Spanish colonial sites, while Sevilla blue-on-blue ceramics seemed to disappear after 1630-1640 (Deagan, 1987: 64-65).

Three distinct groupings of beads were found with Individual 307. The first, identified as Part A (*N* = 38), formed an arc around the head and consisted of several small groupings of clear segmented beads colored with cinnabar (Type 112). Six whole and fragmentary transparent individually blown beads (Type 118) were also found here. Along the western edge of this assemblage was a square copper alloy hair ornament (28.3/2336). Small cobalt blue *a speo* finished beads, with and without facets (Types 20 and 30), were located on all four sides of this ornament.

The two additional bead clusters were so complex that they were block-lifted and transferred to New York, for more careful excavation in the laboratory. One block lift, subdivided into Parts B and C, was removed from the left side of the body/coffin, at the south edge of the Ichucknee

Fig. 15.20. Photographic collage of beads found with Individual 307. The center of the collage shows the total in situ bead concentration. The images in lower-left and upper-left corners are details of beads found in Part B. The upper right corner is a detail of Part D. The lower right corner shows the two majolica plates, 28.1/5745 on the right and 28.1/6657 on the left, found with this burial.

blue-on-white plate. Part C (containing 448 beads) was quite jumbled, with little evidence of patterning except for several short monochrome strands—primarily simple manganese black and violet beads (Types 13 and 17), faceted cobalt blue *a speo* finished beads (Type 30), and compound green *rocailles* (Type 40). No polychrome beads were found in Part C.

Part B (*N* = 6441) contained most of the beads from the left side of Individual 307, and several distinct patterns were recorded during the laboratory excavation of this block lift. The first pattern consisted of between four and six cobalt blue *rocailles* (Type 6) interspersed with alternating transparent (Type 112) and white (Type 113) bi- and trilobed segmented beads. The interiors of many of the transparent beads contain cinnabar. This bead pattern was found at the highest and most central area of this bead concentration (figure 15.20, upper left). The strings showing this pattern tended to occur in several parallel strands, and it seems that these beads may have been sewn onto a surface.

Surrounding these, and slightly below, were strands composed of alternating complex turquoise *a speo* finished beads with white stripes (Type 56) and simple opaque white *a speo* finished beads (Type 23). Simple turquoise beads (Type 18) also occur in these strands. Several plain spherical gilded beads (Type 98) were scattered among these strands (see fig. 15.21, lower left). A third strand pattern consisted of alternating groupings (with one to five beads each) of simple manganese black or violet (Types 13 and 17) beads and simple clear *rocailles* (Type 14). Monochrome strands of these types are also present. The simple clear *rocailles* (*N* = 1822) are the most numerous type in Part B. Other beads of interest in this grouping include a complex opaque white bead with black stripes (Type 63) and a fragmentary, individually blown, compound turquoise bead (Type 120). Many faceted jet beads of various sizes were found in this concentration.

A second large grouping of beads (separated into Parts D and E) was found on the right side of the coffin/body, near the southern and eastern margins of the Sevilla blue-on-blue plate. Part E (*N* = 881), the southernmost part of this grouping, contains mostly manganese black or violet beads (Types 13 and 17) and cobalt blue faceted beads (Type 30). No patterns were observed or restrung from Part E, although many of the beads seem to have been sewn onto a surface (likely cloth or deerskin), as indicated by the numerous beads found with vertically oriented perforations. A single clear faceted segmented bead (Type 114) was found centered within Part E.

The Part D assemblage contains an enormous number of beads (*N* = 12,400), mostly *rocailles*. These are primarily simple cobalt blue *rocailles* (Type 6), simple yellow-brown *rocailles* (Type 11), simple manganese violet and black beads (Types 13 and 17), and monochrome compound beads of white, blue, and green (Types 38, 39, and 40). The chemically unstable compound yellow-over-green beads (Type 42) were also quite common within the Part D assemblage. Laboratory excavation of this concentration revealed several strand patterns. Single-type strands of the types identified above occurred, as well as groupings of between two and nine compound blue or green *rocailles* (Types 39 and 40), alternating with a single compound white *rocaille* (Type 38). Some strands showed this same pattern, with either simple cobalt blue (Type 6) or simple yellow-brown (Type 11) beads replacing the compound blue and green beads. Less common was a pattern in which manganese black beads (Type 17) and cobalt blue *rocailles* (Type 6) alternated one-to-one. The parallel positioning of these strands of seed beads suggests embroidery onto a pliable surface (see fig. 15.20, upper right). Near the bottom of Part D was a concentration of red-striped gooseberries (Type 73; *N* = 64), without apparent patterning. Part D also contained two complex yellow beads with red stripes (Type 51) and a few blown and segmented beads of the types also found in Part B.

We can tentatively suggest a pre-1630 (perhaps slightly later) date for this burial based on the dates of the majolica, the presence of charlottes (Types 27, 29, and perhaps 30), the presence of "tin-rich" opaque white beads (Type 38) (see discussion below), and the large number of compound seed beads (Smith, 1987: 33).

Individual 318: The excavation of Individual 318 (age 15, indeterminate sex, unit R103, Pit E) revealed 46 fragmentary bead strands that were restrung in situ. Additional beads (that could not be restrung) were also found. In all, 2151 beads were associated with Individual 318 (fig. 15.21).

This bead assemblage contained mostly simple blue and simple white beads. The strings are primarily monochromatic—consisting of separate strands of large turquoise beads (Type 18), cobalt blue beads (Type 20), and white beads (Type 23). Cobalt blue seed beads (Type

6) are also scattered throughout the burial and form fragmentary, monochromatic strands. In addition to the monochromatic bead strands, three additional string patterns are evident: (1) Several strands have groupings of four to five cobalt blue *rocailles* (Type 6) interspersed with a single, large turquoise blue bead (Type 18); (2) other fragmentary strands show the alternation of cobalt and turquoise beads (Types 18 and 20); and (3) some strands have alternating white and blue beads (Types 23 and 6). An articulated strand of eight burnt shell beads was also found immediately to the northwest of two bells (discussed below).

Several other bead varieties were associated with Individual 318, including one turquoise blue eye bead with three stars and white stripes (Type 65), three complex turquoise blue beads with white stripes (Type 56), two complex cobalt blue beads with white stripes (Type 53), two gooseberry beads (Type 70), one small Nueva Cádiz bead (Type 36), and two "ruby red" molded faceted beads (Type 123).

Additionally, a fragment of mineralized textile (28.0/6803) was found immediately beneath the dental remains of Individual 318, resting on top of a spherical copper alloy Flushloop rumbler bell (28.0/6803.0001), with incised lines around the equator. Flushloop bells first appeared in the first third of the 17th century (Smith, 1987: 43; Deagan, 2002: 147; Mitchem and McEwan, 1988: 45; Brown: 1979: 201-202). A second spherical copper alloy bell (28.0/6803.0002) with top loop (28.0/6803.0003) was found immediately to the north of (and slightly below) the first bell. This bell is a Clarksdale, usually dated to the 16th century, but known to persist into the early 17th century (Smith, 1987: 43; Mitchem and McEwan, 1988; Deagan, 2002: 145; Brown, 1979: 204).

The dating of this burial is particularly tricky. The co-occurrence of the Clarksdale bell, the Flushloop bell, and the eye bead would suggest that the burial dates to the first third of the 17th century (certainly no earlier). However, the presence of the Nueva Cádiz bead almost certainly implies that heirlooming behavior is occurring.[9] Therefore, we cannot discount the possibility that the eye bead and the Clarksdale bell are also heirloomed objects. Additionally, we have the puzzle of the "ruby red" molded faceted beads (Type 123) found with this burial. Based on the manufacturing method and the color of the glass, Francis (chap. 11, this volume) believed these beads to be the earliest examples of Bohemian ruby red glass beads yet known—thus dating both them and the burial to the end of the 17th century. As previously noted, however, these beads were not colored with gold, but rather with copper—leaving us with considerable uncertainty about the dates for this bead type (chap. 11, note 3, this volume). We are left with two options for the date of this burial: (1) Francis is correct about the late date for the ruby red beads and thus this burial shows evidence of considerable heirlooming activity, or (2) Francis is incorrect about the date of the ruby red beads and therefore the burial most likely dates to the first third of the 17th century, with only the Nueva Cádiz bead (and possibly the Clarksdale bell) being an heirloom. The second scenario seems more plausible.

Fig. 15.21. Photograph of bead concentration found with Individual 318.

Individual 339: Buried immediately to the east of the church sacristy, Individual 339 (age 5, indeterminate sex) consists only of dentition recovered in primary context (unit S101, Pit B), without cranial or postcranial elements. The burial assemblage consists of 382 faceted cobalt blue *a speo* finished beads (Type 30) and one complex cobalt blue bead with four white longitudinal stripes (Type 53).

Individual 345, Burial B: Individual 345 (indeterminate age and sex; unit R101, Pit F and S101, Pit D) was found in disturbed primary context associated with one fragmentary turquoise blue *a speo* finished bead (Type 18). This burial pit intrudes into an older grave (Burial B; located in S101, Pit F and R101, Pit G), but no human remains were recovered there.

Burial B is located adjacent and parallel to the coffin burial of Individual 307 (and somewhat closer to the altar). The bead assemblage with Burial B includes many of the same types found with Individual 307 (Part D), though in lesser quantity (*N* = 1983); the bead assemblage accompanying Individual 282 is also quite similar. The Burial B assemblage includes a variety of simple *rocailles* (Types 6, 7, 11, 13, 14); manganese black, blue, and white simple *a speo* finished beads (Types 17, 18, 20, 23); faceted cobalt blue *a speo* finished beads (Type 30); and many compound monochrome *rocailles* of varying colors (Types 37, 38, 39, 40, and 42). Other beads in the assemblage include two complex turquoise blue beads with white stripes (Type 56), seven red-striped gooseberries (Type 73), 25 blown-segmented beads (Type 112 and 113), and 42 pentagonal faceted jet beads (Jet Variety 2). Eleven transparent colorless blown beads were also found with this individual. No clear patterning was recognized in the field; however, at least one or two long monochrome strands of turquoise blue *a speo* finished beads seem to extend from the neck region to the thoracic region of the burial. Field notes suggest that this burial may have predated, and been slightly intruded into, by the coffin burial; but the notes equivocate on this issue and it seems likely, based on the bead assemblages, that these burials are contemporaneous.

Individuals 348, 349, and 350: The dental remains of two 2-year-olds and one 3-year-old were found interred together by the eastern side of the church altar (unit S103, Pit E and S102, Pit B). Placed with the burial were a *Busycon* sp. rattlesnake shell gorget (28.0/8069), a Santa Elena Mottled blue-on-white majolica pitcher (28.1/0567), a likely *Busycon* sp. cup, and a dense cluster (*N* = 1252) of beads (fig. 15.22).

The bead concentration with these burials consists mostly of turquoise and medium blue *a speo* finished beads (Types 18, and 19, *N* = 512) and cobalt blue *rocailles* (Type 6; *N* = 318). Other beads of interest include a single red *rocaille* (Type 12), 16 transparent brown *a speo* finished beads (Type 25), five eye beads (Types 64, 66, and 67), 138 gooseberries (Type 70), four green segmented beads (Type 117), a very large cloudy amber bead, and 12 whole and fragmentary barrel shaped shell beads.

Although many of these beads were scattered haphazardly, several associations and patterns were apparent during excavation. One observed pattern was gooseberries (Type 70) and turquoise blue *a speo* finished beads (Type 18) alternating in a 2:1 and 2:2 ratio. The turquoise blue beads (Type 18) also seem to alternate with the transparent brown *a speo* finished beads (Type 25) and transparent yellow-brown *rocailles* (Type 11). Several monochromatic strands of turquoise blue beads were noted, some still containing fragments of copper chain links in the perforations. The very large amber bead was prominently centered within the assemblage.

The presence of the shell gorget with this burial is of considerable temporal and geographical interest. The shell gorget (fig. 15.23) is incised with a rattlesnake design in the Carters Quarter style, "an intermediate group in the developmental sequence of the rattlesnake genre," similar to the terminal Citico style, but with fenestrations (Brain and Phillips, 1996: 91). Rattlesnake style gorgets have been considered to have been a late regional form of the Southern Cult, or Southeastern Ceremonial Complex (SECC),[10] materials centered in the Eastern Tennessee Valley (Muller, 1989: 19-21; Brain and Phillips, 1996). Citico-style gorgets, in particular, have been associated with the geographical extent of Coosa (Hudson et al., 1985: 732; Anderson, 1994: 82; see also Brain and Phillips, 1996: 94, 101).[11] Rattlesnake gorgets are rare on the Georgia coast. Besides the specimen from St. Catherines, only seven others have been reported. These include a Lick Creek style gorget from a mound at the north end of Creighton Island (Moore, 1897: 37, fig. 19; Brain and Phillips, 1996: 84, 426 [Ga-MI-C13]), one of an unassigned type from the Irene Mound (Brain and Phillips, 1996: 105, 424 [Ga-Ct-I4]; Caldwell and McCann, 1941: 53, pl. XIXD), one of unknown type with Burial 92 at the mound at Bourbon on Sapelo Island (Moore, 1897: 63; Larson, 1998: 27), three from a site several miles upriver of the Irene site (Cook and Pearson, 1989: 153, fig. 2C), and one from the Grove's Creek site on Skidaway Island (Keene, 2004: 190; Cook and Pearson, 1989: 152–153).

Smith (1987: 111–112) suggests that Citico-style gorgets "went out of style or [were] no longer manufactured … [sometime] during the period 1600-1630. [They were] clearly gone by 1630." In that the Mission Santa Catalina cemetery is primarily a 17th-century context, the presence of the earlier Carter's Quarter-style gorget is somewhat surprising. Smith (personal commun., 2007) suggests that the St. Catherines gorget was likely heirloomed. The presence of

Fig. 15.22. Photograph of burial assemblage found with Individuals 348, 349, and 350.

the five eye beads, suggestive of the later date of 1600–1630 for the burial, further supports the idea that the gorget may have been an heirloom. But, considering that rattlesnake gorgets may have first appeared during the early protohistoric period (Brain and Phillips, 1996: 395), it may not have been heirloomed for long. Additionally, since the Santa Elena mottled blue-on-white majolica pitcher has a production date range of 1500–1600 (FLMNH online Digital Type Collection), we might suggest that this burial could be either one of the last from the 16th century mission or one of the first from the 17th-century mission.

Rattlesnake gorgets may also function as an age marker, almost always accompanying subadults in a mortuary context (Hatch, 1975: 133; Smith, 1987: 108, 1989: 145). This is certainly the case at Mission Santa Catalina de Guale.

The *Busycon* sp. cup[12] in the burial assemblage was positioned at the opening of the majolica vessel, suggesting "black drink" associations. Like the rattlesnake gorget, "black drink" paraphernalia has been associated with SECC materials. While shell dippers and cups have often been found on the coast, paired jugs and cups are most commonly found in interior Dallas and Barnett Phase burials (Polhemus, 1986: personal commun. to David Hurst Thomas; see also, illustration in Hudson, 1984, fig. XXVa).

The black drink ceremony is almost exclusively associated with high-status males. Fray Andrés de San Miguel (Hann, 2001: 67–68) describes a black drink ceremony in the province of Guale that was only attended by "Spaniards, chiefs, and leading men," while Milanich (1979: 83) notes that shell dippers are one of the types of "cult objects" often interred with individuals of high status. Additionally, the positioning of this burial in close proximity to the altar is also a likely indicator of elite status. Precontact cup/jug burial pairings were often found "within or adjacent to temples or other ceremonial structures" (Milanich, 1979: 83).

While we can draw the likely conclusion that this burial is that of a very high-status individual (or individuals), the broader question is *who* is/are this/these individual/s and *why* are items of religious significance that are most commonly associated with the interior present at Mission Santa Catalina? Polhemus (personal commun. to David

Fig. 15.23. Drawing of Carters Quarter style rattlesnake gorget found with Individuals 348, 349, and 350.

Hurst Thomas) commented that "the combination of gorget along with the cup and bottle form leads one to wonder about the ultimate origin of the individual with which they were deposited." Smith (2000; 1987) describes the population collapse of the Coosa paramount chiefdom at the end of the 16th century and subsequent southward migrations out of northern Georgia. Is it possible that during this period of population decline and political instability some individuals moving out of this region might have ended up on the coast at Mission Santa Catalina de Guale? We might never know, but the artifact assemblage of this burial clearly seems to suggest some type of relationship with groups from the interior.

This burial also strongly shows evidence for religious and cultural negotiation. The gorget and the black drink paraphernalia, and likely the amber bead, have meanings tied to traditional religious beliefs; however, this burial was found in the sanctified church cemetery. There is clearly a mediation of elements of disparate religious beliefs found in this burial context. Thomas (1988a: 119) has written that "Native Americans of the Southeast had, for instance, long worn shell gorgets to symbolize a wealth of sacred and secular beliefs. The display of a Christian medallion became a logical extension of that practice." In this particular burial it seems likely that the pairing of the shell dipper with the majolica vessel embodies a similar replacement and juxtaposition of the traditional with the European (Thomas, personal commun.). Additionally, this burial provides good evidence for Thomas's (1988a: 120–121) argument that the compromising of burial practices was an important component of the process of conversion: "friars apparently 'allowed' the Guale to continue their tradition of grave goods, even though the practice directly violated church practice … the Guale enjoyed the luxury of seeking salvation through conversion while simultaneously retaining selected traditional customs."

Individuals 363 and 364: These individuals (one age 14 and the other 31, both indeterminate sex) were found in unit J101, Pit A. Individual 363 was represented by dental and cranial fragments; Individual 364 only by dental fragments. These burials were associated with a large concentration of beads (*N* = 429), articulated in strands, primarily dark turquoise blue *a speo* finished beads (Type 19; *N* = 293) and gooseberry beads (Type 70; *N* = 88). The bead strands were twisted together into a figure-8 pattern, with gooseberry beads alternating with blue beads.

Individual 394: This burial consists of articulated dental remains from an 18-year-old individual (indeterminate sex, unit M102), found in tenuous association with a large cluster of beads (*N* = 1033). These are primarily cobalt blue *rocailles* (Type 6; *N* = 557), compound white *rocailles* (Type 38; *N* = 316), and colorless *a speo* finished beads (Type 26; *N* = 138). Field notes indicate that the colorless beads were found in an alternating pattern with the blue beads

Individual 430: This individual (age 1, indeterminate sex; unit P100, Pit O) is represented only by dental fragments, found with a single compound bluish green seed bead with a clear core and coat (Type 40).

Burial E: This burial association was found in excavation unit Q102, Pit G. A large concentration of beads (*N* = 354) was found along with unrecoverable and unidentifiable bone fragments. This assemblage is primarily composed of turquoise and medium blue *a speo* finished beads (Types 18 and 19). It also includes 35 complex turquoise blue beads with three white stripes (Type 56), 21 turquoise blue eye beads (Type 64), and three turquoise blue eye beads with stripes (Type 65). Although two segmented beads (Types 111 and 116) were also found with this assemblage, it seems likely that these beads derive from disturbed contexts and were originally associated with Individual 282. The large number of eye beads found with this burial suggests that it is likely a pre-1630 burial.

The *Atrio*

An *atrio*, "a square shell-covered sub-plaza, measuring about 15 m on a side," fronts the Santa Catalina church (Thomas, 1993a: 12–13; see also chap. 3, this volume). It was entirely exposed, but only limited test excavations actually penetrated the shell core. A total of 87 beads were recovered from the *atrio,* 38 of which were made of shell. Little can be concluded about this assemblage. See appendix 1 for a listing of specific types.

The Mission West

Excavations to the west of the church, but still within the (presumed) walls of the mission complex, yielded 130 beads, including 33 made of shell, an antler bead preform (fig. 15.24), and two metal beads. One of the metal beads was a collared sphere made of copper (pl. 11-G)—still containing copper wire in the perforation, while the other was a large ring-shaped bead blank made of iron. See appendix 1 for a listing of all types recovered.

The Western Bastion

The 1691 plan view of Mission Santa Catalina de Guale (Amelia Island) (Thomas, 1987: 78, fig. 7) depicts a planned mission community, with sacred areas separated from the secular surroundings by a defensive palisade with bastions located at each corner. Excavations to the northwest of the *iglesia* (magnetic west), in the projected location of one of the mission bastions, uncovered 28 beads. These included 14 shell beads, one pearl, and 13 monochrome glass beads. See appendix 1 for specific types.

The Central *Plaza*

Limited excavations occurred just east of the church in the central *plaza* of the mission complex. Thirty-eight beads were found in this area. See appendix 1 for specific types.

The *Convento* (Structure 4)

The *convento,* or friary, was located on the opposite side of the central *plaza* from the mission church. Excavations revealed evidence of two, superimposed, *convento* structures. The earlier *convento* was likely burned during the 1597 Guale uprising (J. M. Francis, in preparation; Worth, in press; Thomas, 1993a: 16, 1988a: 99–100; see also chap. 3, this volume). The mission complex was rebuilt in the early 17th century and a new, smaller *convento* was constructed at the same location (Thomas, 1993a; 1988a; Saunders, 1990).

Excavations at the *convento* uncovered 133 beads, located inside and immediately outside the walls of the two *conventos*. Appendix 1 details the types and quantities of the beads. The overlapping of the structures, as well as the absence of intentional disposal, makes the distribution of the beads from the *convento* difficult to interpret, although some patterns seem to emerge in the aggregate. Looking at associations with specific features, we can discuss only those beads recovered from closed, early contexts (i.e., those characterized by clean fill). Beads from later features, characterized by a rubble-filled matrix (derived from the destruction of the earlier *convento* structure), cannot be clearly associated with either the early (16th century) or the late (17th century) structure (Saunders, 2000a; 1990).

The beads recovered from an early (late 16th century) context include one cobalt blue *rocaille* (Type 6) and five turquoise blue *a speo* finished beads (Types 18 and 19).

Also of note with the *convento* assemblage is the complete absence of shell beads. No beads were found within the area interpreted to be the late *convento* refectory or library, and almost none were found within the central room of the structure (Blair, 2008, see also chap. 3).

The Mission Wells (Structures 2/4 and 3)

Two wells have been discovered at the mission (Thomas, 1988a, 1993a; see chap. 3, this volume).

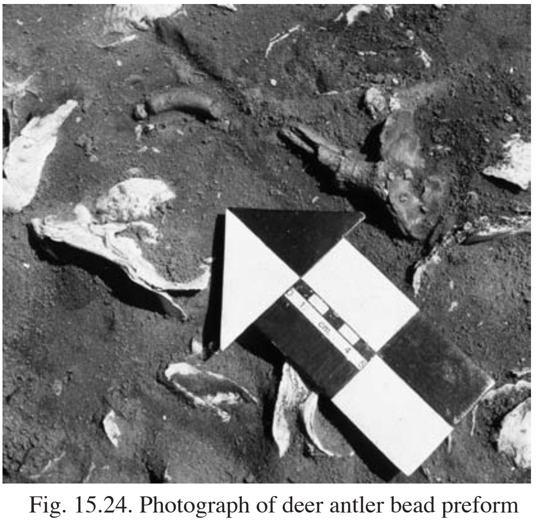


Fig. 15.24. Photograph of deer antler bead preform (28.1/6277) in situ.

The early well (denoted as "Structure 3" in the field) contained no beads. A second, much larger well (denoted as "Structure 2/4, FS(2/4)513" in the field notes) was located directly between the *convento* and the *cocina*. Thomas (1993a: 21) notes that this well intrudes through other features of the *convento* / *cocina* complex and is likely one of the latest mission features—in use until the 1680 mission abandonment. One hundred twenty-four beads, listed in appendix 1, were found in association with this well. Beads of interest include one green heart bugle (Type 35), one green heart *rocaille* (Type 41), seven Ichucknee Inlaid Black beads (Type 60), two transparent colorless beads with gilded perforations (Type 69), one yellow wound annular bead of the type associated with Columbus (Type 85), one carnelian bead (Carnelian Variety 2), and only two shell beads. The other beads found in the well are primarily simple drawn beads.

The *Cocina* (Structure 2)

The mission *cocina* is located 20 m north of the *convento*. It is a 4.5 m × 6 m, three-sided wattle-and-daub structure, with the southern side, facing the well (Structure 2/4), left open (Thomas, 1993a: 18-19). A total of 308 beads (whole and fragmentary) were recovered from within and from the immediate surroundings. The *cocina* beads are primarily drawn beads of simple construction and monochromatic compound beads (e.g., Type 38). Of particular interest is a complex turquoise blue *a speo* finished bead with red-on-white stripes (Type 54), two complex green *a speo* finished beads with white stripes (Type 57), and a complex opaque white *a speo* finished bead with red and blue stripes (Type 61). Each of these varieties is unique to the *cocina* assemblage. Francis (chap. 2, this volume) notes that Type 54 beads may be a late type, first appearing in the Seneca sequence between 1718 and1743 (Kent, 1983: 80). If correct, this is consistent with suggesting a later date for the *cocina* (see also below). Other beads from the *cocina* include two Ichucknee Inlaid Black beads (Type 60), two green segmented beads (Type 117), and seven green heart beads (Types 35, 41, and 47). Several wound beads, one of which was incised and gilded (Type 105), and a carnelian bead (Carnelian variety 2) were also recovered.

A concentration of shell beads ($N = 28$) was located in and around the central hearth feature (FS(2)64) of the *cocina*. Whereas this hearth contained articulated chicken bones and numerous deer remains, it lacked charred botanical remains (other than wood; Ruhl, personal commun., cited in Saunders, 2000a: 95). Saunders (2000a; n.d.) hypothesizes that this absence, as well the as quantity of faunal material present, suggests that this area of the kitchen "may have had a special function over and above domestic food preparation for the friars ... [and] may have been used to prepare meat for storage or perhaps even for export." In notes prepared for this volume Francis has speculated that the shell beads recovered here, based on the higher percentage of bead blanks (25%) compared to the rest of the mission, indicate that shell beadmaking may have also taken place here (see appendix 4). Appendix 1 contains a complete inventory of the beads recovered from the *cocina*.

The *Pueblo*

Limited excavations occurred outside the mission complex in the area where the aboriginal village, or *pueblo,* was located. For present purposes, the beads recovered from the mission periphery will be grouped together as *Pueblo* North, South, East, and West (mission grid orientation)—based on their locations relative to the central mission complex (see fig. 15.7).

Beads of the *Pueblo* West–Structure 1-W: Excavations at Structure 1-W, located immediately west of the mission complex, outside the mission walls, yielded 53 beads. This rectangular structure, of unknown age and function, measures roughly 6 m × 16 m and was apparently not constructed of wattle-and-daub. Structure 1-W is oriented at the same angle as the early *convento,* and may date to the 16th-century occupation of the mission. A single unarticulated burial (denoted as Individual W1, age 1.5–2 years, indeterminate sex) was found within this structure and consisted mostly of teeth, fingers, and toes. Russell et al. (n.d.: 316) state that this burial was "scattered and did not represent a distinctive internment." But the field notes suggest that Individual W1 may have been intentionally exhumed, and the small bone fragments found were those missed during this process. The beads recovered from this structure consist primarily of simple, undiagnostic types. Appendix 1 contains a full inventory of the beads recovered from Structure 1-W.

Beads of the *Pueblo* South: Several excavations have occurred in the aboriginal village area adjacent to Wamassee Creek, south of the central mission complex. These include the Larson excavations at Wamassee Head (9Li13) (Brewer, 1985), the Bonner and Hart collections in Wamassee Creek (Thomas, 1987: 105), the University of Georgia excavations at Wamassee Head and Fallen Tree (9Li8) (Caldwell, 1970; 1971), and numerous excavations conducted by the American Museum of Natural History in this area (Thomas, 1987, 2008; May, 2008; see also chap. 3, this volume). Because of the lack of structural remains documented for this area (with the exception of Structure 6, discussed separately below), the 121 (146 including Structure 6) beads from the *Pueblo* South are reported together.[13] Of these, 76 were drawn beads of simple construction and 32 are of local origin (e.g., shell, bone, and stone). Other beads of interest include a large compound green-over-green bead (Type 44) unique within the St. Catherines assemblage, a large compound orange-yellow-over-green bead (Type 46), a blue melon bead (Type 33) thought to be of Chinese origin (see chap. 9, this volume), a complex cobalt blue bead with 10 white longitudinal stripes (Type 53), two Ichucknee Inlaid Black beads (Type 60), a gooseberry (Type 70), and a wound yellow annular of the type associated with Columbus (Type 85) (see chap. 10, this volume). A highly unusual complex manganese black bead with an equatorial white stripe (Type 59) was also found. Also, as has been previously noted (Blair and Francis, 2008: 760; Blair, 2008), the Fallen Tree site has a relatively greater percentage of shell bead blanks (37% of the shell beads are blanks) than other portions of the mission—suggesting that shell beadmaking may have occurred in this area.

Structure 6: Excavations and a resistivity survey further to the west of the mission compound, but within the area identified as the *Pueblo* South, revealed evidence of another aboriginal structure—identified as Structure 6 (see also Hayden, 2007). Several indistinct architectural features were noted, but the configuration of Structure 6 remains poorly defined. Twenty-two beads were recovered here (see appendix 1), including eight glass beads of simple construction, three bone beads (these appear to be of likely European origin), and five shell beads. Other glass beads of interest include one eye bead (Type 68), one gooseberry (Type 70), one translucent green wound bead (Type 75), one wound yellow melon bead (Type 90), and two fragmentary *a speo* finished green hearts (Type 47). The eye bead is unique within the St. Catherines Island assemblage, with no known parallels. Both wound beads are thought to be of Chinese origin (chaps. 9 and 11, this volume).

Beads of the *Pueblo* North: Excavations to the north of the mission uncovered 39 scattered beads, four beads at an area designated as AMNH 680, and 200 beads associated with an aboriginal structure (Structure 5). The beads from AMNH 680, and those found without structural association, are primarily shell beads and simple drawn beads. See appendix 1 for a complete list of types recovered in these areas.

Structure 5: The 200 beads found during excavations at Structure 5 include 51 shell beads, three green hearts (Types 35, 41, and 47), a complex cobalt blue bead with white stripes (Type 53), a complex cobalt blue bead with red stripes (Type 55), two Ichucknee Inlaid Blacks (Type 60), a wound ruby red hexagonal bicone (Type 93), one incised gilded bead (Type 104), one green segmented bead (Type 117), a subspherical lead bead blank that is dimpled but not fully perforated, and a cut-crystal pendant (Cut Crystal variety 1). The rest of the assemblage (see appendix 1) is mostly simple drawn beads and several wound annulars.

Beads of the *Pueblo* East: Thirteen beads were recovered during very limited excavations to the east of the mission complex. These included six shell beads, two simple turquoise *a speo* finished beads (Type 18), two green faceted *a speo* finished beads (Type 31), and three Ichucknee Inlaid Black Beads (Type 60).

OTHER HISTORIC PERIOD BEADS

9Li91/163 (AMNH 342): One historic period bead, made of carnelian (Carnelian variety 1, 28.0/5287.0001, pl. 12-H, see also fig. 14.1) unassociated with Mission Santa Catalina de Guale, was located during the transect survey of St. Catherines Island (Thomas, 2008: 595; Francis, 2008: 603–604, fig. 21.2; chap. 14, this volume). This site has been described as follows:

> This large palmetto-covered site occurs about 300 m west of Flag Pond Road, on a peninsula that approaches a tributary of Brunsen Creek (figs. 20.11 and 20.15). Two buried midden areas were recorded here, each about 5–6 m in diameter and buried 10 cm below the surface. Only a small amount of shell was exposed along

> the shoreline. Site 9Li91 also includes some small shell concentrations located at the end of the peninsula. One is a midden on the southwestern tip, extending 10 m along the southern shore and 13 m along the western shore. The shell scatter is extensive, consists of both surface and buried deposits, and reaches across the full 100-m extent of Transect N-1. Shell deposits are also evident in the cut-bank and into the marsh.
>
> The ceramic evidence from five test pits (1.90 m^3) consists of 121 sherds, only 38 of which are period diagnostic; all but 1 of these date from the Irene period. Seven El Morro earthenware sherds were also found in Test Pit IV. A faceted carnelian bead (28.0/5287) was also found in Test Pit V (see chap. 21).
>
> A random sample of clams was selected for analysis. Thirteen (of 22) were collected in the winter, with early spring and summer/fall collections also well represented. (Thomas, 2008: 595)

Following the 2007 Second Annual Caldwell Conference: “Indigenous Ceramics of the Late Precontact and Contact Period from the Southeastern Atlantic Coast” (Deagan and Thomas, in press), we elected to revisit this site because discussions suggested that Irene Phase ceramics may have persisted throughout the 16th century and thus should be present at the very earliest contact period sites. Just such a site seemed to be implied at 9Li91/163—where early testing showed the presence of Irene pottery in association with El Morro sherds.

For our reinvestigation of the site we elected to conduct a systematic shovel test survey to understand the distribution of shell, aboriginal ceramics, and historic artifacts. Artifacts recovered from these excavations include a historic concentration which consisted of ceramics, glass, a kaolin pipe stem, a button, and a number of hand-headed cut nails—all suggestive of a late 18th- or early 19th-century date (Noël Hume, 1969: 252-253). Irene period ceramics were also found throughout the site. We decided, considering the possibility of three contexts being present—Irene period, early Spanish contact period, and antebellum period—to submit four samples for radiocarbon dating. Two samples were selected from “pure” aboriginal contexts—at the northern (Beta – 232115) and southern (Beta – 232113) extents of the site. One sample (Beta – 232114) was selected from a test pit adjacent to where the El Morro sherds and carnelian bead were excavated, and the last sample (Beta – 232116) was taken from the newly located historic concentration—about 30 m east of where the bead had been found.

N470 E470: (Beta-232113, *Mercenaria)*: 870 ± 60 B.P. cal A.D. 1270–1460

N560 E510: (Beta-232115, *Mercenaria)*: 830 ± 50 B.P. cal A.D. 1300–1470

N510 E500: (Beta-232114, *Mercenaria)*: 430 ± 40 B.P. cal A.D. 1650–1900

N490 E530: (Beta-232116, *Mercenaria*): 510 ± 70 B.P. cal A.D. 1490–1860

The four dates cluster into two groupings—with the two from the northern and southern extents of the site being clearly from a precontact Irene period context, and the other two from the historic period. Unfortunately, neither of the two later dates is conclusive for dating the bead. At this point we decided to reexamine the sherds recovered during the transect survey, and discovered that in addition to the El Morro sherds a single piece of banded pearlware (1790–1820) was also recovered from the same excavation unit (Thomas, 2008: table 20.3). This suggested to us that perhaps the El Morro sherds had been misidentified, but reexamination showed them to be almost certainly the El Morro type (Deagan, 2008: personal commun.). Deagan noted however, that this type is not particularly temporally diagnostic; it dates from the mid-16th to the 18th centuries. We are left with some ambiguity:

(1) The bead, the El Morro sherds, and the other historic artifacts were found in association with Irene period (cal A.D. 1300 to A.D. 1580 [uncalibrated]) artifacts.

(2) El Morro sherds are not particularly temporally diagnostic; they can date from the mid-16th to the 18th centuries (Deagan, 2008: personal commun.).

(3) The banded pearlware, found with both the bead and the El Morro sherds, suggests a date of 1790–1820 (FLMNH online ceramic type collection).

(4) The other historic artifacts recovered from the site (particularly the nails and the kaolin pipe stem[14]) suggest a late-18th to early-19th date.

(5) The only other available dates for this bead type place it in the early to mid-19th century (chap. 14, this volume; van der Sleen, 1973: 56).

Based on this evidence, we can conclusively state that 9Li191/63 is at least a two-component site with an Irene period component and a late 18th- or early 19th-century component. While we cannot definitively say that there is not a third, early Spanish-contact period component at the site, the evidence seems slim—leading us to suggest that the carnelian bead likely dates to the later antebellum period—consistent with other dates for this bead type.

DISTRIBUTION OF TEMPORALLY DIAGNOSTIC BEADS

As previously discussed by Francis (chap. 2, this volume), it is tempting to use the beads found at Mission Santa Catalina to refine the dates for the burials and to more clearly establish dates for the other site components. In chapter 2, Francis identifies four specific bead types that he believes would be useful for these purposes. Briefly restated, these are:

(1) Eye beads (Types 64, 65, 66, 67)—thought to go out of circulation by 1630 (Smith, 1987: 33),

(2) Charlottes (faceted seed beads)—thought to disappear by 1630 (Smith et al., 1994: 39; see also chap. 6, this volume),

(3) Simple turquoise blue, *a speo* finished beads (Type 18)—thought to be temporally diagnostic based on color and chemistry (Hancock et al., 1994; see also chap. 8, this volume).

(4) Blue beads with compound red-on-white stripes (Types 54). Francis notes that this bead, Kidd Type IIbb24, does not appear in the Susquehanna sequence until 1718–1743 (see Kent, 1983: 80–81). However, the very similar Type 58 (IIbb27)—a cobalt blue bead with red-on-white stripes—is found earlier in the sequence and dates from 1575–1600 (Kent, 1983: 80–81).

In addition, we would add three more:

(1) Cobalt blue with alternating red-and-white stripes (Type 50). This type is thought to be diagnostic of the early 17th century (Smith, 1983: 150; Smith, 1987: 33; Smith, 1990).

(2) Simple and compound opaque white beads (Types 15, 23, and 38). Sempowski et al. (2000) convincingly demonstrated that, at least in the Northeast, the transition from the use of tin to the use of antimony as the opacifier for white beads occurs during the mid to late 17th century.

(3) Seed beads of the period 1600–1630. These are most often of compound construction (Types 37, 38, 39, 40, and 41) and are most common from 1600 to 1630 (Smith, 1987: 33).

Eye Beads: Thirty-two eye beads have been recovered from Mission Santa Catalina. Twenty-four of these were found with Burial E, five were found with Individuals 348, 349, and 350, one was found with Individual 318, and one was found in Structure 6—a possible aboriginal domestic structure. The final eye bead was recovered from the cemetery, without clear burial association.

Charlottes: Three varieties of charlottes (Types 27, 28, and 29) were found at Mission Santa Catalina. Types 27 and 29 were exclusively found with Individual 307, while Type 28 was found almost exclusively in two locations—with Individual 282 (*N* = 109) and in excavation unit N102 (*N* = 19). The remaining 10 beads were found in units adjacent to these two locations. The N102 beads of this type, as well as the beads of this type from adjacent units, were likely originally associated with one of the secondary burials in this unit.

In addition to the charlottes, Types 30, 31, and 32 are also simple faceted beads. These are differentiated from charlottes in that they were finished by the *a speo* method. Nevertheless, many of these beads are within the size range of seed beads, and may also be similarly temporally diagnostic. Type 30 beads were recovered in large quantities with Individuals 208, 282, 307, 339, and Burial B. This type was also recovered in small quantities with a number of other individuals. Type 31 beads were found in greatest number with Individual 59 (*N* = 7). Sixteen Type 32 beads were found with Individual 282, 10 with Individual 151, three each with 208 and 248, and one each with Individuals 200 and 212–218.

Turquoise Blue *a Speo* Finished Beads: Francis (chap. 8, this volume) discusses changes in the turquoise blue bubble glass beads (Type 18, Kidd and Kidd IIa40)—noting specifically that pre-1600 beads are lower in calcium, chlorine, and sodium and higher in copper than post-1600 beads (see Hancock et al., 1994; Karklins et al., 2002). These chemical differences would result in the earlier beads being less physically stable, and noticeably darker in color. We are only beginning to explore the chemical composition of the beads from Mission Santa Catalina and cannot yet use glass chemistries to refine our dating of the burials. We can, however, make some observations based on color variability within Type 18.

During the initial sorting of the St. Catherines beads, Eric Powell noticed that these beads, while of the same type, could be visually divided into two subgroups—one in which the color is best described as turquoise blue (4.6B6/8, 4.9B5/8, 4.5B7/5) and one in which the color is best described as deep green-blue (2.9BG 6/10, 4.6BG 5/5, 4.7B 5/5) (see appendix 3). Our suspicion is that the darker, deep green-blue beads of this type may correspond to the pre-1600 beads with a higher copper content. This darker subtype numbers only 370 (whole and fragmentary) beads out of 5265 total Type 18 beads—consistent with our expectation that most of the Santa Catalina bead assemblage should date to the 17th century. Almost all of these darker beads (*N* = 350) were found with Burial A, while only one of the lighter subgroup was present in the assemblage. Burial A is also very deeply buried, with no bone preservation and only slightly disturbed by later internments—including two primary burials (Individuals 107 and 142). Based on this evidence, Burial A may be one of the only burials that we can hypothesize dates to the 16th century. It would be an excellent bead assemblage with which to begin more comprehensive chemical analyses.

Blue Beads with Compound Red-on-White Stripes: In chapter 2 (this volume) Francis notes: "There are several varieties of these beads, though the precise nature of the beads as listed in Kidd and Kidd (1970) is difficult to determine. These are the beads listed in their classification system as IIbb 24 through 27. IIbb24, an opaque robin's egg blue oblate, seems to be a bubble glass bead (see chap. 8). In the Susquehanna sequence it is not found until the period 1718–1743 (Kent, 1983: 80)." Kidd IIbb24 is our Type 54 and the only specimen was recovered from the *cocina*. While we suspect that the *cocina* is one of the later mission structures, this bead is not particularly helpful in refining the dates for this structure.

Though not discussed by Francis, the very similar Type 58 (Kidd IIbb27)—cobalt blue with compound red-on-white stripes—is found in the Seneca sequence from 1575 to 1600 (Kent, 1983: 80-81). While similar date estimates are not available for the Southeast, Smith (1987: 33) has observed that the period 1630–1670 was "remarkably free of polychrome beads"—implying that assemblages dominated by complex beads such as Type 58 would date earlier. The vast majority of this type found on St. Catherines was in direct association with Individual 65. This burial also contained a number of other complex and composite beads (11 turquoise blue beads with white stripes [Type 56] and 14 gooseberries [Type 70]). Considering the relatively high number of polychrome beads with this Individual (relative to many of the other St. Catherines burials) we might tentatively suggest that Individual 65 is a likely pre-1630 burial.

Cobalt Blue Beads with Alternating Red-and-White Stripes: Cobalt blue beads with alternating red and white stripes (Type 50, Kidd IIb71) are thought to date to the early 17th century (Smith, 1983: 150, figure 1, row 3, 3–4; Smith, 1987: 33; Smith, 1990: 217–222). But this estimate may only apply to the larger, "necklace" size, varieties. Smith (1990, Type 5) discusses this bead type at length, noting its presence/absence at several sites with well-established dates, and clearly establishes that it is "limited to the first third of the seventeenth century and occur[s] primarily on sites showing evidence of Spanish trade." He notes, however, that the Cooper Farm site (1630–1670) "did produce small embroidery (or "seed") beads like Type 5" (Smith, 1990: 223). The Type 50 beads from Mission Santa Catalina fall into the "seed bead" size range, and therefore may not be indicative of the early 17th century. We note, however, that all three specimens of this type were recovered from the N102 excavation unit in the church cemetery and, though none of the beads can be attributed to a specific burial, it is interesting that this distribution parallels that of the charlotte (Type 28) concentration observed in the same unit. We can perhaps suggest that together these beads may be grave goods from a disturbed, pre-1630 burial in this portion of the cemetery.

Opaque White Beads: It has been argued that opaque white beads may be temporally diagnostic, based on the transition from tin to antimony as an opacifying agent (Sempowski et al., 2000). As noted above, we have only recently begun chemical analyses of some of our beads; however, preliminary tests on some of the opaque white beads are tantalizingly promising. A sample of 19 compound white *rocailles* (Type 38) was subjected to analysis by x-ray fluorescence spectroscopy. Fourteen of these beads were associated with Individual 238, while the other five beads were found with Individual 307 (the coffin burial). All 14 of the beads found with Individual 238 were opacified with antimony, while all five with Individual 307 contained tin. This would suggest that Individual 238 might postdate Individual 307. Additional research along these lines is clearly warranted and may help refine the burial sequence. This should be coupled with closer analysis of the number and thickness of the white and clear layers of the beads. Smith (n.d: 5; 1992a: 111) has noted temporal significance in the layering of these beads.

COMPOUND SEED BEADS: Smith (1987: 33) suggests that seed beads from the period 1600-1630 are most often of compound construction. It seems reasonable to suggest that burials with large quantities of these beads (i.e., Individuals 282, 307, and Burial B) may date to this period.

BEAD PROVENIENCE BY TYPE

This section summarizes bead distributions by type. While a more complete distribution is provided in appendices 1 and 2, this narrative summary is a useful tool for understanding the overall character of the St. Catherines Island bead distribution.

Type 1: MANGANESE VIOLET BUGLE (*N* = 7)

All specimens come from contiguous excavation units, O102 and N102, within the mission cemetery. No specimens were piece plotted or associated with a particular burial. The fact that Type 1 beads only occur in adjacent units suggests that they were originally associated with a single burial.

TYPE 2: COBALT BLUE BUGLES (*N* = 6)

Two beads each of this variety were found with Individuals 47 and 102. The remaining two were found in the Mission West area. Preliminary x-ray fluorescent spectroscopy analysis indicates that the latter are chemically distinct from the four beads found in the cemetery.

TYPE 3: COBALT BLUE BUGLES (*N* = 7)

Six of the seven specimens are located west of the church—two in association with Structure 1-W and 4 in the Mission West area. The remaining specimen was found in the *Pueblo* North area.

TYPE 4: MEDIUM/DEEP BLUE-GREEN *ROCAILLE* (*N* = 393)

Three hundred eighty-one specimens were found with Individual 208. The remaining 12 specimens were dispersed around the mission and the *pueblo*.

TYPE 5: TURQUOISE/GREEN-BLUE *ROCAILLE* (*N* = 5777)

Four burials contained 5245 of these beads: Individuals: 90, 93, 151, and 208. The remaining beads were primarily found in unassociated contexts within the cemetery. Small numbers of this type were also found in the *cocina,* the *convento,* the well (Structure 2/4), and Structure 5 in the *Pueblo* North.

TYPE 6: COBALT BLUE *ROCAILLE* (*N* = 20,906)

This is the most numerous bead type found on St. Catherines Island. This type is found in large numbers with many burials. It is also found across the entire mission complex and throughout the *pueblo*.

TYPE 7: DEEP GREEN *ROCAILLE* (*N* = 10)

Individual 307 had two specimens in association, and Burial B had three specimens. Another two specimens were found in the *atrio*. The *cocina,* the well, and the *Pueblo* North area had one specimen each.

TYPE 8: OLIVE *ROCAILLE* (*N* = 1)

The single specimen of this type was found in Structure 5 in the *Pueblo* North area.

TYPE 9: GRAY-BLUE *ROCAILLE* (*N* = 19)

No beads of this type were found in a burial context. Nine specimens were found in the *cocina,* one in the *convento,* four in the Fallen Tree portion of the *Pueblo* South, one in the NW Bastion area, one in the Mission West area, and two were found in Structure 5. The remaining bead has no provenience.

TYPE 10: ORANGE-YELLOW *ROCAILLE* (*N* = 7)

Three beads of this type were found in the *cocina,* while another two were found in Structure 5. One each was found in the plaza and the cemetery.

TYPE 11: YELLOW-BROWN *ROCAILLE* (*N* = 1954)

1938 beads of this variety were found in clear burial contexts, with almost all (*N* = 1821) found with Individual 307. Another 102 were found with Burial B. Small numbers were also found with Individuals 348, 349, and 350, 282, and 208.

TYPE 12: RED-BROWN *ROCAILLE* (*N* = 3)

One specimen of this bead variety was found with Individual 151 and one with Individuals 348, 349, and 350. The third specimen was found in the *convento*.

TYPE 13: MANGANESE VIOLET *ROCAILLE* (*N* = 1807)

Most Type 13 beads were found within the cemetery, with 1336 beads of this variety found with Individual 307. Another 186 and 161 were found with Burial B and Individuals 348, 349, and 350, respectively. The remainder was found in scattered contexts around the mission complex and the *Pueblo*.

TYPE 14: COLORLESS *ROCAILLE* (*N* = 2059)

Individual 307 was associated with 1862 beads of this type, while another 189 specimens were found with Burial B. One was found with

Individual 142 and the remaining seven were found scattered.

Type 15: White *Rocaille* (*N* = 101)

Most beads of this type were found in the Gospel side of the church in burial contexts, but many could not be associated with specific individuals.

Type 16: Manganese Violet (*N* = 3)

Two beads of this type were found in the cemetery without clear burial association. The third bead was found immediately outside Structure 1-W in the *Pueblo* West.

Type 17: Manganese Black (*N* = 6697)

Most beads of this type were found with Individuals 307 and 208 (2328 and 2203, respectively). The remainder were widely distributed, with many found in burial contexts as well as in all areas of the mission and *pueblo*.

Type 18: Turquoise Blue (Ichucknee Plain) (*N* = 5265)

This is a ubiquitous variety, found with many of the burials and widely dispersed across the site.

Type 19: Medium Blue (*N* = 1329)

Eleven burials were found associated with 1100 beads of this type: Individuals 348–350, 363/364, 318, 65, 42, 307, 207, 90, 212/218, and Burials A and E. The remainder was found scattered widely across the site.

Type 20: Cobalt Blue (*N* = 2682)

This is a very common variety, found with many burials and widely dispersed across the site.

Type 21: Bluish Green (*N* = 150)

While 97 beads of this type were recovered from the mission cemetery, the remainder was well distributed across the rest of the site—including both the mission quadrangle and the *pueblo*.

Type 22: Yellow-Green (*N* = 7)

Six beads of this type were found in direct association with Individual 47. The seventh was found within the same excavation unit as Individual 47, and almost certainly was once part of this burial.

Type 23: White (*N* = 1357)

This bead type was primarily found in burial contexts, with the bulk coming from two burials: Individual 307 and Individual 318, with 500 and 491 specimens, respectively. A few beads of this type were also found in other mission contexts. Two beads were found in the *pueblo*—one in the Wamassee Creek area of the *Pueblo* South, and one in Structure 6 in the *Pueblo* South.

Type 24: Yellow (*N* = 52)

All Type 24 beads were found within the cemetery. Forty-one were found without burial association within adjacent excavation units N102 and O102. In these same units two additional beads of this type were found in the burial pit that contained Individual 155 and the disturbed remains of 361 and 406. It seems likely that this bead type was originally associated with one of the secondary burials found in this portion of the cemetery. Several other beads of this type were found with Individuals 93 (*N* = 5) and 65 (*N* = 2). The final two beads are unassociated in the cemetery.

Type 25: Brown Transparent: (*N* = 67)

Forty beads of this type were found in direct association with Individual 238, while another 10 were found in the immediate vicinity of this burial, but without clear association. Sixteen Type 25 beads were found with Individuals 348, 349, and 350. One bead of this type was found in Structure 1-W in the *Pueblo* West. The association of this bead type with Individual 238, and its position within the cemetery, has been previously noted (Blair and Sanger, 2007).

Type 26: Colorless (*N* = 168)

One hundred thirty-eight Type 26 beads were found with Individual 394. Five were found with Individual 102. Another 13 were found within the *cocina-convento* complex. Five, including four in Structure 5, were found in the *Pueblo* North area.

Type 27: Deep Orange-Yellow Charlotte (*N* = 3)

All beads of this type were found with Individual 307, bead cluster Part D.

Type 28: Greenish Blue Charlotte (*N* = 138)

All Type 28 beads were found in the cemetery, with 109 recovered with Individual 282. Another 19 were recovered without burial association from unit N102. The remaining 10 beads of this type were found in units adjacent to these two locations.

Type 29: Gray-Violet Charlottes (*N* = 5)

All beads of this type were found with Individual 307, bead cluster Part D.

Type 30: Cobalt Blue Faceted (*N* = 2297)

Most beads of this type (*N* = 2290) were found in the cemetery, of which 922 can be associated with Individual 307, 382 with Individual 339, 196 with Individual 208, 164 with Individual 282, and 106 with Burial B. Many other burials also contain smaller numbers of this bead type. The remaining seven beads, found outside the cemetery, were located in Structure 1-W (*N* = *3*), Structure 5 (*N* = 2), the *atrio* (*N* = 1), and in the Mission West (*N* = 1).

Type 31: Green Faceted (*N* = 41)

Most Type 31 beads (*N* = 31) were recovered from the cemetery. Seven were found with Individual 59; this was the densest cluster of this type—the others were scattered.

Type 32: Manganese Black Faceted (*N* = 60)

Sixteen Type 32 beads were found with Individual 282, 10 with Individual 151, three each with 208 and 248, and one each with 200 and 212–218. The others, with the exception of four found in the Mission West area, were found in the cemetery in the vicinity of the burials just noted.

Type 33: Deep Green-Blue Melon (*N* = 1)

The single Type 33 bead was recovered from the Wamassee Creek area of the *Pueblo* South.

Type 34: White Segment (*N* = 4)

Three Type 34 beads were found in the Mission West area; one was found with Individual 307.

Type 35: Green Heart Bugle (*N* = 5)

Two beads of this type were found in the *cocina* area, while one each was found in the well (Structure 2/4), the Northwest Bastion, and Structure 5 in the *Pueblo* North area.

Type 36: Small Nueva Cádiz (*N* = 1)

The sole specimen of this type was found with Individual 318.

Type 37: Compound Turquoise Blue *Rocaille* (Clear Core) (*N* = 7)

Four Type 37 beads were found with Burial B. Two were found with Individual 307. The final specimen's provenience is unknown.

Type 38: Compound White *Rocaille* (*N* = 6514)

Type 38 beads are found in large concentrations within the cemetery, as well as across the entire mission and *pueblo* area.

Type 39: Compound Turquoise Blue *Rocaille* (Clear Core and Coat) (*N* = 1884)

Type 39 beads were only found within the church cemetery, with almost all (*N* = 1772) found with Individual 307. The only other large concentration was another 64 found with Burial B.

Type 40: Compound Blue/Yellow-Green *Rocaille* (*N* = 2271)

With the exception of one bead found in association with the well (Structure 2/4), all beads of this type were found in the cemetery: 2131 were found with Individual 307 and 134 were found with Burial B.

Type 41: Green Heart *Rocaille* (*N* = 7)

Three of the seven Type 41 beads were found in association with the *cocina*. One each was found in the well (Structure 2/4), the *convento*, Structure 5, and Individual 282.

Type 42: Compound Yellow Yellow-over-Green *Rocaille* (*N* = 862)

Type 42 beads were primarily located in the cemetery, with 719 specimens found with Individual 307 and 121 found with Individual 282. Another five beads were recovered from the *convento*-*cocina* complex. One bead of this type was found in the *atrio*.

Type 43: Compound Colorless Barrel (*N* = 1)

The sole specimen of this type was found at the northernmost corner of the church. It is unclear if this bead was associated with the cemetery.

Type 44: Compound Yellow-Green over Yellow-Green (*N* = 1)

The single Type 44 bead was recovered from the Wamassee Creek area of the *Pueblo* South.

Type 45: Compound Purple over Turquoise (*N* = 1)

The only bead of this type was found with Individual 307.

Type: 46: Compound Orange-Yellow over Green (*N* = 3)

One Type 46 bead was found with Individual 167. A second was found within the same excavation unit, but without clear burial association. The third bead of this type was recovered from the Wamassee Creek area of the *Pueblo* South.

Type 47: *A Speo* Finished Green Hearts (*N* = 12)

Five beads of this type were found in the cemetery, including one found with Individual 238. Two beads were found in the *cocina*, and one each was located in the *convento*, the Mission West area, and Structure 5. Two bead fragments, likely from a single bead, were recovered from excavations in Structure 6.

Type 48: Five-Layered Chevron (*N* = 3)

All three specimens of this type—each exactly half of a bead—were recovered from the *convento*.

Type 49: Cobalt Blue with White Stripes (*N* = 1)

This bead was found with Individual 248.

Type 50: Cobalt Blue with Red-and-White Stripes (*N* = 3)

All three beads of this type were recovered from the N102 excavation unit in the church cemetery. None of the beads can be attributed to a specific burial.

Type 51: Yellow with Red Stripes (*N* = 2)

The only two beads of this type were found with Individual 307, bead cluster Part D.

Type 52: Rust Brown with Brown Stripes (*N* = 1)

The only specimen of this type was found with Individual 42.

Type 53: Cobalt Blue with White Stripes (*a speo)* (*N* = 14)

Ten beads of this type were found within the cemetery, including one with Individual 307, two each with Individuals 260 and 318, two in close vicinity of Individual 260 but without clear burial association, and one with Individual 339. One each was found in the *convento,* the *plaza,* the Fallen Tree portion of the *Pueblo* South, and Structure 5 in the *Pueblo* North.

Type 54: Turquoise Blue with Red-on-White Stripes (*N* = 1)

The only type 54 bead was found in the *cocina*.

Type 55: Cobalt Blue with Red Stripes (*N* = 17)

Fifteen of the Type 55 beads were recovered from adjacent excavation units N102 and O102; there was no clear burial association. One bead was located in Structure 5 of the *Pueblo* North. One specimen was found in the northwest portion of the church, but no other provenience information was retained.

Type 56: Turquoise Blue with White Stripes (*N* = 119)

All beads of this type were recovered from the cemetery. Sixty-seven were found with Individual 307, and 35 were found were Burial E. Individuals 65, 318, and Burial B also were found with Type 56 beads.

Type 57: Green with White Stripes (*N* = 2)

The only two beads of this type were found outside the *cocina*.

Type 58: Cobalt Blue with Red-on-White Stripes (*N* = 70)

Fifty-three beads of this type were found in clear association with Individual 65; another 11 were found in close proximity. One was found with Individual 102. A single specimen was found in the *atrio*. The remainder was found in the cemetery without burial association.

Type 59: Manganese Black with White Band (*N* = 2)

One Type 59 bead was found at Wamassee in the *Pueblo* South; one was found in the *convento*.

Type 60: Ichucknee Inlaid Black (*N* = 22)

Although relatively uncommon at St. Catherines, beads of this type are very widely distributed. One was found in the cemetery with Individuals 180–183, two were found in the *plaza*, two in the *cocina*, seven in the well (Structure 2/4), three in the *convento*, two in Structure 5 in the *Pueblo* North, two in Wamassee in the *Pueblo* South, and three in the *Pueblo* East.

Type 61: White with Red-and-Blue Stripes (*N* = 1)

The only specimen was recovered outside the *cocina*.

Type 62: Clear with One White Stripe (*N* =1)

The only Type 62 bead was recovered from excavation unit P100 on the Gospel side of the church.

Type 63: White with Black Stripes (*N* = 1)

The sole Type 63 bead was found with Individual 307, bead cluster Part B.

Type 64: Turquoise Blue Eye Bead (*N* = 25)

Twenty-one type 64 beads were recovered with Burial E. Another three were found with Individuals 348, 349, and 350. The only other specimen was recovered from the cemetery without burial association.

Type 65: Turquoise Blue Eye Bead with White Stripes (*N* = 4)

Three type 65 beads were found with Burial E; one was found with Individual 318.

Type 66: Cobalt Blue Eye Bead (*N = 1*)

The single Type 66 bead was found with Individuals 348, 349, and 350.

Type 67: White Eye Bead with Blue-and-White Eyes (*N* = 1)

The single Type 67 bead was found with Individuals 348, 349, and 350.

Type 68: White Eye Bead with Blue-and-Brown Eyes (*N* = 1)

The only Type 68 bead was found in association with Structure 6 in the *Pueblo* West.

Type 69: Clear with Gilded Perforation (*N* = 2)

The two Type 69 beads were recovered from the well (Structure 2/4).

Type 70: Gooseberry (*N* = 261)

The Type 70 beads were concentrated in the church cemetery, with 138 found with Individuals 348, 349, and 350, 88 found with Individuals 363 and 364, 14 with Individual 65, 13 with Individual 279, two with Individual 318, and one with Individual 102. One each was also found in the *plaza*, the *cocina*, and in Structure 6 of the *Pueblo* South.

TYPE 71: WHITE-OVER-BLUE WITH BLUE STRIPES ($N = 1$)

The only Type 71 bead was found in the Mission West area of the site.

TYPE 72: BLUE-OVER-BLUE WITH RED-ON-WHITE STRIPES ($N = 1$)

The single Type 72 bead was found with Individual 208.

TYPE 73: RED-STRIPED GOOSEBERRIES ($N = 102$)

Type 73 beads were found with three burials: 66 with individual 307, 23 with Individual 282, and 7 with Burial B. The remaining six were found in the cemetery without burial associations.

TYPE 74: OLIVE GREEN WITH WHITE STRIPES ($N = 1$)

The sole specimen of this type was found in excavation unit O102 of the cemetery without a clear burial association.

TYPE 75: WOUND GREEN ($N = 4$)

Type 75 beads were widely dispersed and none were found in the cemetery. One each was located in the *plaza*, the *convento*, the Mission West area, and Structure 6 in the *Pueblo* South.

TYPE 76: WOUND YELLOW-BROWN ($N = 36$)

Twenty Type 76 specimens were found with Individual 260. One was found with Individual 238 and another was found near the well (Structure 2/4). The remaining beads of this type were found within the cemetery, mostly in the vicinity of Individual 260.

TYPE 77: GRAY GREENISH YELLOW ($N = 1$)

The single Type 77 bead was recovered from Structure 5 of the *Pueblo* North.

TYPE 78: BARLEYCORN ($N = 1$)

The only Type 78 bead was recovered from the A-zone (surface) of the cemetery.

TYPE 79: WOUND YELLOW ($N = 27$)

Fifteen beads of this type were recovered from the cemetery, including three found with Individual 93, and one each with Individuals 90 and 112. The other 12 beads of this type were found in various contexts of the mission and *pueblo*—including the *cocina*, the well (Structure 2/4), the *convento*, the Mission West area, Structure 1-W, and Structure 5.

TYPE 80: WOUND COLORLESS ($N = 2$)

The two Type 80 beads were found in the *convento*.

TYPE 81: WOUND TURQUOISE ($N = 3$)

One bead was found in the *cocina,* one was found in the Mission West area, and one was located in Structure 5 in the *Pueblo* North.

TYPE 82: WOUND BLUE-GREEN ($N = 2$)

One bead of this type was found outside the *cocina* and the other specimen was found in association with the *convento*.

TYPE 83: WOUND MANGANESE VIOLET ($N = 1$)

The single specimen of this type was found in the cemetery.

TYPE 84: WOUND GREEN ($N = 3$)

One specimen each was found in the plaza, outside the *cocina,* and in Structure 5 in the *Pueblo* North.

TYPE 85: WOUND YELLOW ($N = 2$)

One bead of this type was found in the well (Structure 2/4) and the other was located at Wamassee in the *Pueblo* South.

TYPE 86: WOUND YELLOW RING ($N = 2$)

One specimen was recovered with Individual 42. The other was found during excavations of Structure 1-W in the *Pueblo* West area.

TYPE 87: WOUND MANGANESE BLACK RING ($N = 1$)

The only Type 87 bead was recovered from Fallen Tree in the *Pueblo* South.

TYPE 88: WOUND WHITE RING ($N = 1$)

The single bead of this type was recovered from the *Pueblo* North area.

TYPE 89: WOUND DEEP GREEN ($N = 1$)

The sole specimen of this type was found in the Mission West area.

TYPE 90: WOUND YELLOW MELON ($N = 1$)

The sole Type 90 bead was found in Structure 6 in the *Pueblo* South area.

TYPE 91: WOUND ORANGE-BROWN FACETED ($N = 39$)

Thirty-five of these beads were found with Individual 276. The remaining four were found in the same excavation unit as this Individual, and were likely originally associated with this burial.

TYPE 92: WOUND GREEN FACETED TEARDROP ($N = 1$)

The single specimen of this type was recovered from the cemetery with no clear burial association.

TYPE 93: RUBY RED FACETED BICONE ($N = 3$)

One specimen was found with Individual 200; a second specimen was found in the cemetery in excavation unit O103 without clear burial association. The third bead of this type was recovered from Structure 5 in the *Pueblo* North area.

TYPE 94: WOUND MANGANESE VIOLET FACETED ($N = 1136$)

Almost all (*N* = 1004) Type 94 beads were found in direct association with Individual 276. The remaining beads of this type, with the exception of one found in Structure 5, came from the cemetery, mostly near Individual 276.

Type 95: Wound Incised Green (*N* = 3, fragments of 1 bead)

The three bead fragments of this type were all found in the church cemetery, not associated with a specific individual.

Type 96: Wound Green over Green (*N* = 1)

The only Type 130 bead was found outside the *cocina*.

Type 97: Wound Cobalt Blue with White Dots (*N* = 9, fragments)

All bead fragments of this type were found with Individual 163.

Type 98: Spherical Gilded Glass Beads (*N* = 264)

With the exception of one spherical gilded bead found in the *atrio*, all beads of this type were found in the church cemetery. These beads were found with many individuals (e.g., 208, 307, 117, 228, and 226), but most were not associated with a specific burial. They did tend to cluster in two areas: the Gospel and Epistle sides of the northern end of the church nave, with the presumed location of the church aisle forming a clear break between the two clusters.

Type 99: Oval Gilded Glass Beads (*N* = 22)

All beads of this type were found with Individual 276.

Type 100: Ring Gilded Glass Beads (*N* = 46)

Thirty-five of the ring-shaped gilded beads were found with Individual 112. Seven were found with Individual 151. Three were found in the cemetery without specific individual association, and one was recovered from the *atrio*.

Type 101: Spherical Incised Gilded Glass Beads (*N* = 30)

All beads of this type were found in the mission cemetery; very few could be associated with specific individuals. This type was primarily concentrated in the mid-nave aisle area of the church (excavation units N102 and O102).

Type 102: Oval Spiral-Incised Gilded Glass Beads (*N* =26)

Fifteen Type 102 beads were found with Individual 93. The remaining beads were found in the cemetery, with most concentrated in the mid-nave aisle area of the church (excavation units N102 and O102).

Type 103: Spherical Dash-Incised Gilded Glass Beads (*N* = 5)

All five beads of this type were recovered with Individual 208.

Type 104: Oval Dot-Incised (Comb A) Gilded Glass Beads (*N* = 11)

Ten type 104 beads were found in the cemetery: two with Individual 86, and one each with Individuals 151 and 155. The remaining beads from the cemetery were found in proximity to Individuals 151 and 155. The final bead of this type was recovered in Structure 5 in the *Pueblo* North area.

Type 105: Spherical Dot-Incised (Comb A) Gilded Glass Beads (*N* = 6)

Five beads of this type were found in the mid-nave aisle area of the church (excavation units O102 and O103), not associated with specific burials. The other specimen was recovered in the *cocina*.

Type 106: Oval Dot-Incised (Comb B) Gilded Glass Beads (*N* = 15)

This type was concentrated in the mid-nave aisle area of the church (excavation units N102 and O102), but, with the exception of one found in the burial fill with Individual 155, they cannot be associated with a specific burial. One bead of this type was recovered from the Wamassee area of the *Pueblo* South.

Type 107: Spherical Dot-Incised (Comb B) Gilded Glass Beads (*N* = 6)

Four beads of Type 107 were found with Individual 151; one was found with Individual 208. The remaining bead of this type was found within the cemetery unassociated with an individual.

Type 108: Fancy Double Spacer Tabulars (*N* = 6)

One bead of this type was found with Individual 228. The remaining five were found in the same area of the cemetery (units P101 and Q101), but without clear burial association.

Type 109: Glass Cross Variety 1 (*N* = 5)

Two beads of this type were found with the burial grouping that included Individuals 180, 181, 182, and 183. The remaining three were found without clear burial association, in units P104 and Q104.

Type 110: Glass Cross Variety 2 (*N* = 2 whole; 9 fragmentary; 6 Minimum)

The two whole specimens and six of the fragments were found with Individuals 180, 181, 182, and 183. The other three fragments were found in cemetery excavation units P104 and Q104.

Type 111: Purplish Blue Segmented (*N* = 36)

Thirty-five beads of this type were found with Individual 282. One was found with Burial E.

Type 112: Colorless Segmented with Cinnabar (*N* = 449)

All beads of this type were recovered from the cemetery. Two hundred forty-three were found with Individual 307, 147 were found with Individual 282, and eight were found with Burial B. Another 25 specimens are identified as coming from excavation unit O103; however, these beads are fragmentary and both the typing and count are extremely tenuous. The remaining beads of this type were not associated with specific burials.

Type 113: White Segmented (*N* = 169)

All beads of this type were recovered in the cemetery. One hundred forty-nine were found with Individual 307, 17 were found with Burial B, and two were found with Individual 282. The final bead of this type was found in excavation unit R101, Pit J—adjacent to Individual 307.

Type 114: Faceted Colorless Segmented with Cinnabar (*N* = 5)

Four Type 114 beads were found with Individual 307; one was found with Individual 282.

Type 115: Gold Glass Segmented (*N* = 3)

The only three specimens of this type were recovered in the cemetery with Individual 208.

Type 116: Green Segmented (*N* = 3)

Two Type 116 beads were found with Individual 282. One was found with Burial E.

Type 117: Green Segmented Ring (*N* = 7)

Four Type 117 beads were found with Individuals 348, 349, and 350. Two were found in the *cocina*, and one was recovered from Structure 5 in the *Pueblo* North.

Type 118: Blown Colorless (*N* = 17)

Six of these beads were found with Individual 307; 11 were found with Burial B.

Type 119: Blown Black with Green Dots (*N* = 13)

All Type 119 beads were found with Individual 279.

Type 120: Blown Blue Teardrop (*N* = 2, with 10 fragments)

Both beads of this type were found with Individual 307—one with Part B and one with Part D.

Type 121: Blown White (*N* = 21)

All Type 121 beads were found with Individual 93.

Type 122: Compound Blown Bluish Green (*N* = 8 or 9)

All Type 122 beads were recovered with Burial C.

Type 123: Ruby Red Molded (*N* = 2)

Both ruby red molded beads were found with Individual 318.

Metal Bead (*N* = 4)

The collared metal bead, made of copper and strung on wire, was found in the Mission West area, as was the ring-shaped bead blank made of iron. A perforated piece of lead shot was recovered from Structure 1-W. A lead shot bead blank was found in Structure 5.

Jet Variety 1 (*N* = 11)

All beads of this type were found in the cemetery, with nine of them located midnave on the Epistle side of the church. One was found with Individual 307.

Jet Variety 2 (*N* = 304)

With the exception of one bead found in the *atrio*, all beads of this type were recovered from the cemetery. Two hundred forty were found with Individual 370, 42 with Burial B, and one each with Individuals 228 and 163.

Jet Variety 3 (*N* = 4)

All four specimens were found at the northern end of the nave on the Epistle side of the church. None was associated with a specific burial.

Jet Variety 4 (*N* = 18)

Ten beads of this type were found with Individual 107. Another seven were grouped in excavation unit O103, but unassociated with an individual. One bead was found in the *atrio*.

Jet Variety 5 (*N* = 1)

The single specimen of Jet Variety 5 was found in the cemetery in excavation unit P101. No burial association was evident.

Jet Variety 6 (*N* =1)

The only specimen of this type was found in excavation unit P100. No burial association was evident.

Amber Beads (*N* = 2)

One amber bead was found with Individuals 348, 349, and 350. The other was found in unit P104, without individual association.

Carnelian Variety 1 (*N* = 1)

The only bead of this type was found at 9Li91/163 (AMNH 342).

Carnelian Variety 2 (*N* = 3)

One bead was found in the *cocina,* one in the well (Structure 2/4), and one in the cemetery in excavation unit Q101.

Cut Crystal Variety 1 (*N* = 1)

The only bead of this type was found in Structure 5 of the *Pueblo* North.

CUT CRYSTAL VARIETY 2 (*N* = 6)

All specimens of Cut Crystal Variety 2 were found in the cemetery—five with Burial D.

SOFT STONE BEADS (*N =1*)

The single stone bead of "local" manufacture was found at Fallen Tree in the *Pueblo* South.

PEARLS (*N* = 16)

Six pearls each were found with Individuals 208 and 253. Another two pearls were found in the cemetery, unassociated with specific remains, but in proximity to Individual 253. One pearl was also found in the *cocina,* and one was found in the area of the Northwest Bastion.

BONE BEADS (*N* = 12)

Three bone beads, whole and fragmentary, were recovered from Structure 6 in the *Pueblo* West. Two, both incised, were found in the cemetery with Burial D. Another incised bone bead was found nearby. Two beads were recovered from the *Pueblo* South—Fallen Tree and Wamassee—and one was found in Structure 5 of the *Pueblo* North. Two beads were found during the island-wide transect survey, at sites 9Li217 and 9Li209.

WOODEN BEADS (*N* = 7)

All seven wooden beads were found in a burial context with Individual 282.

ANTLER BEAD PREFORM (*N* =1)

The antler bead preform was recovered from Structure 1-W.

SHELL BEADS (*N* = 851)

Shell beads were found in greatest numbers at the prehistoric burial mounds of the Irene and St. Catherines periods. They were also recovered in small numbers from almost all areas of the mission and surrounding *Pueblo*. Their complete absence in the *convento* is conspicuous.

BEADS OF UNIDENTIFIED ORGANIC MATERIAL (*N* = 2)

Both beads of unidentified organic material were recovered from Structure 5 in the *Pueblo* North.

NOTES

1. Because this discussion of the precontact beads of St. Catherines Island is meant to be brief, site specifics are generally omitted. For excavation and site details see Thomas and Larsen, 1979; Larsen and Thomas, 1982; Larsen and Thomas, 1986; Larsen, 2002; and Thomas, 2008.

2. All dates for the temporal periods discussed here come from Thomas' (2008) merging of the St. Catherines Island radiocarbon record with DePratter's (1979; 1991) ceramic sequence for the northern Georgia coast.

3. The Refuge and Deptford periods are combined here following Thomas and Larsen (1979) and Thomas (2008).

4. Catalog numbers for beads recovered by C.B. Moore from St. Catherines Island include 17/0900, 17/0901, 17/2573, and 17/2574. Most are likely from South End Mound I, but more precise provenience data are unavailable.

5. Throughout this discussion all directional designations will refer to the Hispanic grid system.

6. Parentheses around individual numbers indicate that the individual did not have any beads in direct association. These individuals are discussed when they are in the immediate proximity of another individual with whom beads are associated. Individuals without beads in direct association are not included in appendix 2.

7. Following Francis (this volume: chap. 4) the term *rocaille* is used throughout this chapter instead of "seed bead."

8. The designations Burial A, B, etc. refer to significant burial associations that did not meet the criteria for being designated as individuals (see Russell et al., n.d.: 4).

9. Alternatively, while Nueva Cádiz beads were clearly gone from the Spanish trade by 1600, they were subsequently found in considerable quantities at Jamestown, and were almost certainly obtained from the same European beadmaking source (Lapham, 2001). It is possible, but unlikely, that the Nueva Cádiz bead found with Individual 318 is not an heirloom and rather derives from an English trading source.

10. The discomfort with, opposition to, and critique of these terms must be noted (e.g., Brown, 1976; Phillips and Brown, 1978: 169-170; Brown, 1989; Knight, 2006).

11. Mueller takes strong exception, however, to both of these points. First, he notes that rattlesnake style gorgets, being late styles, "are not Southern Cult styles, nor are they even Mississippian styles" (Mueller, 1997: 374). He also objects to the association of Citico style gorgets with the Coosa chiefdom. Rather, he suggests that they "are, more often than not, associated with historical materials in what are most likely to be Cherokee contexts" (Mueller, 1997: 372, note 5).

12. The *Busycon* sp. cup was found in poor condition, and no definite species-level identification was possible. It seems likely, however, that the cup was constructed from the shell of a lightning whelk (*Busycon perversum)* (Milanich, 1979: 85-86; see also Wise et al., 2004, for a discussion of sinistral whelk nomenclature).

13. Most of the glass and shell beads recovered from Fallen Tree have been previously reported (Blair and May, 2008; Blair and Francis, 2008). Smith (1983: table 1) has reported on bead types recovered from Wamassee Head. These, as well as beads from both sites recovered during subsequent excavations, are discussed here and itemized in appendix 1.

14. The pipe stem has a bore diameter of 4/64 inches, suggesting a date of 1750–1800 (after the Harrington chart, Noël Hume, 1969: 298), or 1779 (after the Binford regression formula, Noël Hume, 1969: 299).

CHAPTER 16
THE ROLE OF BEADS ON ST. CATHERINES ISLAND

ELLIOT H. BLAIR

The process of bead research does not end with the examination of the beads themselves. Rather, it is necessary to consider the people who made, traded, used, and disposed of these beads. Although only a few previous researchers have attempted this exercise, the results seem rewarding—with the potential to generate a surprising amount of information about a single site, about a region, and in this case, about issues beyond the southeastern United States. The study of beads can illuminate unknown processes of international trade, the workings of guilds and other associations, and the roles of many people. Some of these larger questions are considered in chapter 17; here, we will concentrate on what the beads at St. Catherines Island can tell us about daily life at Mission Santa Catalina de Guale.[1]

This 16th- and 17th-century assemblage of nearly 70,000 beads was a critical component of economic, social, and religious life at the mission, reflecting a role in both Franciscan and indigenous belief systems. The nature and distribution of these beads inform about mission mortuary practices, especially with regard to social stratification, political organization, gender, and age. The beads and ornamentation also help in understanding the progression of the missionization process itself (Thomas, 1988a: 116–123). The bead assemblage from Mission Santa Catalina de Guale provides an ideal springboard for discussions of the implications of Native-Spanish culture contact.

Two critical, and interrelated, considerations will frame these discussions:

(1) What was the source of the beads? Why such great variety and quantity? Why is this bead assemblage so different from that found at other southeastern Spanish missions?

(2) Since the vast majority of the beads at Mission Santa Catalina were found in mortuary contexts, what is the source of the variability seen in this context? Why are some individuals found with no beads (or other grave goods) and others found with extensive assemblages? What does the mortuary distribution of the beads tell us about the people at Mission Santa Catalina de Guale?

Elements of these questions have been previously addressed by others, with both religious and secular explanations being offered (e.g., Thomas, 1988a; Worth, 1998; McEwan, 2001).

Considering that the two missions with the most extensive grave goods (Santa Catalina de Guale and San Luis de Talimali) are located at the periphery of Spanish Florida, Worth (1998) observed that the common speculation is that this "concentration of valuable burial goods was an intentional Franciscan response to the tenuous nature of religious conversion on the extreme mission frontiers." He rejected this assessment, however, and suggested that the more likely explanation is based on economic realities. He writes: "it would seem to be no coincidence that these objects were found in provinces and missions known from the documentary record to have been consistent suppliers of large quantities of surplus corn and other local foodstuffs, resulting in a considerable concentration of material wealth in these provinces due to the sale of staple foods to Spanish officials in St. Augustine" (Worth, 1998: 178–180).

Thomas (1988a) has also discounted the "frontier argument," and suggests that such variability may be better understood by a consideration of the nuances of the missionization process. He argues that this process was a formalized endeavor, one that followed a precise series of steps, with each having a distinctive material signature. The three stages he identifies are the *entrada* (premission), the mission (preparochial), and secularization. During the first stage, the *entrada,* friars began establishing links to the Indians, and "emphasized the symbolic trappings of Catholicism . . . . Portable iconographic items were selectively passed into Native American hands" in order to facilitate conversion (Thomas, 1988a: 117). Utilitarian items (and beads) were also distributed during this period (Thomas, 1988a: 117; Lyon, 1984: 4). The Jesuits, having a sporadic presence on St. Catherines during the 1560s, were certainly involved in distributing beads. To the north of Guale, in Orista, Father Juan Rogel is documented to have used "adornments, presents, and gifts"—presumably including beads—in his missionizing efforts (Barcia, 1951: 151; Thomas, 1988a: 117; Lyon, 1984: 4). While his counterparts in Guale doubtless did the same, we cannot attribute any of the beads from St. Catherines to these sources.

The *entrada* phase also included a more secular component—one in which beads were likely transmitted to the Guale through both "casual coastal contact" and more formalized colonial encounters between natives and secular Europeans (Smith, 1992b: 134). In both situations, beads, being a standard component of the "gift kits" carried by Spaniards, were rapidly acquired by native peoples (Brain, 1975; Smith, 1992b: 134). But because many of the earliest coastal contacts between the Spanish and the Guale were slaving expeditions (Worth, in press), it is uncertain how many beads or other trade goods would have actually been transmitted to the Guale. By the 1560s, beads were certainly passing to the Guale on St. Catherines Island through encounters with both the French and the Spanish.

The first clearly documented mention of beads on the Guale coast is associated with the failed 1526 colonization attempt of Lucas Vásquez de Ayllon. While no artifacts have ever been identified from San Miguel de Gualdape, beads have been definitively attributed to native trade with this colony. Mentioned several times in the de Soto accounts, some were observed in mortuary contexts at Cofitachequi (Biedma, 1904: 14; Ranjel, 1904: 100; Elvas, 1904: 67). Beads were ubiquitous in early Spanish "gift kits," and early 16th-century beads would be one of the archaeological indicators for both the location of and trade with the site of San Miguel de Gualdape (Smith, 1992b). Considering that the colony was likely located in Guale, perhaps in the vicinity of Sapelo Sound (Hoffman, 1990), it is possible that some beads recovered on St. Catherines Island might derive from this source. But we have no evidence that this is the case.

From the 1560s until 1595 (and the formal establishment of Mission Santa Catalina de Guale), beads likely arrived on St. Catherines through numerous *entrada* period sources, including the Jesuit activities in the 1560s (see above), a short-lived Spanish garrison on St. Catherines (gone by 1569), and early Franciscan missionizing efforts. However, because the *entrada* stage precedes the actual establishment of missions, the archaeological signature for these exchanges is limited.

The second stage of the missionization process is the "preparochial" phase in which a mission compound would be constructed, and religious instruction would commence (Thomas, 1988a: 117–121; Worth, 1998: 40–43). During this stage the material trappings of Catholicism were emphasized. "The distinctive [Santa Catalina] mission assemblage reflects a preoccupation with, and direct access to, the artifactual expressions of faith—artifacts that functioned as concrete reminders of religious truths or teachings, as incitements to prayer and acts of virtue (Ewing, 1949)" (Thomas, 1988a: 118). During this stage of missionization, a process of negotiation and compromise may have occurred between the Franciscan friars and the Guale. This negotiation involved the allowance of select "pagan" customs, "justified as a necessary step in the overall evolutionary process of conversion" (Thomas, 1988a: 120–121). An example of this is the use of grave goods at Mission Santa Catalina. While not permitted in Catholic tradition, Thomas (1988a: 121) believes that the friars "allowed" the practice to continue, as a compromise in order to achieve other, more fundamental, conversion goals. He argues that these compromises, combined with the emphasis on the material elements of religion, explain much of the artifact assemblage found at Mission Santa Catalina (Thomas, 1988a: 121).

Worth (1998: 36) describes the early missionization process in somewhat different terms, calling the initial phase "the rendering of obedience." Here Indian leaders traveled to St. Augustine in order to pledge allegiance to the Spanish governor and receive gifts in return. These included clothing, cloth, iron implements, and wheat flour. Worth emphasizes that these "perishable," archaeologically invisible, gifts were the most common, and most valued, items given by the Spanish to the Indians, and that beads (and other more durable materials found in the archaeological record) were "secondary in importance as indicators of social rank" (1998: 38). This procedure was a secular event, instigated by native leaders, in order to better position themselves within the local political realities.

The second phase described by Worth (1998: 40–43), the "establishment of missions," combines the religious *entrada* and preparochial phases identified by Thomas (1988a). This phase included the conversion of *caciques* (and subsequently the rest of the community)—either by invitation or persuasion—the construction of missions, and the placement of missionaries.

The final stage of missionization is "secularization." At this point in the process the Indian neophytes would be considered fully converted members of the church, and active missionizing would no longer be required. Missionaries would "move on" to the unconverted, and the former neophytes would be integrated into secular, mainstream Hispanic society (Thomas, 1988a: 121–123). Here the material symbols of faith would be of considerably less importance. Thomas (1988a: 122–123) proposes two artifactual correlates that should accompany the transition to secularization:

> (1) The overall frequency of religious-specific artifacts (beyond church adornment and items of personal devotion) in any such secularized mission should decline precipitously. The iconographic professions of faith so critical during the mission stage are not needed to sustain faith among full-fledged Christians.
>
> (2) Moreover, in such contexts, we expect that grave goods—an apparent "exception" permitted in pre-parochial times—would be strictly prohibited (except in the case of the vestments and adornment worn by members of the clergy).

He further suggests that this may explain the mortuary variability seen in Spanish Florida. "Perhaps such sites with rich grave-associated assemblages ... reflect mostly pre-parochial missionization; whereas missions with only minimal grave goods might reflect the transition to secularized outposts, with ritual more rigorously conditioned by church doctrine" (Thomas, 1988a: 123).

Throughout the rest of this discussion, as we consider both the variability within Spanish Florida and within the Mission Santa Catalina cemetery, these explanatory models will be assessed. We will first explore the roles of the beads as economic, religious, and social objects and subsequently examine their mortuary role.

ECONOMIC ROLE OF BEADS

Beyond their role as grave furnishings, the beads recovered at Mission Santa Catalina de Guale clearly operated as valued commodities of economic and social exchange. One must ask how these objects were transferred to the Guale, and what was the nature of the "value" documented by their transmittal. The beads from Mission Santa Catalina de Guale could have been transmitted in several ways. Some beads were doubtless provided as gifts, others were a currency of the officially sanctioned mission economy, and others still were products of unsanctioned trading activities (as discussed by Bushnell, 1994).

Unsanctioned Trade: Although the vast majority of the beads excavated on St. Catherines Island is clearly associated with 17th-century Mission Santa Catalina de Guale, we also know that beads of European manufacture first arrived on the Guale coast in the early 16th century. We discussed the role of the beads in this earlier *entrada* phase above; we also know that from the 1570s through the establishment of 17th-century Mission Santa Catalina de Guale, both French and Spanish traders must have provided beads to the Guale. Bushnell (1994: 63) notes that when 20 French ships appeared in Guale waters in 1580 they were welcomed by some Guale (those of Tolomato and Gualequini) while the Guale living on Sapelo and St. Catherines islands sided with the Spanish. These alliances, however, were not firmly established. By 1589, French corsairs, waiting to attack Spanish ships, traded with the Indians along the south Atlantic coast, particularly for "medicinal herbs such as sassafras, a popular specific for syphilis, [which] grew in the forests of Mocamo [sic] and Guale." The Guale rebellion of 1597, during which two Spanish friars were killed at Mission Santa Catalina, "found support among those Guales who wanted to trade with French corsairs instead of Spaniards." Following this rebellion, "for six years, French sassafras traders came and went unhindered in the harbors of Guale" (Bushnell, 1994: 64–66).

It is unclear to what extent illicit trade with the French continued following the reestablishment of Mission Santa Catalina in 1605. Such trade certainly did not stop completely within the province of Guale. For example, "when the rest of the province returned to the Spanish fold, the people of Satuache took up arms against the *cacique* of Guale over the issue of trade with the French, who continued to visit their harbors long after the ill-fated Ais and Guale rebellions. Without this trade, they claimed, they could not survive" (Bushnell, 1994: 68, citing Ybarra, 1605). We can also speculate that illicit trade with the French could have readily continued during much of the 17th century—particularly at Satuache. Bushnell (1994: 70) notes that "Spanish visitors to the border must have been few, for Satuache was able to hide three Protestant castaways from Spanish authorities for three years" (1630–1633). This relative isolation would have greatly facilitated unsanctioned trade.

Francis (chap. 8, this volume) suggests that Ichtucknee Plain beads (Type 18)—one of the most common beads found at Mission Santa Catalina—were manufactured in France. While this attribution cannot be established with certainty—and Spain could have (and in fact did) distribute beads of French manufacture (Kelly, 1992: 233, fig. 20)—we must still entertain a direct French source for these beads. And, even if the Guale on St. Catherines were not trading with the French after 1605, it seems clear that such trade was conducted by their neighbors at Satuache. In 1666, this aboriginal population, from Mission San Diego de Satuache, aggregated on St. Catherines with the existing Mission Santa Catalina population (Worth, 1995: 19). It is likely that some of the beads found at Mission Santa Catalina belonged to individuals from Satuache, and could well have derived from their trade with the French.

ROLE OF BEADS IN THE OFFICIAL MISSION ECONOMY: Beads primarily entered the official mission economy in three different ways: as *regalos* (gifts given by the Spanish to establish friendships and alliances), as compensation for participation in the labor *repartimiento*, and as payment for goods during compulsory trade with the presidio in St. Augustine (Bushnell, 1994: 104–124).

It is unclear, however, how significant beads were as *regalos*. They were not provided from the *gasto de indios* (or Indian expense fund)—the primary fund used to pay for the items used as gifts to *caciques* and other Indians. Worth (1998: 138–143, table 9-1, 9-2) documents that this fund was not generally used to obtain the ordinary trade goods (*rescates)* used to pay Indian laborers and used to barter for other commodities, noting that the primary goods obtained with this fund and given to the *caciques* were food items, cloth and clothing, and iron implements (cf. Bushnell, 1994: 109–110).

Beads had a much clearer role in the labor *repartimiento*, as participating Indians were paid for their labor "in set amounts of imported trade goods." For example, to compensate Apalachee laborers working on the construction of the fort at San Marcos, Governor Hita Salazar ordered payment of "European manufactures of low unitary value," including "blue beads and multicolored beads," which, along with knives and hawksbells, became "the coin current in these parts" (Bushnell, 1994; 122, 147; citing Hita Salazar, 1678, 1681). Looking specifically at the payment of *repartimiento* laborers from the province of Timucua, Worth (1998: 195) calculates that each mission, for its yearly participation in the *repartimiento,* might have received, among other goods, about "five dozen stings of glass beads (comprising perhaps 6000 individual beads if each string carried 100 beads)." A portion of these goods would be kept by the *cacique*, while the remainder would be redistributed.

Trade at Mission Santa Catalina—both compulsory sales to the presidio and *rescate* (trade between private individuals)—involved a range of different items, including several that may help explain the considerable diversity and wealth found in the mission cemetery. Besides sassafras, briefly mentioned above, two of the most economically important commodities were maize and deerskins.

MAIZE: Maize is one of the significant exports that may have accounted for the extensive goods found in the Mission Santa Catalina cemetery. Worth (1998: 177–186) argues that it is the *most* important. Captain Dunlop, following his visit to the abandoned mission site on April 28, 1687, reported "the Setlement was great, much clear ground in our view for 7 or 8 miles together" (Dunlop, 1929: 131). Thomas (1993a: 25), while noting that Dunlop's description may be somewhat exaggerated, interprets this account to mean that the mission was surrounded by a "huge agricultural field complex." This is certainly correct. Mission Santa Catalina was the "breadbasket" of St. Augustine, providing the bulk of the corn used to supply the presidio (Bushnell, 1994: 147; Thomas, 1990: 379). Bushnell (1994: 123–124) highlights this importance, noting that "presidio supply boats tied up frequently at the Santa Catalina landing . . . . If anything should happen to interfere with that flow of foodstuffs, the whole system for provisioning the Spanish city would be thrown off balance" (see also Worth, 1998: 177–184, table 12-1).

Arguing that corn was the primary source of the goods found at Mission Santa Catalina, Worth (1999) writes that "Enlightened self-interest motivated chiefs to increase local agriculture production, since credits and cash earned from Spanish maritime trading expeditions were readily converted into wealth in the form of exotic Spanish clothing and religious ornamentation. The church cemetery at Mission Santa Catalina is full of the riches earned by Indians in the lucrative corn trade, and there is no reason to think that this was solely spurred by Franciscan insistence." In addition to clothing and religious ornamentation, the primary goods received in exchange for corn were *rescates*—including numerous glass beads.

Worth also argues that the extensive grave goods found in some of the cemeteries in Guale and Apalachee (specifically Santa Catalina and San Luis) reflect three things: the ability of the provinces of Guale and Apalachee to produce surplus corn (similar excess production was not possible in interior Timucua), their status as provincial capitals and administrative centers ("subordinate missions contain a more limited range of items"), and their access to the coast (Worth, 1998: 173–184). He notes that "Guale was situated at a distance of less than 50 leagues north of St. Augustine along a coastal waterway suitable for canoe traffic," and suggests that the ease of maritime commerce with Guale (compared to the more arduous foot trails linking the interior Timucua province with St. Augustine) facilitated the extensive trade between the two locales (1998: 173–175).

The Deerskin Trade: "Deerskins were one of the most important commodities sought by early Spanish colonists and missionaries . . . ." (Pavao-Zuckerman, 2007: 7), and as such, were likely of importance to the economy of Mission Santa Catalina.[2] Hides were a "currency for tribute" (Thomas, 2008: 947), used by the Indians to buy the wax used in burials (Matter, 1972: 135), and exported to Europe (Waselkov, 1989). At Mission Santa Catalina, the trade in deerskins was "brisk" (Thomas, 2008: 947), and the Guale were involved in this trade in two ways: as middlemen obtaining hides from inland groups (Waselkov, 1989: 129) and as producers—through intensified local deer hunting. This increase in hunting has been observed in the zooarchaeological record at Mission Santa Catalina by significant increases in deer bones over pre-Hispanic levels (Reitz, in press; Reitz and Dukes, 2008). "Unlike Spaniards at the Apalachee mission at San Luis de Talimali, where wealth was expressed in cattle herds, the wealth of Mission Santa Catalina de Guale was expressed in venison" (Reitz, in press: chap. 5). Beads played a role in this trade because deerskin traders to the interior would have exchanged them, as well as other European trade goods, for hides (Bushnell, 1994: 122), and beads would subsequently have been among the goods obtained by the Guale from Europeans in return for the hides.

Distribution of Beads: Francis (chap. 2, this volume) explicitly assumed that "as missions were established, the friars were responsible for importing and distributing beads and the rest of exotic items received from the far reaches of the Spanish Empire and beyond (likely including Havana and/or Mexico City)." But this may be too simplistic an assessment. As noted above, beads and other European goods likely arrived at Mission Santa Catalina in several different ways, and it also seems likely that the Guale elite—more than the Franciscan friars—controlled the distribution of goods (Bushnell, 1994: 104; Thomas, 1990: 364). Worth (1998: 114) notes that the authority of the friars was secondary to that of the *caciques*, writing "Friars directed only the spiritual realm; in other matters of local and regional politics, the *caciques* and *principales* remained largely preeminent." Even during the sale of surplus corn, the *caciques* "seem to have governed or overseen the sale or exchange" (Worth, 1998: 181–182). While we cannot document specifically how the various bead assemblages arrived at Mission Santa Catalina, it seems clear that the exchange of beads—as economic and social commodities—was intensively integrated into the lives of the mission inhabitants.

RELIGIOUS ROLE OF BEADS

Many investigators stress the importance of beads found in Spanish mission contexts as components of rosaries (e.g., Francis, chap. 2, this volume; Deagan, 2002: 65). When analyzing the Santa Catalina bead assemblage, however, we were initially surprised that so few rosaries could be identified. Considering that almost 70,000 beads were recovered from the site, we thought it shocking that only six rosaries could be identified (somewhat tentatively) within the mission cemetery (Individuals 47, 93, 186, 238, 282, and Burial D, with perhaps another composed of the bone beads found in Structure 6). There are two explanations for this absence. First, given that three of these suggested rosaries are composed of wood or bone beads, perhaps rosaries were most commonly made of perishable materials (see Deagan, 1987: 171; 2002: 67–69). The evidence at Mission Santa Catalina seems to confirm Deagan's (2002: 69) suggestion that "rosaries in general are underrepresented in the archaeological record." Worth (1998: 180, 195), however, points out that "many of the burial goods encountered at mission Santa Catalina and other missions were undoubtedly secular in origin . . . . They had less to do with religious conversion than participation in the colonial barter economy or in the *repartimiento* labor system." However, even considering this possible underrepresentation and the secular nature of the *acquisition* of the beads, it seems likely that Thomas (1988a: 120-121) is correct in suggesting that the "real" religious function of the beads (if any) was the Franciscan compromise of allowing them as grave goods in order to "achieve an important outward symbol of conversion"—namely participation in the "fundamental sacraments of the church" (see also McEwan, 2001: 640–641).

MORTUARY SIGNIFICANCE OF BEADS

The most obvious, and tangible, context of the beads from Mission Santa Catalina is that of grave goods, with 67,184 beads recovered from the cemetery (and most of these were found in direct association with buried individuals).[3] We have discussed the various sources and explanations for the great quantity of beads found at Mission Santa Catalina. Here we will examine the "meaning" of these objects as grave goods—exploring their significance to those who were buried with them and to those who buried them. Thomas (1988a: 114–115) has noted that "approaching mortuary variability within Spanish Florida requires an appreciation of the multiplicity of potential factors involved. . . . Considerable research will be required to forge a sufficiently multifaceted explanation of mortuary variability within 16th- and 17th-century Spanish Florida." Each of the factors identified (including sampling strategy, social and political status differentiation, the Catholic religious framework of Spanish Florida, and the evolutionary structure of missionization) is an essential component for addressing broad-scale mortuary variability; these issues also help us understand the *intrasite* variability in mortuary patterning at Mission Santa Catalina de Guale.

The spatial relationships of grave goods and human remains seem to suggest some type of status differentiation within the mission cemetery. Such mortuary distinctions in Spanish Florida have long been recognized (e.g., Koch, 1983; Thomas, 1988a, 1990, 1993a, Larsen, 1990; McEwan, 2001). In her summary of mortuary patterning in Spanish Florida, McEwan (2001: 640) concludes that status was marked primarily by "close proximity to the altar, coffin burial, [and] abundance and variety of grave goods." The exact nature of these distinctions is less clear. Thomas (1988a: 114) observed that social status in Spanish Florida must be considered "within a religious framework," noting that distinctions in religious status were often "reified in space." Koch (1983: 220–221) emphasized that the common organizational structure of Spanish colonial cemeteries was the "segmented cemetery," with different sections reflecting distinctions between holy and unholy, married and single, adult and child, and rich and poor (Thomas, 1990: 384). Such spatial segmentation is seen at Mission Santa Catalina, but our question is *what is the source of these distinctions*?

(1) Do they reflect a "status hierarchy in Guale society" (Larsen, 1990: 22)?

(2) Do they reflect an individual's "perceived 'status' relative to God" (Thomas, 1988a: 114; 1990: 384)?

(3) Are there other issues that can account for these distinctions in burial location and treatment?

Religious and Political Status Inscribed in the Cemetery

The Santa Catalina cemetery can be divided into several distinct segments based on the distribution of human remains and beads.[4] These are the entranceway, the "lower nave," the "upper nave," and the sanctuary. The entranceway consists of the first 4 m of the nave (J and K units), beginning at the church door. Numerous burials were found in this portion of the cemetery, but the fewest number of beads (and other grave goods) were recovered here. Fewer than 1000 beads were found in the entranceway, and more than half of the assemblage was found with Individuals 363 and 364. This area is primarily defined by the extraordinarily low density of artifacts.

The "lower nave" consists of the L, M, N, and O excavation units. This 8 m long section is defined by an increased bead density (almost 20,000 beads were found in this portion of the cemetery) and the lack of differentiation between the Gospel (left, facing the altar) and Epistle (right) sides of this region. Several concentrations of beads also seem to occur in this area of the cemetery (e.g., unit O103, see chap. 15, and gilded bead cluster 3, see below).

Further inside the church (roughly between the O and P excavation units; see fig 15.9) a clear line of demarcation separates burials in the first 12 m from those in the last 8 m (the "upper nave," P and Q units). North of this line (toward the altar end of the church) are two distinct, spatially separated burial groupings. These clusters, consisting of both human remains and artifacts (more than 15,000 beads were found in these areas), found on the Gospel and Epistle sides of the cemetery, respectively, are what distinguish the "upper nave" area.

One cluster, on the Gospel side of the church, is located in excavation units P100, P101, Q100, and Q101. Russell et al. (n.d.: 10) note that "the greatest concentration of individuals is in the P100/Q100 area. Unit P100 contained 9% ($n = 39$) of all of the individuals excavated in the cemetery. Most of the other units contained between 0.5 and 3.0% of the cemetery sample." The second grouping (excavation units P103, P104, Q103, and Q104) is located on the Epistle side of the church. This area has a similarly high density of human remains. The units separating these two groupings (P102 and Q102) have significantly fewer human remains and artifacts (particularly beads).

These regions have also been previously identified based on artifact distributions. Looking specifically at the distribution of gilded beads, Blair and Sanger (2007) defined three distinct clusters where these types occur:

(1) Cluster 1 (Gospel side, upper nave, units P100, P101, Q100, and Q101) is characterized by plain gilded beads (Types 98, 99, and 100) and Comb A incised gilded beads (Types 103, 104, and 105).

(2) Cluster 2 (Epistle side, upper nave, units P103, P104, Q103, and Q104) is characterized by plain gilded beads and incised (no comb) gilded beads (Types 101 and 102).

(3) Cluster 3 (center, lower nave, units N102 and O102) contains gilded beads of all varieties.

Gold bead clusters 1 and 2 correspond to the burial concentrations discussed above. Cluster 3 is centered within the church, south of the burial break previously mentioned.

Few gilded beads are found outside these clusters.[5]

While Koch (1983: 220) has identified the Gospel side of the church as the location where the unholy were often buried, "since the Gospel is preached to sinners, the side of the altar from which it was read was assigned to the unblessed," we cannot affirm this suggestion based upon the evidence at Mission Santa Catalina de Guale. It is possible that the Gospel side of the cemetery did contain unblessed individuals, but the material remains, the burial position, and the treatment of specific individuals do not support this interpretation. The burials on this side of the nave are little differentiated from those on the Epistle side. Clearly, the separation between the Gospel and Epistle sides of the upper nave in the Santa Catalina cemetery is real; we do not, however, fully understand the nature of the distinctions.

The final portion of the church cemetery is the sanctuary. This area (R and S units) is the final, northernmost, 4 m of the church in the vicinity of the altar. As previously discussed (see chap. 3), this area is also defined by pine planking construction (as opposed to wattle-and-daub). Larsen (1990: 22) writes:

> Most of the artifactual materials from the cemetery are associated with the end of the church opposite the entrance, suggesting that it is in this area that the altar may have stood. It is interesting to note that the lowest density of human remains occurs in this area of the cemetery. The placement of these individuals in this area of the cemetery may represent their position in relation to key areas within the ritual nucleus of the church, perhaps reflecting a status hierarchy in Guale society ... there appears to have been some form of social distinction in relation to proximity of burial to the altar area.

Thomas (1988a: 115; 1990: 384) and Larsen (1990: 22), however, both caution that a "high status" – "low status" distinction may be too simplistic.

McEwan and Larsen (1996: 7, emphasis mine) note that in "missionized communities ... the nature of internment and funerary objects may reveal the degree to which a native population adhered to Christian doctrine. Specifically, missionized individuals of high social or economic standing in the community should be buried closest to the altar, they are most likely to be interred in a labor intensive manner such as a coffin burial, and *grave goods, if any, should be limited to rosaries*." At Mission Santa Catalina, however, as at Mission San Luis, these expectations are only partly met because of the number of burials found in the altar area with extensive (in both quantity and variety) grave goods.

This portion of the cemetery was found with more beads (approximately 30,000, including many unique types) than any other specific area, as well as the greatest number of beads per cubic meter excavated. It is interesting to note, however, that the *total* number of beads found throughout the rest of the cemetery exceeds the quantity found in the vicinity of the altar. Additionally, these were almost entirely found with Individuals 276, 307, 339, and Burial B (on the Gospel side of the sanctuary) and Individuals 282, 318, and 348, 349, and 350 (on the Epistle side of the cemetery). Many of the other unusual grave goods—including a rattlesnake shell gorget, a Santa Elena majolica pitcher, a *Busycon* sp. shell cup, two majolica plates, a chunky stone, a copper ring with a jet setting, two pairs of sacred heart rings, a mirror fragment, and two hawks bells—were also found with these individuals[6]. It is also interesting that the bead assemblages found with Individuals 282, 307, and Burial B are strikingly similar—with several bead types found only with these individuals. My suspicion is that in all but one case (Individual 276) these are "early" high-status burials, and those individuals found in the vicinity of the altar *without* grave goods (i.e., beads) are the later high-status counterparts to these individuals.

Dating of Burials (with Beads) on the Gospel Side of the Altar[7]

Four burials on the Gospel side of the church, near the altar, were found to contain large quantities of beads. Three of these appear to be pre-1630 burials, while the fourth may be one of the latest burials (with beads) present at Mission Santa Catalina.

Individual 276: The large quantity of wound beads—more characteristic of 18th-century bead assemblages from Spanish colonial sites (Deagan, 1987: 177)—suggests that Individual 276 may be a late burial at Mission Santa Catalina (see also chap. 15, this volume). It may also be significant that this is the only burial found near the altar with both beads and objects of Christian iconography (i.e., the sacred heart rings, fig. 15.18).

Individual 307: We suspect that this burial may date to 1600–1630 due to the presence of the "early" majolicas, charlotte beads, "tin-rich" opaque white beads, and large quantities of compound seed beads (see chap. 15, this volume). An intruding posthole, likely associated with the sacristy, clearly indicates that this is not a late burial.

Individual 339: The bead assemblage with this burial consists almost entirely of *a speo* finished faceted beads (Type 30), which may have the same temporal significance as the pre-1630 charlottes (see chap. 15, this volume).

Burial B: Due to the striking similarities in the bead assemblages (including some of the more temporally diagnostic types), we suspect that this burial is contemporaneous with Individual 307.

Dating of Burials (with Beads) on the Epistle Side of the Altar

Three individuals were found associated with large quantities of beads on the Epistle side of the church, and we think each of these burials may also predate 1630.

Individual 282: We posit an early date for this burial because of similarities in the bead assemblage to Individual 307 and Burial B—particularly large numbers of charlottes and compound seed beads. Individual 282 was found with a possible rosary (wooden beads strung with links of copper chain), but no artifact with explicit religious iconography (i.e., a cross or devotional medal) was recovered.

Individual 318: We previously suggested two possibilities for the dating of this burial: (1) a 1600–1630 date based on the co-occurrence of the Clarksdale bell and the Flushloop bell, the eye bead, and the Nueva Cádiz bead, or (2) a very late date (perhaps 1670–1680) based on the molded faceted Bohemian "ruby red" beads (chap. 15, this volume, see also chap. 11). This second scenario would require that many of the grave goods found with this individual be heirloomed objects. Based on the very limited evidence of heirlooming at Mission Santa Catalina de Guale, we suspect that the pre-1630 date may be correct.

INDIVIDUALS 348, 349, AND 350: Based on the presence of the eye beads, the Santa Elena mottled blue-on-white vessel, and the Carter's Quarter style shell gorget, we suggest a pre-1630 date for this burial (see chap. 15, this volume).

SIGNIFICANCE OF BEADS IN ALTAR AND CEMETERY BURIALS

Two things are striking about these burials: the "early" date for almost all of them and the absence of explicitly Christian items—those items embodying the "artifactual evidence of faith" (Thomas, 1988a: 118). None of these individuals were found with crosses or devotional medals such as those found with other individuals in the cemetery. We would argue that this absence suggests a nonreligious explanation for the perceived "high status" of these individuals. These were the political, social, and economic elite in Guale society. The "early" dates for each of these burials supports Thomas's (1988a) argument for the evolutionary nature of the missionization process (described above). At this point, the friars may have still been "permitting" the pagan use of grave goods in order to facilitate conversion (see also McEwan, 2001: 640–641). The lack of clearly late burials with numerous beads in the vicinity of the altar[8] suggests that a prohibition of grave goods, which would be expected with a transition toward secularization, may have been more strongly enforced at this later date by the friars. This would also imply that those burials in the altar area without large quantities of beads—those with no grave goods or only crosses or devotional medals—are the "later" burials of high-status individuals more fully indoctrinated in Catholicism. These individuals more closely meet the expectation of McEwan and Larsen (1996: 7) that for individuals of high status in the vicinity of the altar, "grave goods, if any, should be limited to rosaries."

We can, however, consider this same evidence from a different perspective. It is true, as McEwan (2001: 640) pointed out, that "it is unknown whether friars were willing to overlook the use of grave goods as a means of accommodating their native charges or if, after performing their services, friars left the final stages of burial to natives." If the details of interment were left to the natives, then we can conversely hypothesize that grave goods, rather than being "allowed" by the friars, were objects that were interred by the Guale—perhaps as acts of defiance and resistance. Rubertone (1989: 41–42) has argued that wampum recovered in large quantities from a Narragansett burial ground in New England suggests that it was purposely taken out of circulation as an act of resistance to an imposed colonial tribute system. By extension, we can perhaps suggest that the large number of beads included in the Santa Catalina cemetery (most of them not part of religious artifacts, such as rosaries) might represent acts of resistance—the traditional inclusion of grave goods in defiance of the instructions of the friars.

This hypothesis is also supported by the fact that most of the burials found with large quantities of beads in the altar area lack objects of Christian significance and appear to be "early" burials at Mission Santa Catalina. Later burials, those lacking extensive grave goods—found with no grave furnishings or containing only items of religious significance (e.g., devotional medals and crosses)—may represent a later stage in the missionization process (Thomas, 1988a: 120–121), a time when religious conversion was more complete and acts of political resistance had diminished.[9]

We also believe that the distribution of the bead assemblage (along with other grave goods) can provide clues about sex and age differences in the mortuary population at Mission Santa Catalina. Mitchem (1993b: 412) discussed a similar possibility for the bead assemblage from Mission San Luis. Hatch (1975: 133, chart 1), for example, has shown that olivella beads and columella beads were associated with subadults in Dallas burials. Similarly, Pendleton (1986a: 20) noted that at South End Mound I, an Irene period burial mound on St. Catherines Island, the majority of the burials interred with beads were subadults. At Mission Santa Catalina (Amelia Island, Florida) all of the eight burials found with grave goods were female (including three burials with beads; Saunders, 1988: 8–9).

At Mission Santa Catalina, we have limited evidence for evaluating this dimension of mortuary patterning. Russell et al. (1990: 43) describe a significant absence of infants in the Santa Catalina cemetery, suggesting that the "majority of preadults ... were either buried elsewhere, not buried at all, or interred in the church cemetery but not preserved well enough for identification or recovery." Poor bone preservation is a significant problem at Mission Santa Catalina; the acidic soil on St. Catherines Island may have caused differential preservation between the young and the old, numerous individuals are represented only by dentition, and age and sex could not be determined for a significant percentage of the burial population (Russell et al., 1990: 44).

It is still clear, however, that beads at Mission Santa Catalina, were not direct, one-for-one indicators of either sex or age. Individuals 348, 349, and 350, for instance, are subadults accompanied by numerous beads, Individual 90 is an adult male with many beads, and Individual 276 is an adult female with many beads. But there remains the possibility that specific bead types, or shapes, or colors, might be associated with burials of specific age or sex. Such correlations have been observed elsewhere (e.g., Whelan, 1991: 26-29), but the generally poor skeletal preservation at Mission Santa Catalina precludes any such associations.

We also have difficulty in determining spatial patterning in specific age and sex burials at Mission Santa Catalina. Russell et al. (n.d.: 10) observed that "the distribution of subadults follows no clear pattern. However, there are several instances of a number of juvenile skeletons located within close proximity of each other (e.g., excavation unit K100)." Larsen (1990: 22) points out another of these groupings along the north wall of the church. McEwan (2001: 640) suggests that such groupings may reflect burial areas based on "kin groups or clans," but we cannot identify such patterns at Mission Santa Catalina de Guale.

To this point, the working assumption has been that the beads found with each burial were the personal possessions of that individual (thereby reflecting something about the nature of that person in life). This assumption is fairly routine in Southeastern archaeology, and there is considerable evidence to support the suggestion. McEwan (2001: 640), for instance, writes that whereas "it is unclear precisely how these items were selected for interment with the deceased … they appear to consist of personal possessions, Christian symbols (such as crosses, rosaries, and medals), and emblems of native authority."

But we should consider alternative possibilities. Parker Pearson (1999: 7–9), for instance, suggests that whereas "grave goods may include items which were possessions of the deceased ... they might [alternatively] be mourners' gifts to the dead." It is critical to acknowledge that "the dressing of the dead is always carried out by the living," implying that the inclusion of beads as grave goods might reflect more about those individuals conducting the burial ritual than about the deceased.

How do we know that the beads and other grave objects actually belonged to the person with whom they were buried? Perhaps the large quantities of beads and other elaborate grave goods recovered at Mission Santa Catalina might represent evidence for excessive grief—items given by the mourners to the deceased (Parker Pearson, 1999: 77–78). Perhaps the extensive grave goods found with Individuals 348, 349, and 350 (e.g., rattlesnake gorget, majolica vessel, numerous beads) somehow reflect the trauma experienced by a family or community at the death of three subadults (and hence, are not markers of hereditary status and prestige). It seems (intuitively) unlikely, for instance, that the black drink paraphernalia comprised the "personal possessions" of these three subadults.

DAILY USE OF BEADS

Beads certainly played a significant role in the daily lives of the Guale living at Mission Santa Catalina—transcending their use as grave furnishings, economic commodities, and items of religious significance. The extraordinary quantity, the conditions of preservation, and the painstaking excavation methods employed allow us to address several additional questions, especially:

(1) How were beads worn or used on a daily basis?

(2) Were the beads fashioned into necklaces or bracelets, beadwork or embroidery?

(3) Why were certain colors popular and others unpopular?

(4) Were the beads used as European replacements for native goods?

Larson (1978: 130–131) has written that "the Guale were fond of personal ornamentation, a fact borne out by both documentary material and archaeological information. . . . In 1595, San Miguel saw Guale wearing beads on their wrists and upper arms (Garcia et al., 1902: 194)." We found considerable evidence in the cemetery at Mission Santa Catalina that beads were worn on various parts of the body (e.g., Individual 59, Individual 276). But with the exception of Individual 307, we cannot identify beads that were sewn or embroidered onto clothing or fabric.

We also have considerable evidence for particular color preferences among the Guale. Three colors—blue, white, and black (dark violet)—dominate the bead assemblage at Mission Santa Catalina. Smith (1983: 151, table 6) has generalized that blue is always the most popular bead color on 16th- and 17th-century archaeological sites of the eastern United States and red is conspicuously absent throughout the American Southeast[10] (particularly when compared to sites in the Northeast). Hamell (1983, 1987, 1992; Miller and Hamell, 1986) has extensively explored the importance of color symbolism (particularly the color red) to Native American groups in the Northeast, particularly linking the mythological and ideological meanings of color, crystal, lightness, and darkness to the glass beads of that area. Similar arguments, though more specifically linked to light and brightness, have been advanced by N.J. Saunders (1988, 1998, 1999). Such metaphorical, symbolic, and ideological meanings of color have not been deeply explored in the Southeastern context, particularly as they relate to culture contact and the trade in glass beads, although Mitchem (1993b: 412) suggests that many of the issues raised by Hamell (1983, 1987, 1992; Miller and Hamell, 1986) may also have Southeastern correlates. Noting the symbolic importance of the colors blue, white, and red to Muskhogean groups (including the Guale), Mitchem (1993b) suggests that such color choice may play a role in glass bead preferences.

McLamb (2000: 84–86) proposed several possible explanations for color preferences among the Apalachee, especially representations of clan allegiance (see also Bushnell, 1978: 13) and color correlations with Catholic liturgical celebrations, but ultimately rejected both as being unsatisfactory for explaining the absence of red beads among the Apalachee.

Several investigators suggest that beads may have been specifically chosen as replacements for, or analogs to, symbolically important items from the precontact period (Miller and Hamell, 1986: 315–316; Mitchem, 1993b: 411; Kelly, 1992: 135–136). White beads, for instance, might be seen as replacements for shell beads and blue beads as surrogate turquoise. But in the Southeast, such specificity may not be warranted because, while one can hypothesize a correlation between white beads and shell beads, we know of no similar equivalent to the enormously popular blue beads and somewhat less popular black beads.

FINAL THOUGHTS

The beads recovered at Mission Santa Catalina de Guale played multiple roles in the lives (and deaths) of St. Catherines Islanders. Although the most visible role of the beads was as grave goods, these small objects of personal adornment also played significant roles in the economic life of the mission community and helped mediate social relationships. As economic entities, Worth (1998: 180) has noted that “the funerary riches of the Guale and Apalachee are a reflection of local and provincial agricultural productivity.” This secular explanation for the *acquisition* of the beads answers the first of the two questions with which we began this chapter—why there are such great quantities and varieties of beads at Mission Santa Catalina. The second question—explanation of the considerable mortuary variability at Mission Santa Catalina—is more difficult to answer, though it seems that considerations of social and political status, mediated by the evolutionary nature of the missionization process, offer significant explanatory potential. The beads may have played a significant role in ongoing political and religious compromises between the Guale and the friars.

A small number of beads played a direct part in the Catholic faith of the converted Guale, while many others were daily objects of adornment. The ubiquity of blue beads and the near absence of red beads likely speak to some (as yet not understood) aesthetic, symbolic, or ideological meaning behind these objects. We stress that the varied and nuanced roles played by these beads make them critically important artifacts in helping us understand the multiple interactions and negotiations between Spaniards and the Guale people of St. Catherines Island.

NOTES

1. This chapter was initially to have been written by Peter Francis; however, prior to his death in 2002, this first paragraph is all that he had completed.

2. While the 18th-century English deerskin trade was certainly more substantial and is more commonly discussed (e.g., Pavao-Zuckerman, 2007; Lapham, 2005, Braund, 1993), Waselkov (1989) stresses that the importance of this commodity to 16th- and 17th-century trade in the Spanish mission provinces of Guale, Timucua, and Apalachee cannot be discounted.

3. Because this volume focuses strictly on the bead assemblage from Mission Santa Catalina de Guale, we do not include a comprehensive discussion of the mortuary assemblage. Individuals lacking grave goods, and those with grave goods that are not beads, are eliminated from these discussions. Whereas beads are the most ubiquitous grave good—and in truth, there are few burials with grave goods and no beads—a full discussion of mortuary variability (entailing an extended study and comparison of all grave furnishings, individual pathologies, nutritional stress patterns, and cemetery position) is beyond the scope of this volume. Here we will make some preliminary observations, but more detailed analyses will be presented in future publications.

4. We suspect that these segments, while symbolically important, are also related to the architectural organization of the church. Mission San Luis de Talimali was proportionally divided into longitudinal and transverse bays based on the Spanish varas (McEwan and Larsen, 1996). While this pattern is not yet fully defined at Mission Santa Catalina, we believe that a similar organizational principle is contributing to the burial groupings described here.

5. The few found with Individuals 276 and 307 in the sanctuary are noted exceptions.

6. This evidence strongly supports Thomas's (1988a: 112) assertion that mortuary diversity is procedural: "The more graves one digs, the more diverse will the assemblage of grave goods appear." Had only a portion of the Mission Santa Catalina cemetery been excavated we would have a very different conception of the mortuary picture.

7. More detailed justifications for these proposed dates are provided in chapter 15.

8. Individual 276 is an exception.

9. Note that we have marshaled the same evidence in support of two different theories: (1) that extensive grave goods reflect negotiation and comprise between the Franciscans and the Guale and (2) that extensive grave goods reflect resistance to missionization. We think both explanations seem plausible.

10. A significant number of red beads (green hearts), however, have been found at Mission San Luis (Mitchem, 1993b).

CHAPTER 17
SIGNIFICANCE OF ST. CATHERINES' BEADS

Peter Francis, Jr.

Beads from any large assemblage, though small and often overlooked, have much to tell us far beyond their immediate locale. Because beads are universal and trade in them extends back in time tens of thousands of years, any sizable sample will undoubtedly include some from many places. Until a global understanding of these artifacts is approached, the sheer variety of beads will always remain intimidating. The bead literature of the American colonial period is replete with assumptions that nearly all glass beads came from Venice. As discussed in chapter 2, John Goggin thought most beads in the Southeast came from Spain. Holland has also been recognized as an important glass beadmaker, especially after the publications of van der Sleen (1962, 1964, 1973; see chap. 8, this volume).

The influence of a few early publications cannot be overestimated for the consequences they had—and in some cases still exert—on many bead studies. Orchard's *Beads and Beadwork of the American Indians*, originally published in 1929, cited only Venice as a source of glass trade beads (Orchard, 1975: 95). Van der Sleen's *Handbook on Beads* listed only five modern glass beadmaking centers (1973: 113–115). Of the five, only Venice got much credit. Discussing the Bohemian bead industry he wrote, "in general, the glass beads of Gablonz [Jablonec] are not distinguishable from the products of Venice" (van der Sleen, 1973: 114; insertion mine). Kaufbueren, Germany, was noted as an offshoot of Jablonec; Braire, France, made beads that one would not see unless one went to the Congo; and the beads of Hebron (Al-Khalil, in the West Bank) were only briefly noted (van der Sleen, 1973: 114–115). A widely circulated article, Cloyd Sorensen's[1] *The Enduring Intrigue of Glass Trade Beads*, stated: "a good part of the glass beads traded on the American Continent were probably made in the glass factories of Murano, Venice .... Venice probably enjoyed a near monopoly on bead manufacture for nearly 600 years" (Sorensen, 1971: 14).

It has come to be recognized that the original places where glass and other varieties of beads were made were far more numerous than had once been thought. In terms of European trade beads of all material types, it is now time to pool data and draw conclusions about the mechanics and sources of the bead trade during the American colonial period.

THE SPANISH VIEW OF BEADS

While the Spanish *conquistadores*, missionaries, administrators, *hidalgos*, and colonists were not themselves particularly interested in beads, unless they were perceived to be valuable or amuletic, they traded with them from the first moment that Christopher Columbus set foot in the New World. The Indian and Chinese bead trade was a steady stream of luxury objects, such as amber or coral, for rich and powerful European kings, though once Europeans were able to usurp the power held by local rulers, the quality of beads dropped rather quickly.

On his first voyage, Columbus had valuable beads to give away—amber, carnelian, and chevrons—to the *caciques* he met. He did not bring such expensive beads with him on his subsequent voyages. Even the small beads he gave away to the commoners were devalued in his estimation during the few months of his first exploration, going from merely a small bead to one held in contempt.

We see the same effect happening throughout the Spanish period. Valuable beads such as seven-layer chevrons and Nueva Cádiz beads were present at the beginning of Conquest. In Spanish colonial sites they disappear before the end of the 16th century. The only ones at St. Catherines Island are three fragments of a less-complex chevron (28.1/9791.0001, 28.1/9367.0001, 28.1/9814.0001) and a single small Nueva Cádiz (28.0/9056.0761). Yet, we know that seven-layered chevron and Nueva Cádiz beads were produced well after the establishment of Mission Santa Catalina de Guale. Jamestown is one place where these two occur in some numbers, though the English were at the beginning of their colonial venture, while Spain had more than a century of experience in the enterprise.

Cut crystal, (flush) eye beads, and charlottes were all eventually devalued over time. This devaluation was more than a mere matter of economics, though that probably played a role. It might be seen as a growing contempt on the part of the colonizer for the colonized. The missionaries at Mission Santa Catalina may have felt that the Guale were more children than savages, but generally the European colonists had little sympathy for the natives, demonizing them and seeing them as worth no more than slave labor. If the people were so little valued, why should the beads they were given be worth much? This attitude would be reinforced if they would accept lesser or cheaper articles. If this was the attitude, it is no wonder that at Mission Santa Catalina, the overwhelming numbers of beads were cheap *rocailles* and bubble glass beads.

Of course, there are always exceptions to a rule. On St. Catherines Island the exceptions consist of amber and jet, both of which appear late in the cargo lists and were found on the island. Jet carried a set of strong symbolic meanings for the Spanish, who may have passed them on to the Guale. It was also a product of Spain itself. Consisting of over 300 complete and fragmentary specimens, jet beads were clearly an important part of the St. Catherines Island assemblage. The amber, which was not an Iberian product, would have had less meaning for the Spanish than the jet, but there are only two amber beads at St. Catherines, hardly constituting a trend.

SOURCES OF BEADS IN THE SPANISH TRADE

Despite a devaluation of beads, they were still needed for the trade, and the Spanish managed to obtain some for St. Catherines Island from a variety of sources. Some of these sources were tapped only once, or a few times, while others were apparently used more often. It is quite remarkable that despite the isolation of St. Catherines Island, and the poverty of La Florida, St. Catheriners managed to secure at least some valuable beads from around the globe.

The bulk, of course, came from European centers, with Venice leading, followed by France, and then by Spain itself. Holland, the Baltic Region, and Bohemia also contributed beads, though far fewer in numbers. Additionally, all parts of Spain supplied beads. It seems likely that beads came from Andalucia (segmented and perhaps gilded beads), Cataluña (glass crosses), Galacia (jet), and perhaps from around Castile (cut crystal).

We have identified beads from China that must have come through the Manila Trade. There are also Indian carnelian beads. Exactly how these reached Spain is not known. They could have been secured from the Portuguese, brought on the Manila Trade, or reached Europe overland. At least one item, "Mantas de la India" (Torre Revello, 1943: 779), that is, "Shawls (or blankets) from India" went to the Americas across the Atlantic and not through the Manila Trade.

The pattern of the bead sources for St. Catherines reflects that of the larger pattern of trade between Spain and her American colonies. Goods that could be secured in Spain were probably given the first priority. Then all of Europe was scoured for luxuries and commodities. Finally, beads and other goods from even further away were brought to the Americas either via Spain or through the Galleon Trade centered on the Philippines.

WHAT ST. CATHERINES' BEADS TELL US ABOUT BEADMAKING

To those interested in bead research, the beads of St. Catherines Island have a great deal to teach us concerning beadmaking during the life of the site. While some of the identifications made herein remain hypothetical, such ascriptions can now be subject to testing. The development of hypotheses and their testing are at the core of the scientific method. It may be that some of these ideas will need altering, and that is acceptable in the course of building knowledge. However, similar ideas concerning other beadmaking industries, often beginning with the data from the importing sites, have proven valuable in understanding the origins of beads.

We begin with Spain. While the pioneer bead researcher for Spanish colonial sites, John Goggin, thought that Spain's mercantile outlook would have meant that most beads on these sites originated from there, few have agreed with this assessment. We now know that it was not correct, but we can also now see that Spain was a major contributor of beads to the American trade. There is little argument that the jet beads in Spanish colonial sites were from Spain. Some have even suggested that the cut crystal beads were as well. However, Venice, and then Paris were the major centers for cutting crystal, even though Spain also imported the craft. The poor quality of the stone usually found on American colonial sites suggests a Spanish origin to the cut crystal.

It is, however, the glass bead industries herein identified as Spanish that are the most intriguing. The location of the gilt bead industry remains ambiguous, but we have described a clearer picture of the production method. These beads were wound, and the incised ones, at least, appear to have been made in a single workshop, most likely by a master and his child or other assistant. We are looking at a small-scale industry, likely located in Andalucia, but possibly also in Cataluña or even Castile.

The glass crosses, which so closely recall fancy Venetian lampwork, are, if not from Venice, likely made in Barcelona or elsewhere in Cataluña. The use of gilding on the glass crosses is a presumed sign of Spanish beadmaking, and is an indicator that they were not made in Venice. Gold was cheaper on the Iberian Peninsula than anywhere else in Europe. For Spain to import gilded glass objects when it had the technical expertise to make them seems very unlikely.

One of the two outstanding surprises of this work has been the identification of a 17th-century glass beadmaking industry producing segmented and gold-glass beads. This industry had been presumed dead after the 12th century and now, with the exception of St. Catherines Island and a few other Spanish colonial sites, examples of the products of this industry are unknown elsewhere in the world after that date. The segmented bead industry was a staple of Egypt, the Middle East, the Roman World, the Early Islamic period, and the Northern land-bound and Eastern maritime trades for some 1500 years (from ca. 300 B.C. to A.D. 1200). The industry came to an abrupt end by the self-inflicted conflagration of Fustat (Old Cairo) ahead of the marauding Crusaders.

Now, we see that a remnant of the Moorish occupation may have survived, and there is little doubt that Spain is where it survived. This is suggested by the fact that the beads are found only on Spanish sites (and are rather numerous at St. Catherines Island); there were strong political and cultural connections between Spain and Egypt for some 7 centuries; and cinnabar, an important Spanish mineral, is found in the clear beads. Andalucia is the most likely site for these beads to have been made, though Cadalso de los Vidrios in Castile might be another candidate. It would be fascinating to know who these intrepid beadmakers were. Whether originally Jews, Copts, or Muslims, they would have at least outwardly conformed to the Western Christian Rite by the time their beads were added to the cargoes bound for America.

The bubble glass beads, represented so ubiquitously by the blue beads found all along the Atlantic Coast and in West Africa for nearly 2 centuries, has a presence at St. Catherines Island that has helped lead to its identification as French. This identification comes partly from building a case for French beadmaking and partly from data recorded at St. Catherines.

It has long been thought that France should have made beads for the trade. Her products would have been acceptable to nearly all colonial powers at most times. The problem has been identifying the beads.

The bubble glass beads are excellent candidates. They are technologically too poor to have been made in Venice for nearly 2 centuries. They are not Dutch. France encouraged *Paternosters* and established a guild of them just when the beads begin to be found on American sites. The end of the trade in these beads also corresponds with marked changes in the French glass industry. They may be the *turquí* beads of the Spanish cargo lists (they surface at the proper time and have similar ranges of colors), and these are recorded as having come from France.

Two other pieces of evidence support a French origin for the bubble glass beads found at St. Catherines Island. One is that many small bubble glass beads were made within the range of seed beads, and they were finished *a speo,* just as the larger ones were. This is a further indication that the beads were not Venetian, because in Venice seed beads were the provenance of the *Margaritari*, who did not finish beads *a speo*. Secondly, some blue bubble glass beads mimic *Paternostri* beads made in Venice: those with three bands of red on white stripes and a certain eye bead decoration.

Added together, the evidence for them *not* being Venetian and the evidence of the type and periods of French glass beadmaking build a strong case of them being French. The evidence of the timing, color range, and sourcing of the *turquí* beads in the Spanish cargo lists helps complete the picture.

Although few in number, the two multifaceted, molded, ruby red glass beads (28.0/9056.1553, 28.0/9056.1552) from St. Catherines Island are important for the history of what is now the world's biggest bead industry: Bohemia. The presence of these beads in a secure context puts the beginning of the making of red "composition" glass in Bohemia back several decades. It also shows that molding, the keystone to Bohemian bead production, was used at a date much earlier than had been envisioned. This is an important advance in the history of the world's beads.

SOME FINAL THOUGHTS

Who would have imagined that a small, isolated mission on the edge of a great empire would yield so much information about the rest of the globe? Moreover, until recently, who would have imagined that it would be the study of beads from this tiny settlement that would facilitate the extraction of that information?

NOTES

1. In a letter dated 3 June 1971, Joseph Stacey, the Associate Editor of *Arizona Highways*, apologized to Sorensen for omitting the byline from this article. The information was only available in the caption to the front cover and in an apology in the "Letters to the Editor" section in the following (August) issue (photocopy on file, Center for Bead Research, courtesy of Cloyd Sorensen).

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APPENDICES

APPENDIX 1. PROVENIENCE OF ST. CATHERINES' BEADS

Elliot H. Blair

	Mission Santa Catalina de Guale																			Prehistoric								
									The *Pueblo*																			
	Quadrangle								*Pueblo* North			*Pueblo* South				*Pueblo* East	*Pueblo* West			Late Archaic Period		Wilming-ton Period	St. Catherines Period	Irene Period				
Type	Church / Cemetery	*Atrio*	The Mission West	Western Bastion	Central *Plaza*	*Convento*	Late Well	*Cocina*	Structure 5	AMNH 680	Other	Structure 6	Wamassee Head	Fallen Tree	Other	Other	Structure 1-W	No provenience	9Li163	St. Catherines Shell Ring	McQueen Shell Ring	Survey Sites	Johns Mound	Irene Survey Sites	Meeting House Field	Back Creek Village	South End Mound 1	Total
1	7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	7
2	4	—	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	6
3	—	—	4	—	—	—	—	—	—	—	1	—	—	—	—	—	2	—	—	—	—	—	—	—	—	—	—	7
4	386	—	—	—	1	—	2	2	—	—	1	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	393
5	5715	4	2	—	—	8	9	18	10	—	1	—	1	1	—	—	—	8	—	—	—	—	—	—	—	—	—	5777
6	20570	4	25	1	10	38	41	40	40	—	5	—	4	4	—	—	2	122	—	—	—	—	—	—	—	—	—	20906
7	5	2	—	—	—	—	1	1	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	10
8	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
9	—	—	1	1	—	1	—	9	2	—	—	—	—	4	—	—	—	1	—	—	—	—	—	—	—	—	—	19
10	1	—	—	—	1	—	—	3	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	7
11	1946	—	—	—	1	2	—	1	—	—	1	—	2	—	—	—	—	1	—	—	—	—	—	—	—	—	—	1954
12	2	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3
13	1785	—	—	—	—	—	—	10	1	—	1	1	—	—	—	—	—	9	—	—	—	—	—	—	—	—	—	1807
14	2052	—	1	—	—	—	—	1	2	—	—	—	—	—	—	—	—	3	—	—	—	—	—	—	—	—	—	2059
15	98	—	—	—	—	—	—	2	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	101
16	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	3
17	6553	5	7	1	2	5	5	29	33	—	2	—	9	6	—	—	5	35	—	—	—	—	—	—	—	—	—	6697
18	5079	9	15	3	2	11	12	43	10	—	5	2	15	10	—	2	14	33	—	—	—	—	—	—	—	—	—	5265
19	1237	6	4	2	4	20	18	12	3	—	—	3	5	1	—	—	6	8	—	—	—	—	—	—	—	—	—	1329

APPENDIX 1—*(Continued)*

	Mission Santa Catalina de Guale																			Prehistoric								
									The *Pueblo*																			
	Quadrangle								*Pueblo* North			*Pueblo* South				*Pueblo* East	*Pueblo* West			Late Archaic Period		Wilming-ton Period	St. Catherines Period	Irene Period				
Type	Church / Cemetery	*Atrio*	The Mission West	Western Bastion	Central *Plaza*	*Convento*	Late Well	*Cocina*	Structure 5	AMNH 680	Other	Structure 6	Wamassee Head	Fallen Tree	Other	Other	Structure 1-W	No provenience	9Li163	St. Catherines Shell Ring	McQueen Shell Ring	Survey Sites	Johns Mound	Irene Survey Sites	Meeting House Field	Back Creek Village	South End Mound 1	Total
20	2643	7	6	1	4	4	—	7	7	—	—	1	—	—	—	—	2	—	—	—	—	—	—	—	—	—	—	2682
21	97	4	2	1	4	11	4	19	2	1	1	—	3	1	—	—	—	—	—	—	—	—	—	—	—	—	—	150
22	7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	7
23	1337	—	3	1	—	2	—	2	—	—	—	1	8	—	—	—	—	3	—	—	—	—	—	—	—	—	—	1357
24	52	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	52
25	66	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	67
26	145	—	2	—	2	6	6	1	4	—	1	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	168
27	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3
28	138	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	138
29	5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5
30	2290	1	1	—	—	—	—	—	2	—	—	—	—	—	—	—	3	—	—	—	—	—	—	—	—	—	—	2297
31	31	1	—	—	—	1	1	—	—	—	2	—	—	—	—	2	1	2	—	—	—	—	—	—	—	—	—	41
32	56	—	4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	60
33	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
34	1	—	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4
35	—	—	—	1	—	—	1	2	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5
36	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
37	6	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	7
38	6406	—	2	1	1	9	7	51	10	—	2	—	—	1	—	—	1	23	—	—	—	—	—	—	—	—	—	6514
39	1884	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1884
40	2270	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2271

APPENDIX 1—*(Continued)*

	Mission Santa Catalina de Guale																			Prehistoric								
									The *Pueblo*																			
	Quadrangle								*Pueblo* North			*Pueblo* South				*Pueblo* East	*Pueblo* West			Late Archaic Period		Wilming-ton Period	St. Catherines Period	Irene Period				
Type	Church / Cemetery	*Atrio*	The Mission West	Western Bastion	Central *Plaza*	*Convento*	Late Well	*Cocina*	Structure 5	AMNH 680	Other	Structure 6	Wamassee Head	Fallen Tree	Other	Other	Structure 1-W	No provenience	9Li163	St. Catherines Shell Ring	McQueen Shell Ring	Survey Sites	Johns Mound	Irene Survey Sites	Meeting House Field	Back Creek Village	South End Mound 1	Total
41	1	—	—	—	—	1	1	3	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	7
42	855	1	—	—	—	1	—	4	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	862
43	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
44	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
45	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
46	2	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3
47	5	—	1	—	—	1	—	2	1	—	—	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	12
48	—	—	—	—	—	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3
49	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
50	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3
51	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2
52	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
53	10	—	—	—	1	1	—	—	1	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	14
54	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
55	16	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	17
56	119	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	119
57	—	—	—	—	—	—	—	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2
58	69	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	70
59	—	—	—	—	—	1	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2
60	1	—	—	—	2	3	7	2	2	—	—	—	2	—	—	3	—	—	—	—	—	—	—	—	—	—	—	22
61	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1

APPENDIX 1—*(Continued)*

	Mission Santa Catalina de Guale																			Prehistoric								
									The *Pueblo*																			
	Quadrangle								*Pueblo* North			*Pueblo* South				*Pueblo* East	*Pueblo* West			Late Archaic Period		Wilming-ton Period	St. Catherines Period	Irene Period				
Type	Church / Cemetery	*Atrio*	The Mission West	Western Bastion	Central *Plaza*	*Convento*	Late Well	*Cocina*	Structure 5	AMNH 680	Other	Structure 6	Wamassee Head	Fallen Tree	Other	Other	Structure 1-W	No provenience	9Li163	St. Catherines Shell Ring	McQueen Shell Ring	Survey Sites	Johns Mound	Irene Survey Sites	Meeting House Field	Back Creek Village	South End Mound 1	Total
62	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
63	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
64	25	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	25
65	4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4
66	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
67	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
68	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
69	—	—	—	—	—	—	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2
70	256	—	—	—	1	—	—	1	—	—	—	1	1	—	—	—	—	1	—	—	—	—	—	—	—	—	—	261
71	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
72	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
73	102	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	102
74	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
75	—	—	1	—	1	1	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4
76	35	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	36
77	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
78	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
79	15	—	5	—	—	1	1	2	1	—	—	—	—	—	—	—	2	—	—	—	—	—	—	—	—	—	—	27
80	—	—	—	—	—	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2
81	—	—	1	—	—	—	—	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3
82	—	—	—	—	—	1	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2

APPENDIX 1—*(Continued)*

	Mission Santa Catalina de Guale																		Prehistoric								
									The *Pueblo*																		
	Quadrangle								*Pueblo* North			*Pueblo* South				*Pueblo* East	*Pueblo* West			Late Archaic Period		Wilmington Period	St. Catherines Period	Irene Period				
Type	Church / Cemetery	*Atrio*	The Mission West	Western Bastion	Central *Plaza*	*Convento*	Late Well	*Cocina*	Structure 5	AMNH 680	Other	Structure 6	Wamassee Head	Fallen Tree	Other	Other	Structure 1-W	No provenience	9Li163	St. Catherines Shell Ring	McQueen Shell Ring	Survey Sites	Johns Mound	Irene Survey Sites	Meeting House Field	Back Creek Village	South End Mound I	Total
83	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
84	—	—	—	—	1	—	—	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3
85	—	—	—	—	—	—	1	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2
86	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	2
87	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	1
88	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
89	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
90	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
91	39	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	39
92	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
93	2	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3
94	1134	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	1136
95	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
96	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
97	9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	9
98	261	1	—	—	—	—	—	—	—	—	—	—	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	264
99	22	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	22
100	45	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	46
101	30	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	30
102	26	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	26
103	5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5

APPENDIX 1—*(Continued)*

	Mission Santa Catalina de Guale																			Prehistoric								
									The *Pueblo*																			
	Quadrangle								*Pueblo* North			*Pueblo* South				*Pueblo* East	*Pueblo* West			Late Archaic Period		Wilmington Period	St. Catherines Period	Irene Period				
Type	Church / Cemetery	*Atrio*	The Mission West	Western Bastion	Central *Plaza*	*Convento*	Late Well	*Cocina*	Structure 5	AMNH 680	Other	Structure 6	Wamassee Head	Fallen Tree	Other	Other	Structure 1-W	No provenience	9Li163	St. Catherines Shell Ring	McQueen Shell Ring	Survey Sites	Johns Mound	Irene Survey Sites	Meeting House Field	Back Creek Village	South End Mound 1	Total
104	10	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	11
105	5	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	6
106	14	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	15
107	6	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	6
108	6	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	6
109	5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5
110	11	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	11
111	36	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	36
112	449	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	449
113	169	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	169
114	5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5
115	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3
116	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3
117	4	—	—	—	—	—	—	2	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	7
118	17	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	17
119	13	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	13
120	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2
121	21	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	21
122	9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	9
123	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2

APPENDIX 1—*(Continued)*

Type	Mission Santa Catalina de Guale																			Prehistoric								Total
									The *Pueblo*																			
	Quadrangle								*Pueblo* North			*Pueblo* South				*Pueblo* East	*Pueblo* West			Late Archaic Period		Wilming-ton Period	St. Catherines Period	Irene Period				
	Church / Cemetery	*Atrio*	The Mission West	Western Bastion	Central *Plaza*	*Convento*	Late Well	*Cocina*	Structure 5	AMNH 680	Other	Structure 6	Wamassee Head	Fallen Tree	Other	Other	Structure 1-W	No provenience	9Li163	St. Catherines Shell Ring	McQueen Shell Ring	Survey Sites	Johns Mound	Irene Survey Sites	Meeting House Field	Back Creek Village	South End Mound 1	
Metal beads	—	—	2	—	—	—	—	—	1	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	4
Jet variety 1	11	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	11
Jet variety 2	303	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	304
Jet variety 3	4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4
Jet variety 4	17	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	18
Jet variety 5	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
Jet variety 6	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
Amber beads	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2
Carnelian variety 1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	1
Carnelian variety 2	1	—	—	—	—	—	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3
Cut crystal variety 1	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
Cut crystal variety 2	6	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	6
Soft stone	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	1
Shell	36	38	33	14	—	—	2	28	51	3	14	5	—	27	2	6	11	—	—	4	4	—	200	4	8	28	333	851
Pearl	14	—	—	1	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	16
Bone	3	—	—	—	—	—	—	—	1	—	—	3	1	1	—	—	—	—	—	—	—	2	—	—	—	1	—	12

APPENDIX 1 —(*Continued*)

	Mission Santa Catalina de Guale																		Prehistoric									
	Quadrangle								The *Pueblo*											Late Archaic Period		Wilming-ton Period	St. Catherines Period	Irene Period				
									Pueblo North			*Pueblo* South				*Pueblo* East	*Pueblo* West											
Type	Church / Cemetery	*Atrio*	The Mission West	Western Bastion	Central *Plaza*	*Convento*	Late Well	*Cocina*	Structure 5	AMNH 680	Other	Structure 6	Wamassee Head	Fallen Tree	Other	Other	Structure 1-W	No provenience	9Li163	St. Catherines Shell Ring	McQueen Shell Ring	Survey Sites	Johns Mound	Irene Survey Sites	Meeting House Field	Back Creek Village	South End Mound 1	Total
Wood	7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	7
Antler	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
UID Organic	—	—	—	—	—	—	—	—	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2
	67184	87	130	28	38	135	124	308	200	4	39	22	60	59	2	13	53	254	1	4	4	2	200	4	8	29	333	69325

APPENDIX 2. BEAD ASSOCIATIONS BY INDIVIDUAL

Elliot H. Blair

(Indet. = Indeterminate.)

Individual #	Age	Sex	Bead type	Count
12	21	Indet.	18	1
				N = 1
42	Indet.	Indet.	6	19
			18	19
			19	22
			21	4
			52	1
			86	1
				N = 66
46	29	Male	18	1
				N = 1
47	Indet.	Indet.	2	2
			6	34
			22	6
			23	4
				N = 46
52	30-40	Female	6	83
			42	1
				N = 84
59	30	Male	6	64
			19	1
			31	7
				N = 72
60	43	Female	6	20
				N = 20
65	Adult	Indet.	6	38
			18	295
			19	55
			20	93
			23	1
			24	2

APPENDIX 2—*(Continued)*

Individual #	Age	Sex	Bead type	Count
65 (cont'd)			38	3
			56	11
			58	53
			70	14
			Shell	10
				N = 575
70	35	Female	18	1
			20	2
			38	8
				N = 11
77	35	Female	38	22
				N = 22
86	33	Indet.	6	22
			17	4
			23	1
			38	550
			104	2
				N = 579
88	18-25	Female	21	3
			38	2
				N = 5
90	30-40	Male	5	1,518
			6	208
			17	1
			18	2
			19	1
			23	15
			38	276
			79	1
				N = 2,022
93	11	Indet.	5	2,815

APPENDIX 2—*(Continued)*

Individual #	Age	Sex	Bead type	Count
93 (cont'd)			6	1,394
			20	1
			21	9
			24	5
			31	1
			38	218
			79	3
			98	3
			101	1
			102	15
			121	21
				N = 4,486
95	Indet.	Indet.	6	1
				N = 1
102	37	Female	2	2
			6	78
			15	14
			18	2
			20	3
			26	5
			38	185
			58	1
			70	1
				N = 291
107	25	Male	6	3
			20	3
			38	5
			Jet 4	10
				N = 21
142	Indet.	Indet.	6	77
			14	1

APPENDIX 2—*(Continued)*

Individual #	Age	Sex	Bead type	Count
142 (cont'd)			17	139
			20	7
			21	1
			43	1
			38	1
				N = 227
109	26	Indet.	42	1
				N = 1
112	20	Indet.	6	65
			79	1
			100	35
				N = 101
117	Indet.	Indet.	20	5
			30	20
			98	10
			101	1
				N = 36
120	8	Indet.	6	1
				N = 1
125	25	Indet.	20	47
				N = 47
127	40	Female	6	5
			23	1
				N = 6
128	35	Female	20	5
				N = 5
134	19	Female	18	1
			38	1
				N = 2
138	Adult	Indet.	6	3
			18	3

APPENDIX 2—*(Continued)*

Individual #	Age	Sex	Bead type	Count
138 (cont'd)			23	1
			30	1
				N = 8
139 140	21 45+	Male Indet.	6	91
			15	6
			17	3
			18	4
			20	8
			30	1
			38	11
				N = 124
145	28	Indet.	18	2
			23	1
				N = 3
151	30-40	Indet.	5	157
			6	400
			12	1
			13	2
			17	170
			18	1,502
			20	255
			23	1
			30	29
			32	10
			38	1
			98	2
			100	7
			104	1
			107	4
				N = 2,452
155	20-30	Indet.	4	1

APPENDIX 2—*(Continued)*

Individual #	Age	Sex	Bead type	Count
155 (cont'd)			6	5
			20	2
			24	2
			30	4
			98	1
			101	1
			104	1
			106	1
				N = 18
156	24	Indet.	20	14
				N = 14
163	30-40	Indet.	6	99
			23	15
			38	3
			97	9
			Jet 2	1
				N = 127
167	24	Male	46	1
				N = 1
173	Adult	Indet.	20	1
174	Adult	Male		
				N = 1
178	5-15	Indet.	98	2
			102	1
				N = 3
180	Adult	Indet.	6	274
181	1	Indet.	18	2
182	8	Indet.	20	2
183	12	Indet.	30	1

APPENDIX 2—*(Continued)*

Individual #	Age	Sex	Bead type	Count
180–183 (cont'd)				
			60	1
			109	2
			110	8
				N = 290
186	19	Female	5	1
			6	15
			18	10
			20	16
			23	14
			38	2
				N = 58
200	4	Indet.	4	1
			6	5
			17	28
			20	1
			30	2
			32	1
			93	1
				N = 39
201	3	Indet.	6	1
				N = 1
207	17	Indet.	6	12
			17	2
			18	1
			19	2
			20	6
			30	1
			38	1
			39	1
				N = 26

APPENDIX 2—*(Continued)*

Individual #	Age	Sex	Bead type	Count
208	20	Indet.	4	381
			5	755
			6	674
			11	1
			13	6
			17	2,203
			18	71
			20	624
			23	1
			30	196
			32	3
			38	4
			39	2
			72	1
			98	37
			103	5
			107	1
			115	3
			Shell	1
			Pearl	6
				N = 4,975
212	31	Female	6	86
218	Indet.	Indet.	15	1
			17	1
			18	6
			19	1
			21	2
			31	1
			32	1
			48	1
				N = 100

APPENDIX 2—*(Continued)*

Individual #	Age	Sex	Bead type	Count
216	21	Indet.	6	1
				N = 1
217	15-20	Indet.	5	4
			17	3
				N = 7
226	22	Indet.	6	252
			15	11
			20	11
			21	1
			30	2
			98	4
				N = 281
228	25	Indet.	6	329
			15	1
			20	3
			23	1
			30	2
			98	8
			108	1
			Jet 2	1
				N = 346
238	21	Indet.	18	11
			23	1
			25	40
			38	14
			47	1
			76	1
				N = 68
240	21	Indet.	6	2
			20	8

APPENDIX 2—*(Continued)*

Individual #	Age	Sex	Bead type	Count
240 (cont'd)			98	1
			101	1
				N = 12
243	20	Female	6	1
			38	239
				N = 240
248	Indet.	Indet.	6	441
			17	34
			20	25
			30	4
			32	3
			49	1
				N = 508
249	20	Indet.	6	2
			20	1
				N = 3
253	30-40	Male	6	3
			Pearl	6
				N = 9
260	33	Indet.	6	2
			20	1
			53	2
			76	20
			Shell	1
				N = 26
263	10	Indet.	6	7
			20	326
				N = 333
266	Indet.	Indet.	6	4
				N = 4
271	29	Indet.	6	1

APPENDIX 2—*(Continued)*

Individual #	Age	Sex	Bead type	Count
271 (cont'd)			18	1
				N = 2
272	37	Indet.	6	3
				N = 3
275	18	Indet.	6	2
				N = 2
276	20	Female	6	20
			20	2
			23	21
			38	23
			91	35
			94	1,004
			99	22
				N = 1,127
279	13	Indet.	5	1
			6	49
			70	13
			119	13
				N = 76
282	21	Indet.	6	1,207
			11	2
			13	2
			17	117
			28	109
			30	164
			32	16
			38	842
			41	1
			42	121
			73	23
			111	35

APPENDIX 2—*(Continued)*

Individual #	Age	Sex	Bead type	Count
282 (cont'd)			112	147
			113	2
			114	1
			116	2
			Wooden	7
				N = 2,798
295	Adult	Male	6	209
296	4	Indet.	17	2
			20	10
			38	73
				N = 294
307	25	Indet.	Part A	
			20	7
			30	5
			112	20
			118	6
				N = 38
			Part B	
			6	1,483
			11	2
			13	505
			14	1,822
			17	788
			18	392
			20	18
			23	487
			30	202
			37	1
			38	113
			39	1
			40	3

APPENDIX 2—*(Continued)*

Individual #	Age	Sex	Bead type	Count
307 (cont'd)			42	7
			56	66
			63	1
			98	10
			112	189
			113	129
			120	1 (and 4 fragments)
			Jet 1	1
			Jet 2	216
				N = 6,441
			Part C	
			6	12
			11	11
			13	69
			17	191
			20	2
			23	1
			30	67
			38	15
			39	4
			40	76
				N = 448
			Part D	
			6	2,315
			7	2
			11	1,758
			13	613
			14	3
			17	537
			19	5
			20	15

APPENDIX 2—*(Continued)*

Individual #	Age	Sex	Bead type	Count
307 (cont'd)			27	3
			29	5
			30	215
			31	1
			34	1
			37	1
			38	2,513
			39	1,724
			40	1,896
			42	712
			51	2
			53	1
			73	64
			112	4
			114	3
			120	1 (6 fragments)
				N = 12,400
			Part E	
			6	4
			13	60
			17	489
			20	25
			30	276
			38	12
			40	14
			114	1
				N = 881
			Part B–E	
			6	156
			11	44
			13	88

APPENDIX 2—*(Continued)*

Individual #	Age	Sex	Bead type	Count
307 (cont'd)			14	37
			17	303
			18	5
			20	13
			23	5
			30	123
			38	46
			39	29
			40	128
			56	1
			73	1
			112	25
			113	14
			Jet 2	12
				N = 1,030
			Coffin	
			6	81
			11	6
			13	1
			17	20
			18	8
			20	6
			23	2
			30	38
			38	34
			39	14
			40	14
			45	1
			73	1
			112	25
			113	5
			Jet 2	9

APPENDIX 2—*(Continued)*

Individual #	Age	Sex	Bead type	Count
307 (cont'd)				*N* = 265
			Intruding Pit D (Post Hole)	
			6	7
			17	1
			18	2
			23	5
			30	1
			38	1
			113	1
			Jet 2	3
				N = 21
				N = 21,524
318	15	Indet.	6	505
			17	3
			18	679
			19	98
			20	282
			23	564
			36	1
			38	1
			53	2
			56	3
			65	1
			70	2
			123	2
			Shell	8
				N = 2,151
339	5	Indet.	30	382
			53	1
				N = 383

APPENDIX 2—*(Continued)*

Individual #	Age	Sex	Bead type	Count
345	Indet.	Indet.	18	1
				N = 1
348	3	Indet.	6	318
349	2	Indet.	11	12
350	2	Indet.	12	1
			13	161
			18	483
			19	29
			20	22
			21	6
			23	4
			25	16
			38	39
			42	1
			64	3
			66	1
			67	1
			70	138
			117	4
			Amber	1
			Shell	12
				N = 1,252
363	14	Indet.	6	2
364	31	Indet.	18	41
			19	293
			23	5
			70	88
				N = 429
383	28	Indet.	38	2
				N = 2

APPENDIX 2—*(Continued)*

Individual #	Age	Sex	Bead type	Count
394	18	Indet.	6	557
			17	14
			20	7
			26	138
			30	1
			38	316
				N = 1,033
430	1	Indet.	40	1
				N = 1
Burial A	—	—	6	451
			18	351
			19	362
			20	1
				N = 1,165
Burial B	—	—	6	281
			7	3
			11	102
			13	186
			14	189
			17	299
			18	390
			20	17
			23	16
			30	106
			37	4
			38	95
			39	65
			40	134
			42	9
			56	2
			73	7

APPENDIX 2—*(Continued)*

Individual #	Age	Sex	Bead type	Count
Burial B (cont'd)			112	8
			113	17
			118	11
			Jet 2	42
				N = 1,983
Burial C	0-1	—	5	3
			6	54
			122	9
				N = 66
Burial D	—	—	Cut Crystal 2	5
			Incised Bone	2
				N = 7
Burial E	—	—	13	1
			17	2
			18	54
			19	232
			20	1
			30	1
			38	2
			56	35
			64	21
			65	3
			111	1
			116	1
				N = 354
O103	—	—	5	347
			6	302
			15	1
			17	7
			18	39
			20	29

APPENDIX 2—*(Continued)*

Individual #	Age	Sex	Bead type	Count
O103 (cont'd)			23	43
			30	3
			38	13
			93	1
			100	1
			101	2
			105	1
			112	25
			Jet 4	7
				N = 821
P103/Q103	—	—	6	75
			17	5
			18	1
			20	170
			21	1
			30	2
			32	6
			38	56
			98	33
			101	2
			Jet 2	2
			Jet 3	3
				N = 356

APPENDIX 3. ATTRIBUTES OF GLASS, IMPORTED ORGANIC, AND STONE BEADS

Lorann S. A. Pendleton, Elliot H. Blair, and Eric Powell

Description	AMNH type	Kidd & Kidd	Munsell code	Shape	Diameter (mm)	Length (mm)	Whole	Frag.	Facets
Translucent manganese violet bugle	1	Ia2	7.8YR 1/1, N10	Bugle	<2.60	11.1-13.0	5	–	–
Translucent manganese violet bugle	1	Ia2	7.8YR 1/1, N10	Bugle	<2.60	13.1–15.0	2	–	–
Translucent cobalt blue	2	Ia20	2.9PB4/10, 2.8PB3/8, 7.8PB 2/12	Bugle	3.51–4.75	7.1–9.0	1	–	–
Translucent cobalt blue	2	Ia20	2.9PB4/10, 2.8PB3/8, 7.8PB 2/12	Bugle	3.51–4.75	9.1–11.0	1	–	–
Translucent cobalt blue	2	Ia20	2.9PB4/10, 2.8PB3/8, 7.8PB 2/12	Bugle	3.51–4.75	13.1–15.0	4	–	–
Translucent cobalt blue	3	Ia20	2.8PB3/8, 2.2PB2/6	Bugle	2.60–3.50	4.51–5.35	7	–	–
Transparent medium/deep blue-green *rocaille*	4	IIa	4.7B5/5	Ring	2.60–3.58	<2.51	393	–	–
Opaque deep green blue *rocaille*	5	IIa41	2.9BG 6/10, 4.6BG 5/5 , 4.7B 5/5	Ring	<2.60	<2.51	61	–	–
Opaque deep green blue *rocaille*	5	IIa41	2.9BG 6/10, 4.6BG 5/5 , 4.7B 5/5	Ring	2.60–3.50	<2.51	4	–	–
Opaque deep green blue *rocaille*	5	IIa41	2.9BG 6/10, 4.6BG 5/5 , 4.7B 5/5	Ring	3.51–4.75	<2.51	4458	6	–
Opaque turquoise blue *rocaille*	5	IIa41	4.9B5/8, 4.5B7/5, 4.7B 5/5	Ring	<2.60	<2.51	603	–	–
Opaque turquoise blue *rocaille*	5	IIa41	4.9B5/8, 4.5B7/5, 4.7B 5/5	Ring	2.60–3.50	<2.51	487	5	–
Opaque turquoise blue *rocaille*	5	IIa41	4.9B5/8, 4.5B7/5, 4.7B 5/5	Ring	3.51–4.75	2.51–4.50	153	–	–
Translucent cobalt blue *rocaille*	6	IIa56	2.9PB4/10, 3.0PB4/7, 2.2PB2/61, 0.2PB4/3, 7.8PB2/13	Bilobed	4.76–7.99	2.51–4.50	7	–	–
Translucent cobalt blue *rocaille*	6	IIa56	2.9PB4/10, 3.0PB4/7, 2.2PB2/6, 0.2PB4/3, 7.8PB2/13	Irregular barrel/ring	4.76–7.99	2.51–4.50	11	–	–
Translucent cobalt blue *rocaille*	6	IIa56	2.9PB4/10, 3.0PB4/7, 2.2PB2/6, 0.2PB4/3, 7.8PB2/13	Ring	<2.60	<2.51	6284	14	–
Translucent cobalt blue *rocaille*	6	IIa56	2.9PB4/10, 3.0PB4/7, 2.2PB2/6, 0.2PB4/3, 7.8PB2/13	Ring	2.60–3.50	<2.51	11582	22	–
Translucent cobalt blue *rocaille*	6	IIa56	2.9PB4/10, 3.0PB4/7, 2.2PB2/6, 0.2PB4/3, 7.8PB2/13	Ring	3.51–4.75	<2.51	2333	10	–
Translucent cobalt blue *rocaille*	6	IIa56	2.9PB4/10, 3.0PB4/7, 2.2PB2/6, 0.2PB4/3, 7.8PB2/13	Ring	3.51–4.75	2.51–4.50	248	7	–
Translucent cobalt blue *rocaille*	6	IIa56	2.9PB4/10, 3.0PB4/7, 2.2PB2/6, 0.2PB4/3, 7.8PB2/13	Ring	4.76–7.99	2.51–4.50	284	104	–
Opaque deep green *rocaille*	7	IIa	6.2G7/8, 0.4G5/9, 5.1G3/8	Irregular ring	3.51–4.75	<2.51	1	–	–
Opaque deep green *rocaille*	7	IIa	6.2G7/8, 0.4G5/9, 5.1G3/8	Ring	<2.60	<2.51	1	–	–
Opaque deep green *rocaille*	7	IIa	6.2G7/8, 0.4G5/9, 5.1G3/8	Ring	2.60–3.50	<2.51	7	–	–

APPENDIX 3—*(Continued)*

Description	AMNH type	Kidd & Kidd	Munsell code	Shape	Diameter (mm)	Length (mm)	Whole	Frag.	Facets
Opaque deep green *rocaille*	7	IIa	6.2G7/8, 0.4G5/9, 5.1G3/8	Ring	3.51–4.75	<2.51	1	–	–
Translucent olive *rocaille*	8	IIa	7.6Y4/5, 8.9Y2/3	Ring	3.51–4.75	<2.51	1	–	–
Opaque gray-blue *rocaille*	9	IIa	0.2PB4/3	Ring	2.60–3.50	<2.51	5	–	–
Opaque gray-blue *rocaille*	9	IIa	0.2PB4/3	Ring	3.51–4.75	<2.51	10	–	–
Opaque gray-blue *rocaille*	9	IIa	0.2PB4/3	Ring	4.76–7.99	2.51–4.50	4	–	–
Opaque orange-yellow *rocaille*	10	IIa	9.1YR7/12 , 8.6YR6/12	Ring	<2.60	<2.51	1	–	–
Opaque orange-yellow *rocaille*	10	IIa	9.1YR7/12 , 8.6YR6/12	Ring	2.60–3.50	<2.51	6	–	–
Transparent yellow-brown *rocaille*	11	IIa	8.6YR6/12, 8.8YR5/9	Ring	<2.60	<2.51	884	146	–
Transparent yellow-brown *rocaille*	11	IIa	8.6YR6/12, 8.8YR5/9	Ring	2.60–3.50	<2.51	859	54	–
Transparent yellow-brown *rocaille*	11	IIa	8.6YR6/12, 8.8YR5/9	Ring	3.51–4.75	2.51–4.50	10	–	–
Transparent yellow-brown *rocaille*	11	IIa	8.6YR6/12, 8.8YR5/9	Ring	4.76–7.99	2.51–4.50	1	–	–
Translucent red-brown *rocaille*	12	IIa	3YR3/10, 0.3YR3/10	Ring	<2.60	<2.51	1	–	–
Translucent red-brown *rocaille*	12	IIa	3YR3/10, 0.3YR3/10	Ring	2.60–3.50	<2.51	1	–	–
Translucent red-brown *rocaille*	12	IIa	3YR3/10, 0.3YR3/10	Ring	3.51–4.75	<2.51	1	–	–
Translucent manganese violet *rocaille*	13	IIa7	2.9R3/2	Barrel	<2.60	<2.51	120	3	–
Translucent manganese violet *rocaille*	13	IIa7	2.9R3/2	Bilobed	NA	NA	5	–	–
Translucent manganese violet *rocaille*	13	IIa7	2.9R3/2	Ring	<2.60	<2.51	1410	9	–
Translucent manganese violet *rocaille*	13	IIa7	2.9R3/2	Ring	2.60–3.50	<2.51	247	7	–
Translucent manganese violet *rocaille*	13	IIa7	2.9R3/2	Ring	3.51–4.75	<2.51	4	–	–
Translucent manganese violet *rocaille*	13	IIa7	2.9R3/2	Ring	3.51–4.75	2.51–4.50	1	–	–
Translucent manganese violet *rocaille*	13	IIa7	2.9R3/2	Ring	4.76–7.99	2.51–4.50	1	–	–
Transparent colorless *rocaille*	14	IIa	–	Ring	<2.60	<2.51	2042	3	–
Transparent colorless *rocaille*	14	IIa	–	Ring	2.60–3.50	2.51–4.50	14	–	–
Opaque white *rocaille*	15	IIa14	4.5Y9/1, 2.5PB10/0.2	Ring	2.60–3.50	<2.51	100	1	–
Transparent manganese violet	16	IIa6	6.9P1/5	Sphere	4.76–7.99	5.35–7.0	2	–	–
Transparent manganese violet	16	IIa6	1.3RP3/5	Ring	4.2	5.7	1	–	–
Opaque to translucent manganese violet	17	IIa7	3.9R1/2, 6.0R3/1, 2.0R1/1, N1/0	Barrel	<2.60	<2.51	7	–	–
Opaque to translucent manganese violet	17	IIa7	3.9R1/2, 6.0R3/1, 2.0R1/1, N1/0	Barrel	2.60–3.50	2.51–4.50	82	–	–

APPENDIX 3—*(Continued)*

Description	AMNH type	Kidd & Kidd	Munsell code	Shape	Diameter (mm)	Length (mm)	Whole	Frag.	Facets
Opaque to translucent manganese violet	17	IIa7	3.9R1/2, 6.0R3/1, 2.0R1/1, N1/0	Barrel	3.51–4.75	2.51–4.50	8	–	–
Opaque to translucent manganese violet	17	IIa7	3.9R1/2, 6.0R3/1, 2.0R1/1, N1/0	Barrel	4.76–7.99	2.51–4.50	1	–	–
Opaque to translucent manganese violet	17	IIa7	3.9R1/2, 6.0R3/1, 2.0R1/1, N1/0	Barrel	4.76–7.99	4.51–5.35	1	–	–
Opaque to translucent manganese violet	17	IIa7	3.9R1/2, 6.0R3/1, 2.0R1/1, N1/0	Bilobed	–	–	22	–	–
Opaque to translucent manganese violet	17	IIa7	3.9R1/2, 6.0R3/1, 2.0R1/1, N1/0	Ring	3.51–4.75	2.51–4.50	4	–	–
Opaque to translucent manganese violet	17	IIa7	3.9R1/2, 6.0R3/1, 2.0R1/1, N1/0	Ring	4.76–7.99	2.51–4.50	125	4	–
Opaque to translucent manganese violet	17	IIa7	3.9R1/2, 6.0R3/1, 2.0R1/1, N1/0	Ring	<2.60	<2.51	803	14	–
Opaque to translucent manganese violet	17	IIa7	3.9R1/2, 6.0R3/1, 2.0R1/1, N1/0	Ring	2.60–3.50	<2.51	5114	17	–
Opaque to translucent manganese violet	17	IIa7	3.9R1/2, 6.0R3/1, 2.0R1/1, N1/0	Ring	3.51–4.75	<2.51	232	5	–
Opaque to translucent manganese violet	17	IIa7	3.9R1/2, 6.0R3/1, 2.0R1/1, N1/0	Ring	3.51–4.75	2.51–4.50	4	–	–
Opaque to translucent manganese violet	17	IIa7	3.9R1/2, 6.0R3/1, 2.0R1/1, N1/0	Ring	4.76–7.99	<2.51	1	–	–
Opaque to translucent manganese violet	17	IIa7	3.9R1/2, 6.0R3/1, 2.0R1/1, N1/0	Ring	4.76–7.99	2.51–4.50	1	–	–
Opaque manganese black	17	IIa7	N1/0, 2.0R1/1, 4.2R1/5, 3.9R1/2, 9.6R1/4	Olive	2.60–3.50	4.51–5.35	2	–	–
Opaque manganese black	17	IIa7	N1/0, 2.0R1/1, 4.2R1/5, 3.9R1/2, 9.6R1/4	Olive	3.51–4.75	5.35–7.0	102	–	–
Opaque manganese black	17	IIa7	N1/0, 2.0R1/1, 4.2R1/5, 3.9R1/2, 9.6R1/4	Olive	8.4	14.6	1	–	–
Opaque manganese black	17	IIa7	N1/0, 2.0R1/1, 4.2R1/5, 3.9R1/2, 9.6R1/4	Sphere	2.60–3.50	2.51–4.50	9	–	–
Opaque manganese black	17	IIa7	N1/0, 2.0R1/1, 4.2R1/5, 3.9R1/2, 9.6R1/4	Sphere	3.51–4.75	2.51–4.50	57	–	–
Opaque manganese black	17	IIa7	N1/0, 2.0R1/1, 4.2R1/5, 3.9R1/2, 9.6R1/4	Sphere	3.51–4.75	4.51–5.35	10	–	–
Opaque manganese black	17	IIa7	N1/0, 2.0R1/1, 4.2R1/5, 3.9R1/2, 9.6R1/4	Sphere	4.76–7.99	5.35–7.0	34	3	–
Opaque manganese black	17	IIa7	N1/0, 2.0R1/1, 4.2R1/5, 3.9R1/2, 9.6R1/4	Sphere	4.76–7.99	7.1–9.0	2	1	–
Opaque manganese black	17	IIa7	N1/0, 2.0R1/1, 4.2R1/5, 3.9R1/2, 9.6R1/4	Sphere	4.76–7.99	4.51–5.35	20	3	–
Opaque manganese black	17	IIa7	N1/0, 2.0R1/1, 4.2R1/5, 3.9R1/2, 9.6R1/4	Barrel	NA	NA	0	7	–
Opaque manganese black	17	IIa7	N1/0, 2.0R1/1, 4.2R1/5, 3.9R1/2, 9.6R1/4	Barrel	2.60–3.50	5.35–7.0	1	–	–
Opaque/translucent turquoise blue	18	IIa40	4.6B6/8, 4.9B5/8, 4.5B7/5	Barrel	3.51–4.75	2.51–4.50	74	2	–
Opaque/translucent turquoise blue	18	IIa40	4.6B6/8, 4.9B5/8, 4.5B7/5	Barrel	4.76–7.99	5.35–7.0	43	8	–
Opaque/translucent turquoise blue	18	IIa40	4.6B6/8, 4.9B5/8, 4.5B7/5	Barrel	4.76–7.99	7.1–9.0	28	3	–

APPENDIX 3—*(Continued)*

Description	AMNH type	Kidd & Kidd	Munsell code	Shape	Diameter (mm)	Length (mm)	Whole	Frag.	Facets
Opaque/translucent turquoise blue	18	IIa40	4.6B6/8, 4.9B5/8, 4.5B7/5	Barrel	4.76–7.99	9.10–11.0	8	1	–
Opaque/translucent turquoise blue	18	IIa40	4.6B6/8, 4.9B5/8, 4.5B7/5	Bilobed	3.51–4.75	9.10–11.0	5	–	–
Opaque/translucent turquoise blue	18	IIa40	4.6B6/8, 4.9B5/8, 4.5B7/5	Bilobed	4.76–7.99	7.10–9.0	3	–	–
Opaque/translucent turquoise blue	18	IIa40	4.6B6/8, 4.9B5/8, 4.5B7/5	Bilobed	4.76–7.99	11.10–13.0	13	1	–
Opaque/translucent turquoise blue	18	IIa40	4.6B6/8, 4.9B5/8, 4.5B7/5	Bilobed	4.76–7.99	13.10–15.0	13	1	–
Opaque/translucent turquoise blue	18	IIa40	4.6B6/8, 4.9B5/8, 4.5B7/5	Oval	2.60–3.50	2.51–4.50	18	–	–
Opaque/translucent turquoise blue	18	IIa40	4.6B6/8, 4.9B5/8, 4.5B7/5	Oval	3.51–4.75	4.51–5.35	32	–	–
Opaque/translucent turquoise blue	18	IIa40	4.6B6/8, 4.9B5/8, 4.5B7/5	Oval	4.76–7.99	5.35–7.0	69	–	–
Opaque/translucent turquoise blue	18	IIa40	4.6B6/8, 4.9B5/8, 4.5B7/5	Oval	4.76–7.99	7.1–9.0	19	–	–
Opaque/translucent turquoise blue	18	IIa40	4.6B6/8, 4.9B5/8, 4.5B7/5	Oval	8.0–14.99	7.1–9.0	6	–	–
Opaque/translucent turquoise blue	18	IIa40	4.6B6/8, 4.9B5/8, 4.5B7/5	Oval	8.0–14.99	9.1–11.0	9	–	–
Opaque/translucent turquoise blue	18	IIa40	4.6B6/8, 4.9B5/8, 4.5B7/5	Sphere	8.0–14.99	5.35–7.0	21	3	–
Opaque/translucent turquoise blue	18	IIa40	4.6B6/8, 4.9B5/8, 4.5B7/5	Sphere	8.0–14.99	7.10–9.0	151	10	–
Opaque/translucent turquoise blue	18	IIa40	4.6B6/8, 4.9B5/8, 4.5B7/5	Sphere	8.0–14.99	9.10–11.0	4	–	–
Opaque/translucent turquoise blue	18	IIa40	4.6B6/8, 4.9B5/8, 4.5B7/5	Sphere	3.51–4.75	2.51–4.50	336	7	–
Opaque/translucent turquoise blue	18	IIa40	4.6B6/8, 4.9B5/8, 4.5B7/5	Sphere	4.76–7.99	5.35–7.0	1282	1100	–
Opaque/translucent turquoise blue	18	IIa40	4.6B6/8, 4.9B5/8, 4.5B7/5	Sphere	4.76–7.99	7.10–9.0	232	407	–
Opaque/translucent turquoise blue	18	IIa40	4.6B6/8, 4.9B5/8, 4.5B7/5	Sphere	4.76–7.99	9.10–11.0	78	98	–
Opaque/translucent turquoise blue	18	IIa40	4.6B6/8, 4.9B5/8, 4.5B7/5	Sphere	4.76–7.99	2.51–4.50	75	4	–
Opaque/translucent turquoise blue	18	IIa40	4.6B6/8, 4.9B5/8, 4.5B7/5	Sphere	4.76–7.99	4.51–5.35	481	13	–
Opaque/translucent turquoise blue	18	IIa40	4.6B6/8, 4.9B5/8, 4.5B7/5	Ring	4.76–7.99	2.51–4.50	237	–	–
Opaque/translucent deep green blue	18	IIa40	2.9BG 6/10, 4.6BG 5/5, 4.7B 5/5	Oval	8.0–14.99	9.10–11.0	86	–	–
Opaque/translucent deep green blue	18	IIa40	2.9BG 6/10, 4.6BG 5/5, 4.7B 5/5	Oval	8.0–14.99	11.10–13.0	49	–	–
Opaque/translucent deep green blue	18	IIa40	2.9BG 6/10, 4.6BG 5/5, 4.7B 5/5	Sphere	8.0–14.99	5.35–7.0	129	7	–
Opaque/translucent deep green blue	18	IIa40	2.9BG 6/10,4.6BG 5/5, 4.7B 5/5	Sphere	8.0–14.99	7.10–9.0	82	2	–
Opaque/translucent deep green blue	18	IIa40	2.9BG 6/10,4.6BG 5/5, 4.7B 5/5	Sphere	8.0–14.99	9.10–11.0	15	–	–
Transparent turquoise blue	19	IIa44	2.8BG2/8, 4.9B5/8, 4.6B6/8	Oval	3.51–4.75	4.51–5.35	1	–	–

APPENDIX 3—(*Continued*)

Description	AMNH type	Kidd & Kidd	Munsell code	Shape	Diameter (mm)	Length (mm)	Whole	Frag.	Facets
Transparent turquoise blue	19	IIa44	2.8BG2/8, 4.9B5/8, 4.6B6/8	Sphere	2.60–3.50	2.51–4.50	3	–	–
Transparent turquoise blue	19	IIa44	2.8BG2/8, 4.9B5/8, 4.6B6/8	Sphere	8.0–14.99	5.35–7.0	34	3	–
Transparent turquoise blue	19	IIa44	2.8BG2/8, 4.9B5/8, 4.6B6/8	Sphere	8.0–14.99	7.10–9.0	83	–	–
Transparent turquoise blue	19	IIa44	2.8BG2/8, 4.9B5/8, 4.6B6/8	Sphere	8.0–14.99	9.10–11.0	13	–	–
Transparent turquoise blue	19	IIa44	2.8BG2/8, 4.9B5/8, 4.6B6/8	Sphere	8.0–14.99	11.10–13.0	3	–	–
Transparent deep green blue	19	IIa44	2.9BG6/10, 4.6BG 5/5,4.7B 5/5	Bilobed	4.76–7.99	9.10–11.0	3	–	–
Transparent deep green blue	19	IIa44	2.9BG 6/10, 4.6BG 5/5,4.7B 5/5	Oval	4.76–7.99	5.35–7.0	72	4	–
Transparent deep green blue	19	IIa44	2.9BG 6/10, 4.6BG 5/5,4.7B 5/5	Oval	4.76–7.99	7.10–9.0	10	–	–
Transparent deep green blue	19	IIa44	2.9BG 6/10, 4.6BG 5/5,4.7B 5/5	Oval	4.76–7.99	9.10–11.0	2	–	–
Transparent deep green blue	19	IIa44	2.9BG 6/10, 4.6BG 5/5,4.7B 5/5	Oval	4.76–7.99	13.10–15.0	2	–	–
Transparent deep green blue	19	IIa44	2.9BG 6/10, 4.6BG 5/5,4.7B 5/5	Oval	8.0–14.99	9.10–11.0	34	–	–
Transparent deep green blue	19	IIa44	2.9BG 6/10, 4.6BG 5/5,4.7B 5/5	Oval	8.0–14.99	11.0–13.1	20	–	–
Transparent deep green blue	19	IIa44	2.9BG 6/10, 4.6BG 5/5,4.7B 5/5	Sphere	3.51–4.75	2.51–4.50	33	64	–
Transparent deep green blue	19	IIa44	2.9BG 6/10, 4.6BG 5/5,4.7B 5/5	Sphere	4.76–7.99	>5.35	307	571	–
Transparent deep green blue	19	IIa44	2.9BG 6/10, 4.6BG 5/5,4.7B 5/5	Sphere	4.76–7.99	2.51–4.50	46	9	–
Transparent deep green blue	19	IIa44	2.9BG 6/10, 4.6BG 5/5,4.7B 5/5	Ring	4.76–7.99	2.51–4.50	1	–	–
Transparent deep green blue	19	IIa44	2.9BG 6/10, 4.6BG 5/5,4.7B 5/5	Bilobed	8.0–14.99	15.10–17.0	3	–	–
Transparent deep green blue	19	IIa44	2.9BG 6/10, 4.6BG 5/5,4.7B 5/5	Sphere	8.0–14.99	5.35–7.0	4	–	–
Transparent deep green blue	19	IIa44	2.9BG 6/10, 4.6BG 5/5,4.7B 5/5	Sphere	8.0–14.99	7.10–9.0	2	–	–
Transparent deep green blue	19	IIa44	2.9BG 6/10, 4.6BG 5/5,4.7B 5/5	Sphere	8.0–14.99	9.10–11.0	2	–	–
Transparent/translucent cobalt blue	20	IIa55	1.6PB6/9, 2.9PB4/10, 2.8PB3/8, 7.8PB2/13	Barrel	<2.60	2.51–4.50	48	–	–
Transparent/translucent cobalt blue	20	IIa55	1.6PB6/9, 2.9PB4/10, 2.8PB3/8, 7.8PB2/13	Barrel	2.60–3.50	2.51–4.50	130	3	–
Transparent/translucent cobalt blue	20	IIa55	1.6PB6/9, 2.9PB4/10, 2.8PB3/8, 7.8PB2/13	Barrel	3.51–4.75	2.51–4.50	38	2	–
Transparent/translucent cobalt blue	20	IIa55	1.6PB6/9, 2.9PB4/10, 2.8PB3/8, 7.8PB2/13	Barrel	4.76–7.99	4.51–5.35	47	–	–
Transparent/translucent cobalt blue	20	IIa55	1.6PB6/9, 2.9PB4/10, 2.8PB3/8, 7.8PB2/13	Barrel	8.0–14.99	7.10–9.0	1	–	–
Transparent/translucent cobalt blue	20	IIa55	1.6PB6/9, 2.9PB4/10, 2.8PB3/8, 7.8PB2/13	Barrel	8.0–14.99	9.10–11.0	1	–	–
Transparent/translucent cobalt blue	20	IIa55	1.6PB6/9, 2.9PB4/10, 2.8PB3/8, 7.8PB2/13	Bilobed	4.76–7.99	4.51–5.35	6	–	–
Transparent/translucent cobalt blue	20	IIa55	1.6PB6/9, 2.9PB4/10, 2.8PB3/8, 7.8PB2/13	Olive	<2.60	2.51–4.50	22	–	–
Transparent/translucent cobalt blue	20	IIa55	1.6PB6/9, 2.9PB4/10, 2.8PB3/8, 7.8PB2/13	Olive	2.60–3.50	2.51–4.50	27	–	–

APPENDIX 3—*(Continued)*

Description	AMNH type	Kidd & Kidd	Munsell code	Shape	Diameter (mm)	Length (mm)	Whole	Frag.	Facets
Transparent/translucent cobalt blue	20	IIa55	1.6PB6/9, 2.9PB4/10, 2.8PB3/8, 7.8PB2/13	Oval	<2.60	<2.51	116	–	–
Transparent/translucent cobalt blue	20	IIa55	1.6PB6/9, 2.9PB4/10, 2.8PB3/8, 7.8PB2/13	Oval	2.60–3.50	2.51–4.50	356	1	–
Transparent/translucent cobalt blue	20	IIa55	1.6PB6/9, 2.9PB4/10, 2.8PB3/8, 7.8PB2/13	Oval	3.51–4.75	4.51–5.35	229	–	–
Transparent/translucent cobalt blue	20	IIa55	1.6PB6/9, 2.9PB4/10, 2.8PB3/8, 7.8PB2/13	Oval	4.76–7.99	>5.35	5	–	–
Transparent/translucent cobalt blue	20	IIa55	1.6PB6/9, 2.9PB4/10, 2.8PB3/8, 7.8PB2/13	Oval	4.76–7.99	4.51–5.35	236	4	–
Transparent/translucent cobalt blue	20	IIa55	1.6PB6/9, 2.9PB4/10, 2.8PB3/8, 7.8PB2/13	Oval	8.0–14.99	>5.35	0	1	–
Transparent/translucent cobalt blue	20	IIa55	1.6PB6/9, 2.9PB4/10, 2.8PB3/8, 7.8PB2/13	Sphere	<2.60	<2.51	84	–	–
Transparent/translucent cobalt blue	20	IIa55	1.6PB6/9, 2.9PB4/10, 2.8PB3/8, 7.8PB2/13	Sphere	2.60–3.50	2.51–4.50	315	–	–
Transparent/translucent cobalt blue	20	IIa55	1.6PB6/9, 2.9PB4/10, 2.8PB3/8, 7.8PB2/13	Sphere	3.51–4.75	2.51–4.50	150	–	–
Transparent/translucent cobalt blue	20	IIa55	1.6PB6/9, 2.9PB4/10, 2.8PB3/8, 7.8PB2/13	Sphere	4.76–7.99	4.51–5.35	824	33	–
Transparent/translucent cobalt blue	20	IIa55	1.6PB6/9, 2.9PB4/10, 2.8PB3/8, 7.8PB2/13	Sphere	8.0–14.99	>5.35	3	–	–
Transparent-opaque bluish-green	21	IIa	2.8BG2/8, 4.9BG3/5	Oval	2.60–3.50	2.51–4.50	3	–	–
Transparent-opaque bluish-green	21	IIa	2.8BG2/8, 4.9BG3/5	Oval	4.76–7.99	7.10–9.0	3	–	–
Transparent-opaque bluish-green	21	IIa	2.8BG2/8, 4.9BG3/5	Oval	8.0–14.99	9.10–11.0	5	–	–
Transparent-opaque bluish-green	21	IIa	2.8BG2/8, 4.9BG3/5	Sphere	2.60–3.50	2.51–4.50	13	1	–
Transparent-opaque bluish-green	21	IIa	2.8BG2/8, 4.9BG3/5	Sphere	3.51–4.75	2.51–4.50	9	4	–
Transparent-opaque bluish-green	21	IIa	2.8BG2/8, 4.9BG3/5	Sphere	4.76–7.99	5.35–7.0	4	44	–
Transparent-opaque bluish-green	21	IIa	2.8BG2/8, 4.9BG3/5	Sphere	4.76–7.99	4.51–5.35	3	1	–
Transparent-opaque bluish-green	21	IIa	2.8BG2/8, 4.9BG3/5	Sphere	8.0–14.99	5.35–7.0	1	–	–
Transparent green	21	IIa	6.3G5/5, 6.6G3/5	Barrel	4.76–7.99	5.35–7.0	2	–	–
Transparent green	21	IIa	6.3G5/5, 6.6G3/5	Oval	2.60–3.50	2.51–4.50	10	–	–
Transparent green	21	IIa	6.3G5/5, 6.6G3/5	Oval	3.51–4.75	2.51–4.50	1	–	–
Transparent green	21	IIa	6.3G5/5, 6.6G3/5	Oval	4.76–7.99	5.35–7.0	2	–	–
Transparent green	21	IIa	6.3G5/5, 6.6G3/5	Sphere	2.60–3.50	2.51–4.50	25	–	–
Transparent green	21	IIa	6.3G5/5, 6.6G3/5	Sphere	3.51–4.75	2.51–4.50	3	–	–
Transparent green	21	IIa	6.3G5/5, 6.6G3/5	Sphere	4.76–7.99	2.51–4.50	4	–	–
Transparent green	21	IIa	6.3G5/5, 6.6G3/5	Sphere	4.76–7.99	4.51–5.35	10	–	–
Transparent green	21	IIa	6.3G5/5, 6.6G3/5	Ring	3.51–4.75	<2.51	1	–	–
Transparent green	21	IIa	6.3G5/5, 6.6G3/5	Ring	4.76–7.99	2.51–4.50	1	–	–
Transparent yellow/green	22	IIa24?	3.4GY9/2	Sphere	4.76–7.99	5.35–7.0	5	2	–
Opaque white	23	IIa13	2.5PB10/0.2, 4.7Y9/4, 4.5Y9/1	Barrel	4.76–7.99	5.35–7.0	16	–	–

APPENDIX 3—(*Continued*)

Description	AMNH type	Kidd & Kidd	Munsell code	Shape	Diameter (mm)	Length (mm)	Whole	Frag.	Facets
Opaque white	23	IIa13	2.5PB10/0.2, 4.7Y9/4, 4.5Y9/1	Bilobed	4.76–7.99	11.10–13.0	2	–	–
Opaque white	23	IIa13	2.5PB10/0.2, 4.7Y9/4, 4.5Y9/1	Olive	3.51–4.75	5.35–7.0	155	5	–
Opaque white	23	IIa13	2.5PB10/0.2, 4.7Y9/4, 4.5Y9/1	Oval	3.51–4.75	>5.35	2	–	–
Opaque white	23	IIa13	2.5PB10/0.2, 4.7Y9/4, 4.5Y9/1	Oval	3.51–4.75	4.51–5.35	131	12	–
Opaque white	23	IIa13	2.5PB10/0.2, 4.7Y9/4, 4.5Y9/1	Oval	4.76–7.99	5.35–7.0	120	7	–
Opaque white	23	IIa13	2.5PB10/0.2, 4.7Y9/4, 4.5Y9/1	Oval	4.76–7.99	7.10–9.0	40	3	–
Opaque white	23	IIa13	2.5PB10/0.2, 4.7Y9/4, 4.5Y9/1	Oval	4.76–7.99	9.10–11.0	13	1	–
Opaque white	23	IIa13	2.5PB10/0.2, 4.7Y9/4, 4.5Y9/1	Sphere	3.51–4.75	2.51–4.50	412	70	–
Opaque white	23	IIa13	2.5PB10/0.2, 4.7Y9/4, 4.5Y9/1	Sphere	4.76–7.99	5.35–7.0	310	27	–
Opaque white	23	IIa13	2.5PB10/0.2, 4.7Y9/4, 4.5Y9/1	Sphere	4.76–7.99	2.51–4.50	24	7	–
Opaque yellow	24	IIa	4.3Y9/7, 4.7Y9/4, 4.4Y7/4	Barrel	4.76–7.99	5.35–7.0	2	–	–
Opaque yellow	24	IIa	4.3Y9/7, 4.7Y9/4, 4.4Y7/4	Oval	4.76–7.99	5.35–7.0	5	–	–
Opaque yellow	24	IIa	4.3Y9/7, 4.7Y9/4, 4.4Y7/4	Sphere	4.76–7.99	5.35–7.0	45	–	–
Transparent brown	25	IIa18	8.6YR6/12, 8.8YR5/9, 4.4Y9/9, 3.7Y7/9	Oval	4.76–7.99	5.35–7.0	3	–	–
Transparent brown	25	IIa18	8.6YR6/12, 8.8YR5/9, 4.4Y9/9, 3.7Y7/9	Oval	4.76–7.99	7.10–9.0	18	–	–
Transparent brown	25	IIa18	8.6YR6/12, 8.8YR5/9, 4.4Y9/9, 3.7Y7/9	Sphere	4.76–7.99	5.35–7.0	36	–	–
Transparent brown	25	IIa18	8.6YR6/12, 8.8YR5/9, 4.4Y9/9, 3.7Y7/9	Sphere	4.76–7.99	7.10–9.0	1	–	–
Transparent brown	25	IIa18	8.6YR6/12, 8.8YR5/9, 4.4Y9/9, 3.7Y7/9	Sphere	4.76–7.99	4.51–5.35	1	–	–
Transparent brown	25	IIa18	8.6YR6/12, 8.8YR5/9, 4.4Y9/9, 3.7Y7/9	Sphere	8.10–14.99	5.35–7.0	8	–	–
Transparent colorless	26	IIa9	–	Barrel	4.76–7.99	4.51–5.35	108	36	–
Transparent colorless	26	IIa9	–	Bilobed	4.76–7.99	11.10–13.0	1	–	–
Transparent colorless	26	IIa9	–	Irregular sphere	4.76–7.99	4.51–5.35	3	–	–
Transparent colorless	26	IIa9	–	Sphere	4.76–7.99	5.35–7.0	2	4	–
Transparent colorless	26	IIa9	–	Sphere	4.76–7.99	2.51–4.50	4	3	–
Transparent colorless	26	IIa9	–	Sphere	4.76–7.99	4.51–5.35	4	3	–
Transparent deep orange-yellow charlotte	27	If	8.6YR6/12	Sphere	2.60–3.50	2.51–4.50	3	–	3–4
Transparent greenish-blue charlotte	28	If	2.8BG2/8, 4.9BG3/5	Barrel	4.76–7.99	5.35–7.0	1	–	3
Transparent greenish-blue charlotte	28	If	2.8BG2/8, 4.9BG3/5	Barrel	2.60–3.50	2.51–4.50	8	–	4
Transparent greenish-blue charlotte	28	If	2.8BG2/8, 4.9BG3/5	Barrel	3.51–4.75	2.51–4.50	4	–	4
Transparent greenish-blue charlotte	28	If	2.8BG2/8, 4.9BG3/5	Oval	4.76–7.99	4.51–5.35	1	–	1
Transparent greenish-blue charlotte	28	If	2.8BG2/8, 4.9BG3/5	Oval	2.60-3.50	2.51-4.50	5	–	1
Transparent greenish-blue charlotte	28	If	2.8BG2/8, 4.9BG3/5	Oval	2.60–3.50	2.51–4.50	9	–	3–4

APPENDIX 3—*(Continued)*

Description	AMNH type	Kidd & Kidd	Munsell code	Shape	Diameter (mm)	Length (mm)	Whole	Frag.	Facets
Transparent greenish-blue charlotte	28	If	2.8BG2/8, 4.9BG3/5	Sphere	2.60–3.50	2.51–4.50	3	–	1
Transparent greenish-blue charlotte	28	If	2.8BG2/8, 4.9BG3/5	Sphere	2.60–3.50	2.51–4.50	4	–	2
Transparent greenish-blue charlotte	28	If	2.8BG2/8, 4.9BG3/5	Sphere	3.51–4.75	2.51–4.50	1	–	2
Transparent greenish-blue charlotte	28	If	2.8BG2/8, 4.9BG3/5	Sphere	2.60–3.50	2.51–4.50	28	–	3–4
Transparent greenish-blue charlotte	28	If	2.8BG2/8, 4.9BG3/5	Sphere	3.51–4.75	2.51–4.50	74	–	3–4
Transparent manganese gray-violet charlotte	29	If	1.2P3/4, 0.5RP3/2	Sphere	3.51–4.75	2.51–4.50	5	–	3–4
Translucent to transparent cobalt blue faceted	30	If	1.6PB6/9, 2.9PB4/10, 2.8PB3/8, 7.8PB2/13	Barrel	<2.60	2.51–4.50	3	–	2
Translucent to transparent cobalt blue faceted	30	If	1.6PB6/9, 2.9PB4/10, 2.8PB3/8, 7.8PB2/13	Barrel	2.60–3.50	2.51–4.50	15	–	1
Translucent to transparent cobalt blue faceted	30	If	1.6PB6/9, 2.9PB4/10, 2.8PB3/8, 7.8PB2/13	Barrel	2.60–3.50	2.51–4.50	45	–	2
Translucent to transparent cobalt blue faceted	30	If	1.6PB6/9, 2.9PB4/10, 2.8PB3/8, 7.8PB2/13	Olive	2.60–3.50	2.51–4.50	2	–	1
Translucent to transparent cobalt blue faceted	30	If	1.6PB6/9, 2.9PB4/10, 2.8PB3/8, 7.8PB2/13	Oval	<2.60	2.51–4.50	16	–	1
Translucent to transparent cobalt blue faceted	30	If	1.6PB6/9, 2.9PB4/10, 2.8PB3/8, 7.8PB2/13	Oval	2.60–3.50	2.51–4.50	193	–	1
Translucent to transparent cobalt blue faceted	30	If	1.6PB6/9, 2.9PB4/10, 2.8PB3/8, 7.8PB2/13	Oval	3.51–4.75	4.51–5.35	8	–	1
Translucent to transparent cobalt blue faceted	30	If	1.6PB6/9, 2.9PB4/10, 2.8PB3/8, 7.8PB2/13	Oval	<2.60	2.51–4.50	11	–	2
Translucent to transparent cobalt blue faceted	30	If	1.6PB6/9, 2.9PB4/10, 2.8PB3/8, 7.8PB2/13	Oval	2.60–3.50	2.51–4.50	280	–	2
Translucent to transparent cobalt blue faceted	30	If	1.6PB6/9, 2.9PB4/10, 2.8PB3/8, 7.8PB2/13	Oval	3.51–4.75	2.51–4.50	9	–	2
Translucent to transparent cobalt blue faceted	30	If	1.6PB6/9, 2.9PB4/10, 2.8PB3/8, 7.8PB2/13	Oval	4.76–7.99	4.51–5.35	2	–	2
Translucent to transparent cobalt blue faceted	30	If	1.6PB6/9, 2.9PB4/10, 2.8PB3/8, 7.8PB2/13	Sphere	<2.60	<2.51	21	–	1
Translucent to transparent cobalt blue faceted	30	If	1.6PB6/9, 2.9PB4/10, 2.8PB3/8, 7.8PB2/13	Sphere	2.60–3.50	2.51–4.50	320	–	1
Translucent to transparent cobalt blue faceted	30	If	1.6PB6/9, 2.9PB4/10, 2.8PB3/8, 7.8PB2/13	Sphere	3.51–4.75	2.51–4.50	16	–	1
Translucent to transparent cobalt blue faceted	30	If	1.6PB6/9, 2.9PB4/10, 2.8PB3/8, 7.8PB2/13	Sphere	4.76–7.99	2.51–4.50	4	–	1
Translucent to transparent cobalt blue faceted	30	If	1.6PB6/9, 2.9PB4/10, 2.8PB3/8, 7.8PB2/13	Sphere	<2.60	<2.51	5	–	2
Translucent to transparent cobalt blue faceted	30	If	1.6PB6/9, 2.9PB4/10, 2.8PB3/8, 7.8PB2/13	Sphere	2.60–3.50	2.51–4.50	359	3	2
Translucent to transparent cobalt blue faceted	30	If	1.6PB6/9, 2.9PB4/10, 2.8PB3/8, 7.8PB2/13	Sphere	3.51–4.75	2.51–4.50	103	–	2

APPENDIX 3—*(Continued)*

Description	AMNH type	Kidd & Kidd	Munsell code	Shape	Diameter (mm)	Length (mm)	Whole	Frag.	Facets
Translucent to transparent cobalt blue faceted	30	If	1.6PB6/9, 2.9PB4/10, 2.8PB3/8, 7.8PB2/13	Sphere	4.76–7.99	4.51–5.35	5	–	2
Translucent to transparent cobalt blue faceted	30	If	1.6PB6/9, 2.9PB4/10, 2.8PB3/8, 7.8PB2/13	Sphere	<2.60	<2.51	4	–	3–4
Translucent to transparent cobalt blue faceted	30	If	1.6PB6/9, 2.9PB4/10, 2.8PB3/8, 7.8PB2/13	Sphere	2.60–3.50	2.51–4.50	557	–	3–4
Translucent to transparent cobalt blue faceted	30	If	1.6PB6/9, 2.9PB4/10, 2.8PB3/8, 7.8PB2/13	Sphere	3.51–4.75	2.51–4.50	303	–	3–4
Translucent to transparent cobalt blue faceted	30	If	1.6PB6/9, 2.9PB4/10, 2.8PB3/8, 7.8PB2/13	Sphere	4.76–7.99	4.51–5.35	3	–	3–4
Translucent to transparent cobalt blue faceted	30	If	1.6PB6/9, 2.9PB4/10, 2.8PB3/8, 7.8PB2/13	Ring	<2.60	<2.51	1	–	2
Translucent to transparent cobalt blue faceted	30	If	1.6PB6/9, 2.9PB4/10, 2.8PB3/8, 7.8PB2/13	Ring	2.60–3.50	<2.51	4	–	2
Translucent to transparent cobalt blue faceted	30	If	1.6PB6/9, 2.9PB4/10, 2.8PB3/8, 7.8PB2/13	Ring	3.51–4.75	2.51–4.50	5	–	2
Transparent green faceted	31	If	6.3G5/5, 6.6G3/5	Oval	3.51–4.75	2.51–4.50	1	–	1
Transparent green faceted	31	If	6.3G5/5, 6.6G3/5	Oval	4.76–7.99	4.51–5.35	1	–	1
Transparent green faceted	31	If	6.3G5/5, 6.6G3/5	Oval	2.60–3.50	2.51–4.50	5	–	2
Transparent green faceted	31	If	6.3G5/5, 6.6G3/5	Oval	4.76–7.99	5.35–7.0	6	–	2
Transparent green faceted	31	If	6.3G5/5, 6.6G3/5	Oval	2.60–3.50	2.51–4.50	2	–	3
Transparent green faceted	31	If	6.3G5/5, 6.6G3/5	Oval	3.51–4.75	2.51–4.50	1	–	3–4
Transparent green faceted	31	If	6.3G5/5, 6.6G3/5	Sphere	2.60–3.50	2.51–4.50	2	–	1
Transparent green faceted	31	If	6.3G5/5, 6.6G3/5	Sphere	4.76–7.99	2.51–4.50	8	–	2
Transparent green faceted	31	If	6.3G5/5, 6.6G3/5	Sphere	2.60–3.50	2.51–4.50	12	–	2
Transparent green faceted	31	If	6.3G5/5, 6.6G3/5	Sphere	4.76–7.99	2.51–4.50	1	–	2
Transparent green faceted	31	If	6.3G5/5, 6.6G3/5	Sphere	3.51–4.75	2.51–4.50	1	–	3
Transparent green faceted	31	If	6.3G5/5, 6.6G3/5	Sphere	4.76–7.99	5.35–7.0	1	–	3
Translucent manganese black faceted	32	If	4.2R1/5, 2.9R3/2, 3.9R1/2, 9.6R1/4	Oval	3.51–4.75	2.51–4.50	1	–	1
Translucent manganese black faceted	32	If	4.2R1/5, 2.9R3/2, 3.9R1/2, 9.6R1/4	Oval	3.51–4.75	2.51–4.50	2	–	2–3
Translucent manganese black faceted	32	If	4.2R1/5, 2.9R3/2, 3.9R1/2, 9.6R1/4	Sphere	2.60–3.50	2.51–4.50	18	–	2–3
Translucent manganese black faceted	32	If	4.2R1/5, 2.9R3/2, 3.9R1/2, 9.6R1/4	Sphere	3.51–4.75	2.51–4.50	28	–	2–3
Translucent manganese black faceted	32	If	4.2R1/5, 2.9R3/2, 3.9R1/2, 9.6R1/4	Sphere	3.51–4.75	4.51–5.35	3	–	1–2
Translucent manganese black faceted	32	If	4.2R1/5, 2.9R3/2, 3.9R1/2, 9.6R1/4	Ring	3.51–4.75	2.51–4.50	2	–	2

APPENDIX 3—*(Continued)*

Description	AMNH type	Kidd & Kidd	Munsell code	Shape	Diameter (mm)	Length (mm)	Whole	Frag.	Facets
Translucent manganese black faceted	32	If	4.2R1/5, 2.9R3/2, 3.9R1/2, 9.6R1/4	Ring	2.60–3.50	<2.51	3	–	2–3
Translucent manganese black faceted	32	If	4.2R1/5, 2.9R3/2, 3.9R1/2, 9.6R1/4	Ring	3.51–4.75	<2.51	3	–	2–3
Deep green-blue melon with 8 flutes	33	IIe2	4.9B5/8	Melon	7.60	6.80	1	–	–
Opaque white with clear coat	34	IIIa	4.5Y9/1	Tube	3.51–4.75	2.51–4.50	4	–	–
Opaque green heart	35	IIIa3	9.2R4/12, 9.3R4/9, 0.3YR3/10 over 5.0B2/4	Bugle	2.60–3.50	5.35–7.00	2	–	–
Opaque green heart	35	IIIa3	9.2R4/12, 9.3R4/9,0.3YR3/10 over 5.0B2/4	Bugle	2.60–3.50	7.10–9.00	1	–	–
Opaque green heart	35	IIIa3	9.2R4/12, 9.3R4/9, 0.3YR3/10 over 9.5Y7/7	Bugle	2.60–3.50	<2.51	–	2	–
Small Nueva Cádiz plain	36	IIIc3	2.2PB2/6 over 2.5PB10/0 over 9.2B3/2	Squared tube	5.40	11.10	1	–	11
Opaque turquoise blue with clear core	37	IVa	4.5B7/5, 4.7B5/5	Ring	<2.60	<2.51	7	–	–
Opaque white with clear core	38	IVa	4.5Y9/1, 2.5PB10/0	Barrel	<2.60	<2.51	7	–	–
Opaque white with clear core	38	IVa	4.5Y9/1	Barrel	2.60–3.50	<2.51	83	–	–
Opaque white with clear core	38	IVa	4.5Y9/1	Barrel	2.60–3.50	2.51–4.50	7	–	–
Opaque white with clear core	38	IVa	4.5Y9/1	Bilobed	2.60–3.50	<2.51	1	–	–
Opaque white with clear core	38	IVa	4.5Y9/1	Ring	<2.60	<2.51	572	3	–
Opaque white with clear core	38	IVa	4.5Y9/1	Ring	2.60–3.50	<2.51	1960	14	–
Opaque white with clear core	38	IVa	4.5Y9/1	Ring	3.51–4.75	<2.51	49	3	–
Opaque white with clear core	38	IVa	4.5Y9/1	Ring	3.51–4.75	2.51–4.50	16	1	–
Opaque white with clear core	38	IVa	4.5Y9/1	Ring	4.76–7.99	2.51–4.50	5	–	–
Opaque white with clear core and clear coat	38	IVa	4.5Y9/1, 2.5PB10/0	Barrel	2.60–3.50	2.51–4.50	40	–	–
Opaque white with clear core and clear coat	38	IVa	4.5Y9/1, 2.5PB10/0	Separated cores & clear coats	–	–	–	90	–
Opaque white with clear core and clear coat	38	IVa	4.5Y9/1, 2.5PB10/0	Ring	<2.60	<2.51	1088	3	–
Opaque white with clear core and clear coat	38	IVa	4.5Y9/1, 2.5PB10/0	Ring	2.60–3.50	<2.51	55	–	–
Opaque white with clear core and clear coat	38	IVa	4.5Y9/1, 2.5PB10/0	Ring	2.60–3.50	2.51–4.50	1115	–	–
Opaque white with clear core and clear coat	38	IVa	4.5Y9/1, 2.5PB10/0	Ring	3.51–4.75	<2.51	7	–	–
Opaque white with clear core and clear coat	38	IVa	4.5Y9/1, 2.5PB10/0	Ring	3.51–4.75	2.51–4.50	1384	–	–
Opaque white with clear core and clear coat	38	IVa	4.5Y9/1, 2.5PB10/0	Ring	4.76–7.99	2.51–4.50	11	–	–

APPENDIX 3—*(Continued)*

Description	AMNH type	Kidd & Kidd	Munsell code	Shape	Diameter (mm)	Length (mm)	Whole	Frag.	Facets
Opaque turquoise blue with clear core and clear coat	39	IVa	4.6BG5/9, 4.6B6/8	Ring	<2.60	<2.51	901	13	–
Opaque turquoise blue with clear core and clear coat	39	IVa	4.6BG5/9, 4.6B6/8	Ring	2.60–3.50	<2.51	970	–	–
Opaque blue green with clear coat and clear core	40	IVa	3.2G5/11, 6.2G7/8, 5.8G4/9, 6.0G6/5, 6.3G5/5	Ring	<2.60	<2.51	63	–	–
Opaque blue green with clear coat and clear core	40	IVa	3.2G5/11, 6.2G7/8,, 5.8G4/9, 6.0G6/5, 6.3G5/5	Ring	2.60–3.50	<2.51	224	–	–
Opaque yellow green with clear core and clear coat	40	IVa	4.9GY8/9, 5.0GY8/6	Ring	<2.60	<2.51	1971	13	–
Opaque green heart *rocaille*	41	IVa5	9.2R4/12,9.3R4/9, 0.3YR3/10 over 9.5Y7/7	Sphere	<2.60	<2.51	1	–	–
Opaque green heart *rocaille*	41	IVa5	9.2R4/12, 9.3R4/9, 0.3YR3/10 over 9.5Y7/7	Sphere	2.60–3.50	<2.51	4	–	–
Opaque green heart *rocaille*	41	IVa5	9.2R4/12, 9.3R4/9, 0.3YR3/10 over 9.5Y7/7	Sphere	3.51–4.75	2.51–4.50	1	–	–
Opaque green heart *rocaille*	41	IVa5	0.3YR3/10 over 1.0BG3/2, 157 over 0.3YR3/10	Ring	3.51–4.75	<2.51	1	–	–
Opaque yellow over green *rocaille*	42	IVa	4.3Y9/7, 4.7Y9/4, 5.8G4/9, 5.1G3/8	Ring	<2.60	<2.51	101	10	–
Opaque yellow over green *rocaille*	42	IVa	4.3Y9/7, 4.7Y9/4, 5.8G4/9, 5.1G3/8	Ring	2.60–3.50	<2.51	614	13	–
Opaque yellow over green *rocaille*	42	IVa	4.3Y9/7, 4.7Y9/4, 5.8G4/9, 5.1G3/8	Ring	3.51–4.75	2.51–4.50	124	–	–
Transparent colorless over transparent colorless	43	IVa	–	Barrel	5.22	4.48	1	–	–
Transparent yellow-green over yellow-green	44	IVa	5.4GY6/9	Sphere	9.27	8.23	1	–	–
Transparent purple with turquoise core and clear coat	45	IVa	6.9P1/5, 0.8RP1/2 over 4.0B8/4	Sphere	9.17	9.01	1	–	–
Translucent orange-yellow over transparent green	46	IVa	8.6YR6/12, 8.8YR5/9 over 4.5Y9/1 over 7.6G6/2	Sphere	8.00–14.99	7.1–9.0	3	–	–
Opaque *a speo* finished green heart	47	IVa5	9.3R4/9, 9.2R4/12, 0.3YR3/10 over 5.0B2/4	Bilobed	4.76–7.99	12.52	1	–	–
Opaque *a speo* finished green heart	47	IVa5	9.3R4/9, 9.2R4/12, 0.3YR3/10 over 5.0B2/4	Barrel	4.76–7.99	2.51–4.50	2	–	–
Opaque *a speo* finished green heart	47	IVa5	9.3R4/9, 9.2R4/12, 0.3YR3/10 over 5.0B2/4	Sphere	4.76–7.99	2.51–4.50	5	1	–
Opaque *a speo* finished green heart	47	IVa5	9.2R4/12, 9.3R4/9, 0.3YR3/10 over 9.5Y7/7	Barrel	3.51–4.75	4.51–5.35	1	2	–
Five layer chevron - Translucent green over white over red over white over translucent green	48	IVk7	6.6G3/5 over 2.5PB10/0 over 5.1R3/10, 4.0R3/7 over 2.5PB10/0 over 6.6G3/5	Sphere	10.15–11.39	9.22–9.56	–	3	–
Opaque cobalt blue with white lines	49	IIb	2.9PB4/10, 2.8PB3/8	Sphere	3.50	2.85	1	–	–
Opaque cobalt blue w/ 2 red, 2 white lines	50	IIb71	2.9PB4/10, 2.8PB3/8, 5.1R3/10	Ring	2.60–3.50	<2.51	1	–	–
Opaque cobalt blue w/ 2 red, 2 white lines	50	IIb71	2.9PB4/10, 2.8PB3/8, 5.1R3/10	Sphere	4.18	3.26	1	–	–

APPENDIX 3—*(Continued)*

Description	AMNH type	Kidd & Kidd	Munsell code	Shape	Diameter (mm)	Length (mm)	Whole	Frag.	Facets
Opaque cobalt blue w/ 3 red, 3 white lines	50	IIb71	2.9PB4/10, 2.8PB3/8, 5.1R3/10	Sphere	3.51–4.75	2.51–4.50	1	–	–
Opaque yellow w/ 4 red lines	51	IIb	4.7Y9/4, 6.5R2/8	Ring	4.28	2.73	1	–	–
Opaque yellow w/ 4 red lines	51	IIb	4.7Y9/4, 6.5R2/8	Ring	3.25	1.90	1	–	–
Opaque rust brown w/ 6 brown lines	52	IIb	1.6YR2/8, 9.6R1/4, 9.0R3/5	Sphere	4.22	3.08	1	–	–
Opaque cobalt blue w/ 4 white lines	53	IIb68, IIb70	1.6PB6/9, 2.9PB4/10	Oval	2.60–3.50	2.51–4.50	1	–	–
Opaque cobalt blue w/ 6 white lines	53	IIb68, IIb70	1.6PB6/9, 2.9PB4/10	Oval	2.60–3.50	2.51–4.50	1	–	–
Opaque cobalt blue w/ 4 white lines	53	IIb68, IIb70	1.6PB6/9, 2.9PB4/10	Sphere	3.51–4.75	2.51–4.50	3	–	–
Opaque cobalt blue w/ 10 white lines	53	IIb68, IIb70	1.6PB6/9, 2.9PB4/10	Sphere	4.76–7.99	4.51–5.35	6	1	–
Opaque cobalt blue w/ 4 white lines	53	IIb68, IIb70	1.6PB6/9, 2.9PB4/10	Sphere	4.76–7.99	4.51–5.35	2	–	–
Opaque turquoise blue with 3 brownish red on white stripes	54	IIbb24	4.6B6/8, 4.9B5/8 with 0.3YR3/10	Sphere	6.85	5.80	1	–	–
Translucent cobalt blue with 3 red stripes	55	IIb65	2.9PB4/10, 2.8PB3/8, 2.2PB2/6, 5.1R3/10, 3.8R4/9	Sphere	4.76–7.99	4.51–5.35	17	1	–
Opaque turquoise blue with 3 white lines	56	IIb56	4.6B6/8, –, 4.5B7/5, 4.7B 5/5	Bilobed	4.76–7.99	11.10–13.0	2	–	–
Opaque turquoise blue with 3 white lines	56	IIb56	4.6B6/8, –, 4.5B7/5, 4.7B 5/5	Bilobed	4.76–7.99	13.10–15.0	1	–	–
Opaque turquoise blue with 3 white lines	56	IIb56	4.6B6/8, –, 4.5B7/5, 4.7B 5/5	Irregular oval/ring	4.76–7.99	5.35–7.0	1	–	–
Opaque turquoise blue with 3 white lines	56	IIb56	4.6B6/8, –, 4.5B7/5, 4.7B 5/5	Oval	4.76–7.99	5.35–7.0	9	–	–
Opaque turquoise blue with 3 white lines	56	IIb56	4.6B6/8, –, 4.5B7/5, 4.7B 5/5	Oval	4.76–7.99	7.10–9.0	10	–	–
Opaque turquoise blue with 3 white lines	56	IIb56	4.6B6/8, –, 4.5B7/5, 4.7B 5/5	Oval	4.76–7.99	9.10–11.0	10	–	–
Opaque turquoise blue with 3 white lines	56	IIb56	4.6B6/8, –, 4.5B7/5, 4.7B 5/5	Ring	4.76–7.99	2.51–4.50	2	–	–
Opaque turquoise blue with 3 white lines	56	IIb56	4.6B6/8, –, 4.5B7/5, 4.7B 5/5	Ring	4.76–7.99	4.51–5.35	1	–	–
Opaque turquoise blue with 3 white lines	56	IIb56	4.6B6/8, –, 4.5B7/5, 4.7B 5/5	Sphere	4.76–7.99	5.35–7.0	1	–	–
Opaque turquoise blue with 3 white lines	56	IIb56	4.6B6/8, –, 4.5B7/5, 4.7B 5/5	Sphere	4.76–7.99	7.10–9.0	55	–	–
Opaque turquoise blue with 3 white lines	56	IIb56	4.6B6/8, –, 4.5B7/5, 4.7B 5/5	Sphere	8.0–14.99	7.10–9.0	26	–	–
Opaque turquoise blue with 3 white lines	56	IIb56	4.6B6/8, –, 4.5B7/5, 4.7B 5/5	Sphere	8.0–14.99	9.10–11.0	1	–	–
Transparent green with 3 white stripes	57	IIb	6.6G3/5, 6.3G5/5	Sphere	4.76–7.99	4.51–5.35	2	–	–

APPENDIX 3—*(Continued)*

Description	AMNH type	Kidd & Kidd	Munsell code	Shape	Diameter (mm)	Length (mm)	Whole	Frag.	Facets
Translucent cobalt blue with 3 red on white stripes	58	IIbb27	2.9PB4/10, 2.8PB3/8, 5.1R3/10	Barrel	4.76–7.99	4.51–5.35	1	–	–
Translucent cobalt blue with 3 red on white stripes	58	IIbb27	2.9PB4/10, 2.8PB3/8, 5.1R3/10	Bilobed	4.76–7.99	4.51–5.35	1	–	–
Translucent cobalt blue with 3 red on white stripes	58	IIbb27	2.9PB4/10, 2.8PB3/8, 5.1R3/10	Sphere	4.76–7.99	4.51–5.35	21	47	–
Opaque manganese black with white equatorial zone	59	IIb	3.9R1/2	Sphere	6.67–6.90	6.23–6.27	2	–	–
Opaque manganese black w/ 3 white longitudinal stripes	60	IIb10, IIb11	3.9R1/2, 2.0R1/1	Barrel/peanut	4.76–7.99	13.10–15.0	1	–	–
Opaque manganese black w/ 3 white longitudinal spiral stripes	60	IIb10, IIb11	3.9R1/2, 2.0R1/1	Oval	8.0–14.99	>5.35	–	2	–
Opaque manganese black w/ 3 white longitudinal stripes	60	IIb10, IIb11	3.9R1/2, 2.0R1/1	Oval	8.0–14.99	11.10–13.0	4	14	–
Opaque manganese black w/ 3 white longitudinal stripes	60	IIb10, IIb11	3.9R1/2, 2.0R1/1	Sphere	4.76–7.99	5.35–7.0	1	–	–
Opaque white with 2 red and 2 blue stripes on opposite halves	61	IIb32	2.5PB10/0.2, 4.0R3/7, 2.9PB4/10	Olive	5.30	8.50	1	–	–
Clear to slightly yellow-white with 1 white stripe	62	IIb	4.5Y9/1, 2.5PB10/0	Oval	4.76–7.99	4.51–5.35	1	–	–
Opaque white with 2 black stripes	63	IIb23	2.5PB10/0.2, N1/0	Sphere	5.20	5.75	–	1	–
Opaque turquoise blue with 3 reddish-brown stars	64	IIg, IIh1	4.6B6/8, 4.9B5/8, 9.0R3/5, 0.3YR3/10, 7.8PB2/13	Sphere	8.0–14.99	5.35–7.0	7	3	–
Opaque turquoise blue with 3 reddish-brown stars	64	IIg, IIh1	4.6B6/8, 4.9B5/8, 9.0R3/5, 7.8PB2/13	Sphere	8.0–14.99	7.10–9.0	11	4	–
Opaque turquoise blue with 3 reddish-brown stars and 2 white stripes	65	IIg	4.6B6/8, 4.9B5/8 with 7.8PB2/12	Sphere	8.0–14.99	5.35–7.0	3	–	–
Opaque turquoise blue with 3 reddish-brown stars and 2 white stripes	65	IIg	4.6B6/8, 4.9B5/8 with 7.8PB2/12	Sphere	8.0–14.99	7.10–9.0	1	–	–
Transparent cobalt blue with 1 red-brown white "star" on purple-blue	66	IIg	2.9PB4/10,2.8PB3/8, 9.0R3/5,7.8PB2/13	Sphere	8.93	9.66	1	–	–
White (porcelain) with 4 cobalt blue and white eyes	67	IIg4	7.8PB2/13, 7.8PB2/8	Oval	7.60	8.03	1	–	–
Opaque white with 3 reddish-brown on cobalt blue eyes	68	IIg	9.0R3/5, 1.5PB8/3	Sphere	6.80	6.70	1	–	–
Clear with gilded perforation	69	–	4.4Y9/9, 3.7Y7/9	Barrel	6.0	6.20	1	–	–
Clear with gilded perforation	69	–	4.4Y9/9, 3.7Y7/9	Oval	5.0	6.96	1	–	–

APPENDIX 3—*(Continued)*

Description	AMNH type	Kidd & Kidd	Munsell code	Shape	Diameter (mm)	Length (mm)	Whole	Frag.	Facets
Gooseberry	70	IIb18[a]	9.0Y7/4	Irregular ring	3.51–4.75	2.51–4.50	1	–	–
Gooseberry	70	IIb18	9.0Y7/4	Irregular ring	4.76–7.99	2.51–4.50	1	–	–
Gooseberry	70	IIb18	9.0Y7/4	Sphere	3.51–4.75	4.51–5.35	2	–	–
Gooseberry	70	IIb18	9.0Y7/4	Sphere	4.76–7.99	5.35–7.0	228	29	–
Opaque white over pale blue with 6 blue stripes	71	IVb	3.0PB4/7, 9.2B9/1, 2.5PB10/0	Sphere	6.54	4.91	1	–	–
Opaque blue over translucent blue with 3 red on white stripes	72	IVbb	2.9PB4/10, 2.8PB3/8, 5.1R3/10	Barrel	4.12	4.18	1	–	–
Translucent red striped gooseberry	73	IVb	6.5R2/8	Ring	2.60–3.50	<2.51	44	–	–
Translucent red striped gooseberry	73	IVb	6.5R2/8	Ring	3.51–4.75	2.51–4.50	57	1	–
Clear over olive-green with 9 white stripes	74	IVb	7.6Y4/5, 2.5PB10/0	Sphere	9.10	7.90	1	–	–
Translucent to transparent green	75	WIb, WId	5.8G4/9	Barrel	4.76–7.99	4.51–5.35	1	–	–
Translucent to transparent green	75	WIb, WId	5.8G4/9	Sphere	4.76–7.99	4.51–5.35	1	–	–
Translucent to transparent green	75	WIb, WId	5.8G4/9	Sphere	3.51–4.75	2.51–4.50	1	–	–
Translucent to transparent green	75	WIb, WId	5.8G4/9	Ring	4.46	2.83	1	–	–
Yellow-brown wound	76	WIc6	4.6YR4/8, 8.6YR6/12, 9.3YR6/8, 8.8YR5/9	Olive	4.76–7.99	9.10–11.0	35	1	–
Gray-greenish yellow	77	WIb	9.5Y7/7, 9.0Y7/4	Sphere	4.43	4.33	1	–	–
White Venetian barleycorn	78	WIc1	N1/0	Oval	6.88	10.78	1	–	–
Yellow wound	79	WI	9.1YR7/12, 4.4Y9/9, 3.7Y7/9, 4.3Y9/7, 4.4Y7/4	Barrel	4.76–7.99	5.35–7.0	2	–	–
Yellow wound	79	WI	9.1YR7/12, 4.4Y9/9, 3.7Y7/9, 4.3Y9/7, 4.4Y7/4	Oval	2.60–3.50	5.35–7.0	1	–	–
Yellow wound	79	WI	9.1YR7/12, 4.4Y9/9, 3.7Y7/9, 4.3Y9/7, 4.4Y7/4	Oval	4.76–7.99	7.10–9.0	2	–	–
Yellow wound	79	WI	9.1YR7/12, 4.4Y9/9, 3.7Y7/9, 4.3Y9/7, 4.4Y7/4	Barrel	3.51–4.75	<2.51	1	–	–
Yellow wound	79	WI	9.1YR7/12, 4.4Y9/9, 3.7Y7/9, 4.3Y9/7, 4.4Y7/4	Barrel	3.51–4.75	2.51–4.50	2	–	–
Yellow wound	79	WI	9.1YR7/12, 4.4Y9/9, 3.7Y7/9, 4.3Y9/7, 4.4Y7/4	Barrel	3.51–4.75	4.51–5.35	9	1	–
Yellow wound	79	WI	9.1YR7/12, 4.4Y9/9, 3.7Y7/9, 4.3Y9/7, 4.4Y7/4	Sphere	4.76–7.99	2.51–4.50	9	–	–
Colorless wound	80	WId	–	Ring	5.21–6.41	2.67	2	–	–
Turquoise wound	81	WId3	4.6B6/8, 4.9B5/8	Ring	4.76–7.99	2.51–4.50	3	–	–

[a]As previously noted, Gooseberries are commonly given Kidd No. IIb18; however, as composite beads, this makes no sense. They should properly fall in to the IVb series.

APPENDIX 3—*(Continued)*

Description	AMNH type	Kidd & Kidd	Munsell code	Shape	Diameter (mm)	Length (mm)	Whole	Frag.	Facets
Blue-green wound	82	WId	4.9BG7/5, 4.6BG5/5	Ring	3.51–4.75	5.35–7.0	2	–	–
Manganese violet wound	83	WId	4.2R1/5, 2.9R3/2, 3.9R1/2	Ring	3.51–4.75	2.51–4.50	1	–	–
Green wound	84	WId	6.3G5/5	Ring	4.76–7.99	<2.51	3	–	–
Yellow-orange wound	85	WId1	9.1YR7/12, 4.4Y9/9, 3.7Y7/9	Ring	3.51–4.75	2.51–4.75	2	–	–
Yellow-orange wound	86	WId1	9.1YR7/12, 4.4Y9/9, 3.7Y7/9	Ring	1.86–2.20	1.10–1.15	2	–	–
Manganese black wound	87	WId	3.9R1/2, 2.0R1/1	Ring	5.20	1.50	1	–	–
White wound	88	WId	2.5PB10/0	Ring	3.70	1.02	1	–	–
Deep green wound	89	WI	6.6G3/5, 8.0G2/3	Sphere	9.93	–	–	1	–
Yellow wound	90	WIIe2	4.4Y9/9, 3.7Y7/9	Melon	5.81	5.16	1	–	–
Orange-brown wound	91	WII	4.1YR5/8, 4.6YR4/8	–	–	–	–	39	–
Faceted green wound	92	WII	5.1G3/8, 6.6G3/5	Teardrop	7.90	17.80	1	–	10
Copper ruby red wound	93	WII	4.0R3/7, 9.8R5/15, 9.2R4/12	Hexagonal bicone	2.60–3.50	2.51–4.50	3	–	12
Manganese violet wound	94	WII	2.9R3/2	Barrel	3.51–4.75	2.51–4.50	1064	14	7–10
Manganese violet wound	94	WII	2.9R3/2	Bilobed	3.51–4.75	5.35–7.0	57	–	7–10
Manganese violet wound	94	WII	2.9R3/2	Trilobed	2.60–3.50	11.10–13.0	1	–	7–10
Incised green wound with green protrusions	95	WII	6.2G7/8+D367	Sphere	4.76–7.99	4.51–5.35	–	3	–
Yellow green over tan/yellow/ over pale green wound	96	WIII	0.5G6/5, 7.3G9/2	Ring	7.55	2.94	1	–	–
Cobalt blue with white dots wound	97	WIII	1.6PB6/9, 2.9PB4/10, 2.8PB3/8, 7.8PB2/12, 2.5PB10/0	Ring	–	–	–	9	–
Round gilded	98	–	Gold	Sphere	4.20–8.88	3.76–8.49	264	–	–
Oval gilded	99	–	Gold	Oval	6.50–8.04	9.52–12.17	22	–	–
Ring gilded	100	–	Gold	Ring	2.71–4.25	1.27–2.61	46	–	–
Round incised gilded	101	–	Gold	Sphere	4.95–6.84	4.18–6.54	30	–	–
Oval spiral-incised gilded	102	–	Gold	Oval	6.75–8.07	9.29–12.55	26	–	–
Round dash incised gilded–Comb A	103	–	Gold	Sphere	8.22–8.43	7.11–7.47	5	–	–
Oval incised gilded–Comb A	104	–	Gold	Oval	5.22–8.0	9.25–11.34	11	–	–
Round incised gilded–Comb A	105	–	Gold	Sphere	5.17–6.33	5.08–5.36	6	–	–

APPENDIX 3—*(Continued)*

Description	AMNH type	Kidd & Kidd	Munsell code	Shape	Diameter (mm)	Length (mm)	Whole	Frag.	Facets
Oval incised gilded–Comb B	106	–	Gold	Oval	4.0–6.03	7.91–10.39	15	–	–
Round incised gilded–Comb B	107	–	Gold	Sphere	6.34–6.87	5.54–5.85	6	–	–
Tabular incised gilded double spacer	108	–	Gold	Tabular	12.01–12.64	9.41–10.0	6	–	–
Gilded crosses–A	109	–	–	Cross	12.90–20.77	10.91–13.23	5	–	–
Gilded crosses–B	110	–	–	Cross	18.12–20.77	9.61–13.0	2	9	–
Segmented purplish-blue	111	–	7.0PB 8/4, 6.9PB 3/4, 1.0 RP 6/1	Bilobed	2.60–3.50	7.1–9.0	3	1	–
Segmented purplish-blue	111	–	7.0PB 8/4, 6.9PB 3/4, 1.0 RP 6/1	Bilobed	3.51–4.75	5.35–7.0	3	13	–
Segmented purplish-blue	111	–	7.0PB 8/4, 6.9PB 3/4, 1.0 RP 6/1	Bilobed	3.51–4.75	7.10–9.0	14	–	–
Segmented purplish-blue	111	–	7.0PB 8/4, 6.9PB 3/4, 1.0 RP 6/1	Single lobed	2.60–3.50	2.51–4.50	–	1	–
Segmented purplish-blue	111	–	7.0PB 8/4, 6.9PB 3/4, 1.0 RP 6/1	Trilobed	3.51–4.75	>5.35	1	–	–
Segmented colorless with cinnabar	112	–	–	Fragments	–	–	–	50	–
Segmented colorless with cinnabar	112	–	–	Bilobed	3.51–4.75	5.35–7.0	58	111	–
Segmented colorless with cinnabar	112	–	–	Bilobed	3.51–4.75	7.10–9.0	99	–	–
Segmented colorless with cinnabar	112	–	–	Bilobed	3.51–4.75	9.10–11	12	–	–
Segmented colorless with cinnabar	112	–	–	Bilobed	4.76–7.99	–	–	2	–
Segmented colorless with cinnabar	112	–	–	Sphere	3.51–4.75	2.51–4.50	5	29	–
Segmented colorless with cinnabar	112	–	–	Sphere	4.76–7.99	7.10–9.0	12	6	–
Segmented colorless with cinnabar	112	–	–	Sphere	4.76–7.99	9.10–11.0	29	9	–
Segmented colorless with cinnabar	112	–	–	Sphere	4.76–7.99	11.10–13.0	4	–	–
Segmented colorless with cinnabar	112	–	–	Trilobed	3.51–4.75	9.10–11.0	2	9	–
Segmented colorless with cinnabar	112	–	–	Trilobed	3.51–4.75	>5.35	3	9	–
Segmented white to greenish-yellow	113	–	2.5PB10/0.2 to 9.5Y9/4, 9.0Y7/4	Bilobed	3.51–4.75	5.35–7.0	18	16	–
Segmented white to greenish-yellow	113	–	2.5PB10/0.2 to 9.5Y9/4, 9.0Y7/4	Bilobed	3.51–4.75	7.10–9.0	67	66	–

APPENDIX 3—*(Continued)*

Description	AMNH type	Kidd & Kidd	Munsell code	Shape	Diameter (mm)	Length (mm)	Whole	Frag.	Facets
Segmented white to greenish-yellow	113	–	2.5PB10/0.2 to 9.5Y9/4, 9.0Y7/4	Trilobed	3.51–4.75	11.1–13.0	1	1	–
Segmented faceted colorless with cinnabar	114	–	–	Sphere	8.0–14.99	9.10–11.0	2	–	15–18
Segmented faceted colorless with cinnabar	114	–	–	Sphere	8.0–14.99	11.10–13.0	3	–	15–18
Compound gold segments	115	–	–	Collared sphere	4.76–7.99	5.35–7.0	1	2	–
Segmented green	116	–	6.0G6/5, 6.3G5/5	Bilobed	3.51–4.75	–	–	3	–
Segmented green	117	–	5.8G4/9	Ring	<2.60	<2.51	7	–	–
Blown colorless	118	–	–	Sphere	4.76–7.99	5.35–7.0	4	13	–
Blown black with greenish yellow dots	119	–	N1/0, 9.5Y7/7	Sphere	9.50–11.20	8.80–11.70	12	1	–
Blown turquoise over grayish-yellow	120	–	4.5B7/5, 4.4Y7/4	Teardrop	13.62	15.79	1	4	–
Blown blue-green over grayish-yellow	120	–	4.4BG8/5–4.9BG7/5, 4.4Y7/4	Teardrop	14.90	14.07	1	6	–
Blown opaque white	121	–	2.5PB10/0	Sphere	3.51–4.75	2.51–4.50	14	7	–
Blown compound/ bluish gray exterior	122	–	4.9BG7/5, 8.9Y2/3, 4.5Y9/1	Oval	1.0–1.50	0.90–1.20	9	–	–
Molded faceted ruby red	123	–	5.0R4/15, 5.1R3/10	Sphere	8.0–14.99	5.35–7.0	2	–	9
Metal bead; copper	–	–	Copper	Collared sphere	4.20	5.20	1	–	–
Metal bead blank; iron	–	–	Iron	Ring	14.22	8.54	1	–	–
Metal bead; lead (hourglass perforation)	–	–	Lead	Subsphere	5.78	3.76	1	–	–
Metal bead blank; lead (dimpled, not drilled)	–	–	Lead	Subsphere	5.30	3.80	1	–	–
Jet faceted spherical	Variety 1	–	Black	Sphere	5.08–9.67	2.61–9.53	9	3	20–25
Jet pentagons	Variety 2	–	Black	Pentagon	3.51–7.99	<2.51–4.50	221	83	5–10
Jet faceted lozenge	Variety 3	–	Black	Lozenge	6.08–7.96	9.53–10.46	4	–	8
Jet faceted triple spacer	Variety 4	–	Black	Tabular	14.30–20.39	10.80–14.48	18	–	9–10
Jet pendant-leaf incised	Variety 5	–	Black	Oval	22.33	27.62	1	1	–

APPENDIX 3—*(Continued)*

Description	AMNH type	Kidd & Kidd	Munsell code	Shape	Diameter (mm)	Length (mm)	Whole	Frag.	Facets
Jet pendant–cross incised?	Variety 6	–	Black	Oval	22.16 (wide); 13.47 (thick)	27.02	1	–	–
Amber sphere	Variety 1	–	Amber	Sphere	17.14	15.85	1	–	–
Amber subsphere	Variety 1	–	Amber	Subsphere	27.0	18.50	1	–	–
Cut crystal	Variety 1	–	Crystal	Teardrop	–	15.50	1	–	6–12
Cut crystal	Variety 2	–	Crystal	Sphere	11.49–13.09	7.31–10.50	6	–	24–28
Carnelian	Variety 1	–	Carnelian	Subsphere	12.0	13.10	1	–	70
Carnelian	Variety 2	–	Carnelian	Irregular disc	4.51–5.35	8.0–14.99	3	–	–

APPENDIX 4. ATTRIBUTES OF ST. CATHERINES ISLAND SHELL BEADS

PETER FRANCIS, JR. AND LORANN S. A. PENDLETON

This appendix provides the attribute data for the St. Catherines Island shell beads. Some have been previously reported, and for the sake of completeness are included herein. Additionally, some of the previously reported beads reflect updated analyses.

Data are tabulated as follows:

The first column notes the catalog number of the specimen. When more than one specimen was found at a particular locale they are arbitrarily labeled a, b. c, etc.

Column 2 indicates the type of shell (univalve or bivalve) from which the bead was made. If nothing is entered, the shell could not be determined. If identification is based on a columella this is also noted.

Diameter and length follow in columns 3 and 4. When two numbers are entered (usually for diameters) it means the bead does not have a round profile. All measurements are in millimeters.

The Form column (column 5) lists the shape of the bead, using standard bead nomenclature (see Beck, 1928).

Column 6 describes the perforation. Most perforations are hourglass (sometimes called biconical) in shape, indicating that the bead was drilled from both sides with a tapered drill. When shell is drilled from only one side, the distal end usually breaks out; this is noted in the tables. “Off center” indicates that the perforation is not centered at the end of the bead. “Wobbly” indicates that the perforation is not concentric. This is an important point as it usually indicates a hand-held drill rather than a machine drill (like a bow drill). The measurements are for the apertures. When there is no measurement, it indicates that the aperture is less than 0.6 mm, the lower limit of the calipers that were used (and all Vernier-type calipers, it seems). When there are two measurements, both apertures were measured.

The seventh column is Description. This generally includes a description of the bead “side” and refers to the edges of the great majority of these beads, which are small short bicones or short cylinders (none are technically discs, though they might be referred to as such). The usual choices are “not ground,” “ground” and “ground, facets.” The addition of “facets” indicates that the grinding was not smooth. When a bead of some other shape is considered, the terms apply to the whole bead. Occasionally other notes are placed in this column.

Catalog no.	Shell type	Diameter	Length	Form	Perforation	Description
St. Simons Period (*N* = 8)						
St. Catherines Shell Ring (9Li231) (*N* = 4)						
28.5/1676	—	5.39	2.46	disc	biconical, wobbly, off-center	ground
28.5/3673	—	6.22	1.49	ring/disc	Biconical, 3.28 mm in diameter	ground; highly polished; very large perforation diameter
28.5/3799	—	7.77	3.62	disc	biconical, centered, straight	ground

APPENDIX 4—*(Continued)*

Catalog no.	Shell type	Diameter	Length	Form	Perforation	Description
28.6/1419	*Oliva* sp.	21.50	53.95	Spire lopped	spire removed, ground smooth	
McQueen Shell Ring (9Li1648) (*N* = 4)						
28.6/3167	*Busycon* sp.	9.8	2.5	disc	ground off	ground
28.6/3173	—	3.3	1.2	ring	ground off	ground
28.6/3174	*Busycon* sp.	9.6	2.9	disc	ground off	ground
28.6/3175	*Busycon* sp.	3.2	1.6	ring	ground off	ground
St. Catherines Period (*N* = 200)						
John's Mound (9Li8) (*N* = 200)						
28.0/0234[a] (27)	—	4.1-6.3	2.9-4.9	short barrel / short cylinder — many have wedge profile	biconical, wobbly, off center	ground, facets
28.0/0236[a]	—	4.5	4	short barrel, wedge profile	biconical, wobbly, off center	ground, facets
28.0/0238[a] (16)	—	4.5, 5.3	3.2, 5.4	short barrel / short cylinder	biconical, wobbly, off center	ground, facets
28.0/0238[a] (155)	—	4.3, 6.2	1.7, 5.3	short barrel / short cylinder	biconical, wobbly, off center	ground, facets—6 pairs and 1 triplet joined together
28.0/0239[a]	columella	10.6, 7.8	36.2	rectangular cylinder	biconical, wobbly 4.0, 3.4	ground, possibly a blank
Irene Period (*N* = 373)						
AMNH 445 (9Li197) (*N* = 1)						

APPENDIX 4—*(Continued)*

Catalog no.	Shell type	Diameter	Length	Form	Perforation	Description
28.0/1808[b]	—	25.5	3.0	Round pendant; gorget	—	—
Little Camel New Ground Field 4 (9Li205) ($N = 1$)						
28.0/2324[b]	bivalve	20.2, 24.5	8.7	pendant—hardly formed	biconical, wobbly, off center 3.2, 3.2	ground
AMNH 487 (9Li218) ($N = 1$)						
28.0/3212[b]	columella	14.1, 10.3	39.6	ellipsoidal barrel	biconical, wobbly, off center not drilled through	ground, facets
Little Camel New Ground Field 1 (9li202) ($N = 1$)						
28.0/2408[b]	bivalve	30.4, 19.2	3.3	waster with 5 open holes	not pierced, drilled with conical, hollow drill or punched	—
South End Mound I (9Li3) ($N = 333$)						
28.0/3203[c]	columella	10.8	15.7	irregular barrel	biconical, wobbly, off center 3.0, 3.1	ground, facets
28.0/3204[c]	columella	8.9	11.5	barrel	biconical, wobbly, off center 3.6, 3.1	ground, facets
28.0/4225[c]	columella	13.2, 11.3	16.2	ellipsoidal barrel	biconical 4.4, 4.4	ground, facets
28.0/4241[c]	columella	17.7, 14.1	33.7	barrel with whorl	biconical, wobbly 5.4, 4.4	ground, facets
28.0/6006.0001[c]	columella	20.1, 12.3	27.3	barrel with whorl	biconical, wobbly 5.3, 5.5	ground, facets
28.0/6006.0002[c]	—	5.6	2.1	—	—	—
28.3/2619	—	4.8	2.6	short barrel, wavy profile	biconical, wobbly, off center	ground, facets
28.3/2627a	columella	11.4, 8.5	19.4	elliptical barrel	biconical, wobbly, off center 4.0, 4.0	ground, facets

APPENDIX 4—*(Continued)*

Catalog no.	Shell type	Diameter	Length	Form	Perforation	Description
28.3/2627b	columella	15.9, 17.2	32.7	irregular barrel with large whorl	biconical, wobbly, off center, bent 4.8, 5.0	ground, facets
28.3/2627c	columella	12.5, 13.8	33.8	irregular barrel with groove	biconical, wobbly, off center 5.0, 4.8	ground, facets
28.3/2630a	columella	14.1, 12.4	25.7	irregular barrel	biconical, wobbly, off center 5.3, .8	ground, facets, broken at ends
28.3/2630b	columella	12.9, 10.6	20.0	irregular barrel	biconical, off center 4.4, 3.9	ground, facets
28.3/2630c	columella	13.4, 11.5	23.5	ellipsoidal barrel with whorl	biconical, wobbly, off center 5.0, 4.4	ground, facets
28.3/2630d	columella	13.7, 10.0	23.5	irregular barrel	biconical, wobbly, off center 4.7, 4.9	ground, facets
28.3/2633	columella	4.2	1.7	short cylinder	biconical, wobbly, off center	ground, facets
28.3/2634a	columella	11.8, 15.6	34.0	barrel with whorl	biconical, wobbly 5.4, 4.6	ground, facets
28.3/2634b	columella	7.9, 7.5	10.0	elliptical barrel	biconical, wobbly, off center 2.3, 2.4	ground, facets
28.3/2634c – hhhh (84)	—	2.6, 5.2	1.1, 3.4	Short cylinder	biconical, wobbly, off center	ground, facets, 2 broken
28.3/2655	—	10.9, 9.0	15.1	elliptical barrel	biconical, wobbly, off center 3.1, 2.6	ground, facets
28.3/2661a	—	4.5	2.5	short barrel, wedge profile	biconical, wobbly, off center	ground
28.3/2661b	—	6.2	2.9	short barrel, wedge profile	biconical, wobbly, off center	ground, facets
28.3/2661c	—	7.8, 6.4	2.8	disc blank	biconical, wobbly	not ground

APPENDIX 4—*(Continued)*

Catalog no.	Shell type	Diameter	Length	Form	Perforation	Description
28.3/2661d	—	6.6	3.3	short barrel	biconical, wobbly, off center	partly ground
28.3/2661e	—	7.4, 7.3	3.4	disc blank	biconical, wobbly	partly ground
28.3/2676a[d]	*Busycon* sp.	6.32	2.35	disc	—	—
28.3/2676b[d]	*Busycon* sp.	4.58	3.15	disc	—	—
28.3/2676c[d]	*Busycon* sp.	4.62	1.71	disc	—	—
28.3/2711.0001	—	5.5	2.9	short cylinder wedge profile	biconical, wobbly	ground
28.3/2711.0002	—	—	—	short cylinder	biconical, wobbly	fragments
28.3/2714	—	4.6	1.8	short cylinder, wedge profile	biconical, wobbly, off center	ground, facets
28.3/2719	columella	10.3, 9.6	11.9	irregular uneven bicone	biconical, wobbly, off center 3.8, 2.6	ground, facets
28.3/2724a	columella	11.2, 10.8	14.1	irregular barrel	biconical	ground, facets
28.3/2724b	columella	5.6	3.0	short barrel	biconical, wobbly, off center 1.6, 2.2	ground
28.3/2726a	columella	8.5, 7.6	12.7	irregular barrel	biconical, wobbly, off center 3.0, 3.6	ground, facets
28.3/2726b	—	5.4	2.0	short cylinder wedge profile	biconical, wobbly, off center	ground
28.3/2726c	columella	5.1	2.8	short barrel	biconical, wobbly, off center	ground
28.3/2726d	columella	5	2.8	short barrel, wedge profile	biconical, wobbly, off center	ground, facets
28.3/2726e	—	4.9	1.7	short cylinder, wedge profile	biconical, wobbly, off center	ground

APPENDIX 4—*(Continued)*

Catalog no.	Shell type	Diameter	Length	Form	Perforation	Description
28.3/2726f	—	5.5	3.7	short barrel, wedge profile	biconical, wobbly, off center	ground, facets
28.3/2726g	—	4.8	2.4	short barrel, wedge profile	biconical, wobbly, off center	ground, facets
28.3/2726h	—	5.1	2.5	short barrel, wedge profile	biconical, wobbly, off center	ground, facets
28.3/2726i	—	5.5	3.6	short barrel, wedge profile	biconical, wobbly, off center	ground, facets
28.3/2726j	columella	5.4	4.0	short cylinder, wedge profile	straight, off center	ground, facets
28.3/2726k	columella	5.2	2.3	short barrel, wedge profile	biconical, wobbly, off center	ground, facets
28.3/2726l	—	4.8	2.3	short cylinder, wedge profile	biconical, wobbly, off center	ground, facets
28.3/2726m	—	3.9	4.0	barrel, broken	biconical, wobbly, off center	ground
28.3/2732a[d]	*Busycon* sp.	7.72	4.07	disc	—	—
28.3/2732b[d]	*Busycon* sp.	4.32	2.34	disc	—	—
28.3/2747[d]	columella	19.11	32.58	—	—	—
28.3/2769[d]	columella	19.50	32.94	—	—	—
28.3/2775	—	—	—	—	—	—
28.3/2787[d]	columnella	4.78	10.54	—	—	—
28.3/9269	columnella	16.12	15.97	tear drop	ground off	ground
28.3/9270	*Busycon* sp.	3.60	1.67	ring	conical	ground

APPENDIX 4—*(Continued)*

Catalog no.	Shell type	Diameter	Length	Form	Perforation	Description
28.3/9271	*Busycon* sp.	4.54	2.20	disc	biconical	ground
28.3/9272	*Busycon* sp.	4.71	2.58	disc	biconical	ground
28.3/9273	—	—	—	—	—	—
28.3/9274	*Busycon* sp.	3.88	1.73	disc	biconical	ground
28.3/9275	—	2.39	1.13	ring	—	—
28.3/9276	*Busycon* sp.	4.60	2.78	disc	conical	ground
28.3/9277	—	4.75	2.43	disc	ground off	ground
28.3/9278	—	4.39	2.08	disc	ground off	ground
28.3/9279	*Mercenaria* sp.	4.23	2.74	ring	ground off	ground
28.3/9280	*Mercenaria* sp.?	4.57	2.21	ring	ground off	ground
28.3/9281	*Mercenaria* sp.?	3.94	1.92	ring	ground off	ground
28.3/9282	*Busycon* sp.	4.77	2.47	disc	biconical	ground
28.3/9283	*Busycon* sp.	4.95	2.15	disc	ground off	ground
28.3/9284	*Busycon* sp.	4.44	2.26	disc	biconical	ground
28.3/9285	—	3.47	1.46	ring	ground off	ground
28.3/9286	—	4.19	2.25	ring	ground off	ground
28.3/9287	*Busycon* sp.	2.87	1.43	ring	biconical	ground
28.3/9288	*Busycon* sp.	3.03	1.89	ring	ground off	ground
28.3/9289	—	2.80	0.92	ring	ground off	ground
28.3/9290	*Busycon* sp.	4.51	1.86	disc	ground off	ground
28.3/9291	*Busycon* sp.	3.80	1.64	disc	ground off	ground

APPENDIX 4—*(Continued)*

Catalog no.	Shell type	Diameter	Length	Form	Perforation	Description
28.3/9292	—	2.85	1.10	ring	ground off	ground
28.3/9293	*Busycon* sp.	4.01	1.51	disc	ground off	ground
28.3/9294	*Busycon* sp.	3.73	3.12	cylinder	ground off	ground
28.3/9295	*Busycon* sp.	4.51	2.11	ring	ground off	ground
28.3/9296	*Busycon* sp.	4.33	1.89	ring	ground off	ground
28.3/9297	*Busycon* sp.	4.38	2.03	ring	biconical	ground
28.3/9298	*Busycon* sp.	4.48	1.97	ring	biconical	ground
28.3/9299	—	4.19	1.94	disc	ground off	ground
28.3/9300	*Busycon* sp.	4.58	2.25	disc	biconical	ground
28.3/9301	*Busycon* sp.	4.49	2.17	ring	conical	ground
28.3/9302	*Busycon* sp.	3.85	1.92	square	ground off	ground
28.3/9303	*Busycon* sp.	4.23	1.81	ring	ground off	ground
28.3/9304	*Busycon* sp.	3.03	1.61	ring	conical	ground
28.3/9305	*Busycon* sp.	4.46	2.13	disc	biconical	ground
28.3/9306	*Busycon* sp.	4.61	1.92	disc	conical	ground
28.3/9307	*Busycon* sp.	4.07	0.96	disc	ground off	ground
28.3/9308	—	4.57	2.05	disc	conical	ground
28.3/9309	*Busycon* sp.	4.57	2.80	disc	biconical	ground
28.3/9310	—	4.10	1.77	disc	ground off	ground
28.3/9311	*Busycon* sp.	4.48	2.20	ring	biconical	ground
28.3/9312	*Busycon* sp.	4.37	1.82	disc	biconical	ground
28.3/9313	*Busycon* sp.	4.69	3.06	cylinder	biconical	ground

APPENDIX 4—*(Continued)*

Catalog no.	Shell type	Diameter	Length	Form	Perforation	Description
28.3/9314	*Busycon* sp.	4.60	1.57	disc	ground off	ground
28.3/9315	*Busycon* sp.	4.53	1.99	disc	biconical	ground
28.3/9316	*Busycon* sp.	2.56	1.16	ring	ground off	ground
28.3/9317	*Busycon* sp.	4.32	1.69	disc	biconical	ground
28.3/9318	*Busycon* sp.	4.73	2.26	ring	ground off	ground
28.3/9319	*Busycon* sp.	4.87	3.11	cylinder	conical	ground
28.3/9320	*Busycon* sp.	4.45	2.69	ring	biconical	ground
28.3/9321	*Busycon* sp.	4.31	2.07	disc	biconical	ground
28.3/9322	*Busycon* sp.	3.83	2.02	ring	biconical	ground
28.3/9323	*Busycon* sp.	4.39	3.24	cylinder	biconical	ground
28.3/9324	*Busycon* sp.	3.19	1.67	ring	ground off	ground
28.3/9325	*Busycon* sp.	4.37	1.59	disc	conical	ground
28.3/9326	*Busycon* sp.	4.61	1.96	disc	biconical	ground
28.3/9327	*Busycon* sp.	4.67	2.09	disc	conical	ground
28.3/9328	*Busycon* sp.	4.75	1.91	disc	conical	ground
28.3/9329	*Busycon* sp.	4.76	2.30	disc	biconical	ground
28.3/9330	*Busycon* sp.	4.25	2.20	ring	conical	ground
28.3/9331	*Busycon* sp.	5.07	1.86	disc	biconical	ground
28.3/9332	*Busycon* sp.	4.01	2.56	cylinder	ground off	ground
28.3/9333	*Busycon* sp.	4.57	2.41	disc	biconical	ground
28.3/9334	*Busycon* sp.	4.32	2.01	disc	biconical	ground

APPENDIX 4—*(Continued)*

Catalog no.	Shell type	Diameter	Length	Form	Perforation	Description
28.3/9335	*Busycon* sp.	4.80	1.99	disc	conical	ground
28.3/9336	*Busycon* sp.	4.78	2.05	disc	biconical	ground
28.3/9337	*Busycon* sp.	4.58	1.91	disc	ground off	ground
28.3/9338	—	4.68	1.51	disc	biconical	ground
28.3/9339	*Busycon* sp.	3.40	2.01	ring	ground off	ground
28.3/9340	*Busycon* sp.	3.73	2.01	ring	conical	ground
28.3/9341	*Busycon* sp.	3.85	2.17	disc	biconical	ground
28.3/9342	*Busycon* sp.	4.21	1.79	ring	biconical	ground
28.3/9343	*Busycon* sp.	4.25	1.97	ring	biconical	ground
28.3/9344	*Busycon* sp.	3.91	2.19	ring	biconical	ground
28.3/9345	—	—	—	—	—	—
28.3/9346	*Busycon* sp.	2.71	1.56	ring	ground off	ground
28.3/9347	*Busycon* sp.	4.23	2.74	ring	biconical	ground
28.3/9348	*Busycon* sp.	2.68	1.54	ring	biconical	ground
28.3/9349	*Busycon* sp.	5.38	2.36	ring	biconical	ground
28.3/9350	*Busycon* sp.	3.81	1.70	ring	ground off	ground
28.3/9351	*Busycon* sp.	4.43	2.23	disc	biconical	ground
28.3/9352	*Busycon* sp.	4.75	2.43	ring	biconical	ground
28.3/9353	*Busycon* sp.	4.78	1.49	disc	ground off	ground
28.3/9354	*Busycon* sp.	4.41	2.82	disc	biconical	ground
28.3/9355	*Busycon* sp.	4.25	2.80	square	biconical	ground

APPENDIX 4—*(Continued)*

Catalog no.	Shell type	Diameter	Length	Form	Perforation	Description
28.3/9356	*Busycon* sp.	2.47	4.22	broken cylinder	—	ground
28.3/9357	*Busycon* sp.	2.76	4.44	cylinder	—	ground
28.3/9358	*Busycon* sp.	5.17	2.51	disc	conical	ground
28.3/9359	*Busycon* sp.	4.19	2.39	square	biconical	ground
28.3/9360	*Busycon* sp.	2.93	3.37	cylinder	—	ground
28.3/9361	*Busycon* sp.	2.80	1.42	square	biconical	ground
28.3/9362	*Busycon* sp.	4.05	2.63	square	biconical	ground
28.3/9363	*Busycon* sp.	2.96	1.44	ring	—	ground
28.3/9364	*Busycon* sp.	4.27	2.15	ring	biconical	ground
28.3/9365	*Busycon* sp.	4.05	1.89	disc	conical	ground
28.3/9366	*Busycon* sp.	3.61	2.35	ring	biconical	ground
28.3/9367	*Busycon* sp.	4.18	2.22	ring	biconical	ground
28.3/9368	*Busycon* sp.	4.23	1.45	disc	biconical	ground
28.3/9369	*Busycon* sp.	4.73	1.77	disc	ground off	ground
28.3/9370	*Busycon* sp.	2.78	1.59	ring	ground off	ground
28.3/9371	*Busycon* sp.	4.37	2.40	ring	biconical	ground
28.3/9372	*Busycon* sp.	4.45	2.08	ring	conical	ground
28.3/9373	—	4.60	1.30	disc	ground off	ground
28.3/9374	*Busycon* sp.	3.96	1.93	disc	biconical	ground
28.3/9375	*Busycon* sp.	4.52	1.85	ring	biconical	ground

APPENDIX 4—(*Continued*)

Catalog no.	Shell type	Diameter	Length	Form	Perforation	Description
28.3/9376	*Busycon* sp.	4.53	2.13	disc	biconical	ground
28.3/9377	*Busycon* sp.	3.44	2.07	ring	biconical	ground
28.3/9378	*Busycon* sp.	4.05	2.05	ring	biconical	ground
28.3/9379	*Busycon* sp.	4.72	2.55	ring	ground off	ground
28.3/9380	—	4.65	3.22	disc	biconical	ground
28.3/9381	*Busycon* sp.	4.43	2.15	ring	conical	ground
28.3/9382	*Busycon* sp.	4.84	2.31	disc	biconical	ground
28.3/9383	*Busycon* sp.	4.26	2.88	square	biconical	ground
28.3/9384	*Busycon* sp.	4.68	2.03	disc	ground off	ground
28.3/9385	*Busycon* sp.	4.99	2.60	disc	biconical	ground
28.3/9386	*Busycon* sp.	4.63	2.36	ring	conical	ground
28.3/9387	*Busycon* sp.	4.19	2.63	square	biconical	ground
28.3/9388	*Busycon* sp.	4.65	2.20	ring	ground off	ground
28.3/9389	*Busycon* sp.	4.61	2.45	disc	conical	ground
28.3/9390	*Busycon* sp.	4.73	2.26	disc	conical	ground
28.3/9391	*Busycon* sp.	4.50	2.23	disc	ground off	ground
28.3/9392	*Busycon* sp.	4.57	2.23	disc	biconical	ground
28.3/9393	*Busycon* sp.	4.21	1.64	ring	biconical	ground
28.3/9394	*Busycon* sp.	4.66	2.76	disc	biconical	ground
28.3/9395	*Busycon* sp.	4.83	2.15	disc	ground off	ground
28.3/9396	*Busycon* sp.	4.69	1.92	ring	conical	ground

APPENDIX 4—*(Continued)*

Catalog no.	Shell type	Diameter	Length	Form	Perforation	Description
28.3/9397	*Busycon* sp.	4.87	2.38	ring	biconical	ground
28.3/9398	*Busycon* sp.	4.84	2.15	ring	conical	ground
28.3/9399	*Busycon* sp.	4.16	2.33	ring	conical	ground
28.3/9400	*Busycon* sp.	2.61	1.43	ring	conical	ground
28.3/9401	*Busycon* sp.	3.78	2.18	ring	biconical	ground
28.3/9402	*Busycon* sp.	3.84	2.48	ring	biconical	ground
28.3/9403	*Busycon* sp.	4.82	2.97	disc	biconical	ground
28.3/9404	*Busycon* sp.	4.22	2.68	ring	biconical	ground
28.3/9405	*Busycon* sp.	5.01	2.16	ring	ground off	ground
28.3/9406	*Busycon* sp.	5.18	2.84	disc	conical	ground
28.3/9407a	*Busycon* sp.	2.45	1.29	ring	—	ground
28.3/9407b	*Busycon* sp.	2.79	1.47	ring	biconical	ground
28.3/9408	*Busycon* sp.	2.64	4.55	cylinder	biconical	ground
28.3/9409	*Busycon* sp.	4.87	1.81	disc	ground off	ground
28.3/9410	*Busycon* sp.	4.33	2.22	ring	conical	ground
28.3/9411	*Busycon* sp.	2.75	1.66	ring	conical	ground
28.3/9412	*Busycon* sp.	2.71	1.77	ring	ground off	ground
28.3/9413	—	5.15	1.66	disc	ground off	ground
28.3/9414	*Busycon* sp.	2.47	1.30	ring	biconical	ground
28.3/9415	*Busycon* sp.	4.27	2.71	disc	biconical	ground

APPENDIX 4—*(Continued)*

Catalog no.	Shell type	Diameter	Length	Form	Perforation	Description
28.3/9416	*Busycon* sp.	4.62	2.23	disc	biconical	ground
28.3/9417	*Busycon* sp.	4.31	2.38	ring	—	ground
28.3/9418	*Busycon* sp.	3.77	1.38	ring	biconical	ground
28.3/9419	*Busycon* sp.	4.18	1.92	ring	biconical	ground
28.3/9420	*Busycon* sp.	3.70	3.12	disc	—	ground
28.3/9421	*Busycon* sp.	4.22	2.18	ring	ground off	ground
28.3/9422	*Busycon* sp.	4.62	2.95	disc	ground off	ground
28.3/9423	*Busycon* sp.	4.68	2.01	disc	biconical	ground
28.3/9424	*Busycon* sp.	4.29	2.12	ring	biconical	ground
28.3/9425	*Busycon* sp.	4.17	2.53	disc	biconical	ground
28.3/9426	*Busycon* sp.	2.52	3.48	cylinder	biconical	ground
28.3/9427	*Busycon* sp.	4.77	2.16	ring	biconical	ground
28.3/9428	*Busycon* sp.	2.31	4.77	cylinder	biconical	ground
28.3/9429	*Busycon* sp.	4.85	2.59	disc	ground off	ground
28.3/9430	*Busycon* sp.	3.04	4.65	cylinder	biconical	ground
28.3/9431	*Busycon* sp.	2.64	1.64	ring	biconical	ground
28.3/9432	*Busycon* sp.	4.21	2.17	ring	conical	ground
28.3/9433	*Busycon* sp.	3.94	2.43	ring	biconical	ground
28.3/9434	*Busycon* sp.	4.76	2.43	disc	biconical	ground
28.3/9435	*Busycon* sp.	4.46	2.10	disc	biconical	ground
28.3/9436	*Busycon* sp.	4.61	2.10	ring	biconical	ground

APPENDIX 4—*(Continued)*

Catalog no.	Shell type	Diameter	Length	Form	Perforation	Description
28.3/9437	*Busycon* sp.	4.56	2.31	disc	conical	ground
28.3/9438	—	4.57	1.65	disc	ground off	ground
28.3/9439	*Busycon* sp.	4.99	2.38	disc	ground off	ground
28.3/9440	*Busycon* sp.	4.26	1.89	ring	conical	ground
28.3/9441	*Busycon* sp.	2.86	1.70	ring	biconical	ground
28.3/9442	*Busycon* sp.	4.52	1.95	ring	ground off	ground
28.3/9443	*Busycon* sp.	4.70	2.31	disc	ground off	ground
28.3/9444	*Busycon* sp.	4.75	2.22	disc	biconical	ground
28.3/9445	*Busycon* sp.	3.89	1.63	ring	biconical	ground
28.3/9446	*Busycon* sp.	4.70	1.98	ring	biconical	ground
28.3/9447	*Busycon* sp.	4.33	2.39	ring	conical	ground
28.3/9448	*Busycon* sp.	4.27	2.24	ring	biconical	ground
28.3/9449	*Busycon* sp.	4.69	2.40	disc	biconical	ground
28.3/9450	*Busycon* sp.	2.71	1.47	ring	conical	ground
28.3/9451	*Busycon* sp.	5.19	2.91	ring	biconical	ground
28.3/9452	*Busycon* sp.	2.84	1.63	ring	conical	ground
28.3/9453	*Busycon* sp.	2.77	3.02	cylinder	biconical	ground
28.3/9454	*Busycon* sp.	4.92	1.90	disc	biconical	ground
28.3/9455	*Busycon* sp.	4.91	1.94	disc	ground off	ground
28.3/9456	*Busycon* sp.	5.03	2.14	disc	ground off	ground
28.3/9457	*Busycon* sp.	4.40	2.28	ring	ground off	ground

APPENDIX 4—*(Continued)*

Catalog no.	Shell type	Diameter	Length	Form	Perforation	Description
28.3/9458	*Busycon* sp.	4.87	2.48	ring	ground off	ground
28.3/9459	*Busycon* sp.	2.71	4.21	cylinder	biconical	ground
28.3/9460	*Busycon* sp.	4.44	2.64	disc	biconical	ground
28.3/9461	*Busycon* sp.	4.22	2.03	ring	biconical	ground
28.3/9462	*Busycon* sp.	4.98	1.80	disc	biconical	ground
28.3/9463	*Busycon* sp.	4.12	1.99	ring	conical	ground
28.3/9464	*Busycon* sp.	3.90	2.02	ring	conical	ground
28.3/9465	*Busycon* sp.	2.35	2.62	cylinder	biconical	ground
Back Creek Village (9Li207) (*N* = 28)						
28.2/8347	—	5.5	8.4	cylinder with round ends	biconical, wobbly, off center	ground, facets
28.6/2810	*Busycon* sp.	5.3	8.6	squared cylinder	conical	ground; string wear
28.6/2811	*Busycon* sp.	7.3	5.5	squared round	biconical	ground, 4 facets
28.6/2812	*Busycon* sp.?	2.8	5.4	tube	biconical	ground
28.6/2813	*Mercenaria* sp.	5.3	2.2	disc	biconical	ground
28.6/2814	*Mercenaria* sp.	5.0	2.2	disc	ground off	ground
28.6/2815	*Busycon* sp.	9.4	3.9	disc	biconical	ground
28.6/2816	*Busycon* sp.	3.5	2.1	disc	biconical	ground
28.6/2817	*Busycon* sp.	4.4	6.9	cylinder	ground off	ground, 4 facets
28.6/2818	*Mercenaria* sp.	18.4	7.1	oblong disc	biconical	ground
28.6/2819	*Crassostrea virginica*	17.9	6.1	oblong disc	conical	ground

APPENDIX 4—*(Continued)*

Catalog no.	Shell type	Diameter	Length	Form	Perforation	Description
28.6/2820	*Busycon* sp.	3.3	1.8	ring	biconical	ground
28.6/2821	*Busycon* sp.	3.3	1.9	ring	biconical	ground
28.6/2822	—	3.5	1.5	ring	biconical	ground
28.6/2823	—	3.6	1.4	ring	biconical	ground
28.6/2824	*Crassostrea virginica*	14.8	3.9	disc	conical	ground
28.6/2825	*Busycon* sp.	5.3	3.8	disc	ground off	ground
28.6/2826	*Busycon* sp.	5.6	2.8	disc	biconical	ground
28.6/2827	—	10.4	3.2	disc	biconical	lightly ground
28.6/2828	*Crassostrea virginica*	10.0	3.6	disc	biconical	ground
28.6/2829	*Busycon* sp.	7.3	4.8	disc	biconical	ground
28.6/2830	*Busycon* sp.	6.5	2.8	disc	biconical	not ground
28.6/2831	*Mercenaria* sp.	4.5	2.3	disc	ground off	ground
26.6/2832	—	3.0	1.5	ring	ground off	ground
26.6/2833	—	4.1	1.5	ring	conical	burned, ground
28.6/2834	—	4.3	1.3	ring	conical	squarish, ground
28.6/2835	*Busycon* sp.	3.4	1.3	ring	biconical	ground
28.6/2836	*Crassostrea virginica*	15.5	4.8	rectangle	conical	ground
Meeting House Field (9Li21) (*N* = 8)						
28.3/4593[b]	bivalve	20.2, 19.3	7.0	rough blank	biconical, very wobbly	not ground
28.3/4594[b]	bivalve	16.7, 11.0	3.0	rough blank	biconical, broken while drilling--	not ground

APPENDIX 4—*(Continued)*

Catalog no.	Shell type	Diameter	Length	Form	Perforation	Description
28.3/4595[b]	—	4.4	2.7	short barrel, wedge profile	biconical, wobbly, off center	ground
28.3/4596[b]	—	5.2	2.0	short bicone	biconical, wobbly, off center	ground
28.6/3168	*Busycon* sp.?	3.5	1.4	ring	ground off	ground
28.6/3169	*Busycon* sp.?	3.2	1.6	ring	ground off	ground
28.6/3170	*Busycon* sp.?	3.3	2.2	ring	ground off	ground
28.6/3171	*Busycon* sp.?	3.9	1.7	ring	ground off	ground
TOTAL						
MISSION SANTA CATALINA DE GUALE (9Li274) The Church and Cemetery (Structure 1) (*N* = 36)						
28.1/5388	—	6.5	3.9	short cylinder	biconical, wobbly, off center	edge ground
28.1/5549	—	5.7	3.0	short cylinder blank	biconical, wobbly, off center	not ground on edge
28.1/5640	—	3.9	4.0	barrel	biconical	edge faceted, not circular
28.2/5301	—	7.7	6.4	short cylinder wedge profile	biconical	ground, facets
INDIVIDUAL 318						
28.0/9056a	*Busycon* sp.	6.7	10.3	barrel		burnt
28.0/9056b	—	6.0	9.9	barrel	straight	burnt
28.0/9056c	—	—	—	barrel	straight	burnt, fragments
28.0/9056d	—	6.8	11.6	barrel	—	burnt

APPENDIX 4—*(Continued)*

Catalog no.	Shell type	Diameter	Length	Form	Perforation	Description
28.0/9056e	—	6.5	11.2	barrel	—	burnt
28.0/9056f	*Busycon* sp.	5.4	7.6	barrel	—	burnt
28.0/9056g	—	5.7	7.6	barrel	—	burnt
28.0/9056h	—	—	—	—	—	fragments, burnt
INDIVIDUALS 348, 349, AND 350						
28.1/3876	*Busycon* sp.	5.8	9.7	barrel	biconical , blunt bit	fragments of 8
28.1/3877	—	—	—	—	—	fragments only
28.1/4068a	—	5.7	5.3	short barrel	—	corroded
28.1/4068b	—	5.1	7.2	barrel	slight taper	fragment
28.1/8754	*Busycon* sp.	4.4	6.5	hex bar	straight 1.8	poorly ground
INDIVIDUAL 208						
28.1/6803b	—	1.9	2.3	slight pear	—	
INDIVIDUAL 260						
28.1/7660	—	7.4	6.6	knobbed oblate	—	—
INDIVIDUAL 65						
28.1/9880 (5)	—	7.5	—	oblates	—	5 fused together
28.1/9881a	—	7.0	5.8	oblate	—	burnt
28.1/9881b	—	7.5	6.1	oblate	—	burnt
28.1/9881c (3)	—	7.7	7.6	oblates	—	3 fused together
The *Atrio* ($N = 38$)						

APPENDIX 4—*(Continued)*

Catalog no.	Shell type	Diameter	Length	Form	Perforation	Description
28.1/5609	—	8.6	4.2	short cylinder	biconical, wobbly	edge tapered, faceted not circular
28.1/5646a	—	6.6	1.5	disc blank	conical	not ground
28.1/5646b	—	6.5	2.2	short cylinder	slight biconical	ground on edge
28.1/5660a	—	4.6	4.1	short barrel	biconical, wobbly, off center	ground on edge
28.1/5660b	—	3.3	2.0	short cylinder	biconical	edge ground, not circular
28.1/5706a	—	5.7	3.8	short truncated uneven bicone	biconical, off center	edge ground; well made
28.1/5706b	—	3.8	2.0	short truncated bicone	biconical, off center	edge ground
28.1/5706c	—	5.2	2.9	truncated cone	biconical, off center	edge ground facets
28.2/3886	—	2.9	2.4	short cylinder	biconical	ground one end nacreous
28.2/3998	—	10.7	4.3	short irregular cylinder	biconical, off center, blue in perforation	ground large facets
28.2/4008a	bivalve	6.0	2.2	short cylinder blank	off center	not ground
28.2/4008b	—	4.0	4.1	cylinder	biconical, wobbly	ground
28.2/4771a	—	4.0	3.0	short barrel	biconical	ground
28.2/4771b	—	2.8	1.0	short cylinder blank	conical	not ground
28.2/4784a	—	8.5	5.0	wedge short cylinder blank	biconical	not ground
28.2/4784b	—	3.3	2.1	short cylinder	—	ground
28.2/4819	—	5.8	3.7	irregular short cylinder	biconical, wobbly	ground facets

APPENDIX 4—*(Continued)*

Catalog no.	Shell type	Diameter	Length	Form	Perforation	Description
28.2/4929	—	4.7	4.7	short cylinder	biconical, wobbly	ground
28.2/4935	—	4.6	2.2	short cylinder blank	biconical, wobbly	not ground
28.2/5054	—	4.6	3.2	uneven short truncated bicone	biconical	ground, facets
28.2/5060	—	3.8	2.0	short cylinder	biconical, wobbly, off center	ground, facets
28.2/5112	—	6.3	3.8	short tapered cylinder	biconical, wobbly	ground
28.2/5332	—	6.2	3.8	short barrel wedge profile	biconical	ground, facets
28.2/5738	—	5.7	3.3	irregular short cylinder	biconical, wobbly off center	ground, facets
28.2/9772	—	3.2	2.5	short barrel	biconical	ground
28.2/9778	—	4.6	1.8	short cylinder	biconical, wobbly off center	ground, facets
28.2/9779a	—	5.5	3.4	short cylinder	dirt	ground, facets
28.2/9779b	—	6.4	2.7	elliptical short cylinder	biconical, wobbly off center	ground, facets
28.2/9817	—	5.1	3.3	short cylinder	biconical	ground, facets
28.2/9833a	—	5.6	2.9	ellipsoidal short cylinder	biconical, wobbly off center	ground, facets
28.2/9833b	—	7.7	2.6	short cylinder	biconical, wobbly off center	ground, facets
28.2/9840	—	3.4	3.6	barrel wedge profile	biconical, wobbly	ground, facets
28.2/9850	—	4.8	4.0	short barrel	biconical	ground, facets
28.3/0004	—	6.6	3.9	short cylinder	biconical, wobbly off center	ground, facets

APPENDIX 4—*(Continued)*

Catalog no.	Shell type	Diameter	Length	Form	Perforation	Description
28.3/0030	—	9.5	7.2	short cylinder blank	biconical	not ground
28.3/0054	—	7.1	6.2	ellipsoidal barrel	biconical, wobbly	ground
28.3/0115	—	3.5	1.2	disc	conical	ground, well made
28.3/0133	—	4.4	1.6	disc	conical, wobbly	ground, facets
The *Cocina* (Structure 2) (N = 28)						
28.1/9999	—	5.6	3.0	short cylinder	biconical, wobbly, off center	ground, facets
28.2/0341	—	7.5	4.7	suboblate	biconical, wobbly, off center	ground
28.2/0379	—	4.5	3.8	ellipsoidal short cylinder	biconical, wobbly, off center	ground, facets, nacreous--
28.2/0393a	—	6.3	3.3	short cylinder	biconical, wobbly, off center	ground, facets, nacreous--
28.2/0393b	—	6.2	3.4	short cylinder	biconical, wobbly, off center	ground--
28.2/0400a	*Busycon* sp.	6.7	5.0	short cylinder, wedge profile	biconical, wobbly, off center	ground
28.2/0400b	—	6.2	4.0	short cylinder	biconical, wobbly, off center	ground
28.2/0400c	—	6.8	4.0	short cylinder blank	biconical, wobbly, off center	not ground
28.2/0400d	—	7.4	3.2	short cylinder	conical	ground, facets
28.2/0400e	—	5.8	3.2	short cylinder blank	biconical	not ground
28.2/0400f	—	6.4	4.9	short barrel	biconical, wobbly, off center	ground

APPENDIX 4—*(Continued)*

Catalog no.	Shell type	Diameter	Length	Form	Perforation	Description
28.2/0400g	—	4.7	4.4	short cylinder wedge profile	biconical	ground
28.2/0400h	—	4.8	2.1	short cylinder wedge profile	conical	ground, broken
28.2/0400i	—	4.9	3.1	short cylinder	biconical, wobbly, off center	ground, facets
28.2/0400j	—	4.5	1.8	short cylinder	straight, off center	ground, facets
28.2/0400k	—	4.1	1.8	very short barrel	biconical, wobbly	ground
28.2/04001(L)	—	5.4	3.6	short cylinder blank	biconical, wobbly, off center	not ground
28.2/0406a	—	5.2	4.5	short barrel	biconical, off center	ground
28.2/0406b	—	—	—	—	—	fragments
28.2/0409a	—	4.4	2.5	short cylinder	biconical, wobbly	ground, facets
28.2/0409b	—	4.4	2.8	short cylinder blank	conical	partly ground
28.2/0599	—	4.1	2.3	short cylinder	biconical, wobbly	ground, facets
28.2/0913	—	3.0	1.5	square short cylinder	biconical, wobbly, off center	ground, facets or partly ground blank
28.2/1017	—	5.4	1.9	short cylinder blank	biconical, wobbly, off center	partly ground
28.2/1103	—	—	2.8	short cylinder	biconical	ground, facets, fragment
28.2/5125	—	5.8	0.8	short cylinder blank	biconical, wobbly	not ground
28.3/0300	—	—	—	—	—	fragments only
28.3/0345	—	6.9	4.0	short barrel, wavy profile	biconical, wobbly, off center	ground, facets

APPENDIX 4—*(Continued)*

Catalog no.	Shell type	Diameter	Length	Form	Perforation	Description
The Well II (Structure 2/4; FS(2/4)513) (*N* = 2)						
28.1/8275	—	11.1	2.0	disc blank	conical, wobbly	not ground; other perf attempts
28.1/9279	—	5.1	3.9	short cylinder	biconical, wobbly, off center	ground, facets
Western Bastion (*N* = 14)						
28.1/1696	—	6.5	3.5	elliptical short barrel	biconical, wobbly	ground
28.1/5521	—	8.5	4.0	ellipsoidal short cylinder	biconical, off center	ground, facets
28.1/5532a	—	4.9	1.6	short cylinder blank	biconical, off center	partly ground
28.1/5532b	—	8.2	5.0	ellipsoidal short cylinder, wedge profile	biconical	ground, facets
28.1/5532c	—	5.2	2.3	crude short cylinder	conical, wobbly	ground, facets
28.1/5666a	—	8.6	5.4	short cylinder wedge profile	biconical, wobbly, off center	ground, facets
28.1/5666b	—	9.0	3.3	short cylinder blank--	biconical	not ground or broken
28.1/5666c	—	6.3	3.0	triangular short cylinder	biconical, wobbly, off center	ground, facets
28.1/5666d	—	5.6	3.4	short cylinder wedge profile	biconical, wobbly, off center	ground, facets
28.1/5674	—	5.2	2.1	short cylinder	biconical	ground, half bead
28.1/5733	—	7.9	3.9	ellipsoidal short cylinder	biconical	ground, facets
28.1/5737	—	4.9	2.7	short cylinder blank	biconical, wobbly, off center	partly ground
28.2/3595	—	8.4	7.8	short cylinder wedge profile	biconical, wobbly, off center	ground, facets
28.2/7310	—	8.3	4.4	short cylinder	biconical, off center	ground, facets

APPENDIX 4—*(Continued)*

Catalog no.	Shell type	Diameter	Length	Form	Perforation	Description
Mission West ($N = 33$)						
28.1/4775a	—	4.7	1.5	disc	biconical, wobbly off center	edge partly ground
28.1/4775b	—	5.0	3.4	short cylinder	off center, biconical	edge ground; side tapered
28.1/4780a	—	4.1	2.0	disc	biconical 1.5	edge ground, not circular
28.1/4780b	—	4.0	2.8	short barrel	biconical, wobbly	edge ground
28.1/5476	—	4.9	2.4	short cylinder	biconical, wobbly, off center	edge ground
28.1/5645	—	4.4	2.1	short cylinder blank	biconical, off center	edge not ground
28.1/5697	—	4.4	1.9	short cylinder	biconical, wobbly, off center	edge ground
28.1/5702a	—	8.8	5.8	truncated cone wedge profile	biconical, wobbly, off center	ground
28.1/5702b	*Busycon* sp.	6.4	2.4	short cylinder	biconical, wobbly, off center	ground, facets
28.1/5741	—	7.1	2.1	disc blank	conical, wobbly	not ground, worn
28.1/7132a	bivalve	6.8	3.9	short cylinder	biconical	not ground
28.1/7132b	—	5.8	2.6	short truncated bicone	dirt	ground, facets
28.1/7132c	—	5.1	1.7	square short cylinder	conical	ground, facets
28.1/7132d	—	3.3	2.8	short barrel	dirt	ground
28.1/7135a	—	6.3	3.5	short cylinder	very biconical	ground, facets
28.1/7135b	—	4.9	1.8	ellipsoidal short cylinder	dirt, off center	ground
28.1/7203	—	5.1	2.0	short cylinder blank	conical, off center	not ground

APPENDIX 4—*(Continued)*

Catalog no.	Shell type	Diameter	Length	Form	Perforation	Description
28.1/7728a	*Busycon* sp.	7.5	3.8	short cylinder blank	biconical, off center	not ground
28.1/7728b	—	3.8	2.7	short cylinder	biconical	ground; in 2 pieces
28.2/3825	bivalve	6.6	3.7	short cylinder	biconical, off center	ground, facets
28.2/3975	—	5.2	2.4	ellipsoidal short cylinder	biconical, wobbly	ground unevenly
28.2/3986	—	4.9	2.3	short cylinder	conical, split out	ground
28.2/3990	—	4.0	2.2	short cylinder	biconical off center	ground
28.2/3993	—	3.8	2.1	short cylinder	biconical of center	ground one end nacreous
28.2/4013	—	6.0	1.8	disc blank	biconical, wobbly	not ground, worn
28.2/4018	—	6.8	3.4	short truncated bicone	biconical, wobbly	ground
28.2/4806	—	5.5	2.5	short cylinder	biconical	ground
28.2/9824	—	5.8	4.4	short barrel wedge profile	biconical, wobbly	ground
28.2/9830a	—	5.4	3.4	short barrel	biconical	ground
28.2/9830b	—	3.5	3.0	short truncated bicone	biconical	ground
28.2/9874	—	3.5	2.9	short barrel	biconical, wobbly	ground
28.2/9891a	—	4.0	3.0	short barrel	biconical, wobbly off center	ground
28.2/9891b	—	5.1	2.7	short cylinder	biconical, wobbly off center	partly ground
THE *PUEBLO* (*N* = 119) **The *Pueblo* North (*N* = 68)**						
Structure 5 (*N* = 51)						
28.2/7899	—	11.8	9.2	suboblate wedge profile	biconical, wobbly	ground

APPENDIX 4—*(Continued)*

Catalog no.	Shell type	Diameter	Length	Form	Perforation	Description
28.2/8623	—	4.8	3.0	short cylinder	biconical off center 1.4, 1.4	ground, facets
28.2/8636a	—	7.0	3.6	short cylinder	biconical, off center 2.1, 1.7	ground, facets
28.2/8636b	—	5.1	4.7	squarish short cylinder wedge profile	biconical 1.3, 1.2	ground, facets
28.2/8645	—	7.2	4.2	short cylinder wedge profile	biconical, wobbly off center 2.2, 1.7	ground, facets
28.2/8652	—	5.6	3.1	subtriangular short cylinder	biconical, wobbly, off center 1.3, 1.4	ground, facets
28.2/8765a	—	6.5	4.3	short barrel wedge profile	biconical, wobbly, off center 1.4, 1.6	ground
28.2/8765b	—	4.6	3.2	short barrel wedge profile	biconical, wobbly, off center 1.4, 1.2	ground, facets
28.2/8844	—	—	—	—	—	fragments
28.2/8848	—	4.9	2.9	short barrel	biconical, wobbly	ground, facets
28.2/8856a	—	6.0	3.0	short cylinder, slightly conical	biconical, wobbly 1.7, 1.3	ground
28.2/8856b	—	6.4	6.6	barrel wedge profile	biconical, wobbly 1.9, 1.7	ground, facets
28.2/8856c	—	6.6	2.7	short cylinder	conical	ground, facets
28.2/8866a	—	6.3	2.5	short cylinder wedge profile	conical 1.2, 1.0	ground
28.2/8866b	—	5.2	2.8	short barrel	biconical, wobbly	ground, facets
28.2/8902	—	5.3	2.3	short cylinder	biconical, wobbly 1.6, 1.4	ground

APPENDIX 4—*(Continued)*

Catalog no.	Shell type	Diameter	Length	Form	Perforation	Description
28.2/8950	—	8.8	6.2	short cylinder wedge profile	biconical, off center	ground, facets
28.2/8962a	—	4.4	2.4	short cylinder	biconical, wobbly 1.3, 1.0	ground, facets
28.2/8962b	—	3.3	2.1	short truncated bicone	biconical	ground
28.2/8972	—	4.3	2.8	short cylinder wedge profile	biconical 1.4, 1.4	ground, facets
28.2/9002	*Busycon* sp.	11.3	5.9	short cylinder wavy profile	biconical, wobbly 1.9, 1.8	ground, facets
28.2/9040	—	6.4	3.8	short cylinder wedge profile	biconical, off center 1.7, 1.6	ground, facets
28.2/9122a	—	6.7	2.9	short barrel wedge profile	biconical	ground
28.2/9122b	—	8.1	7.0	short cylinder wedge profile	biconical, wobbly off center 2.1, 2.0	ground, facets
28.2/9122c	—	3.0	2.1	short cylinder	biconical, wobbly off center 1.7, 1.4	ground, facets
28.2/9148	—	6.4	3.3	short cylinder blank	biconical off center 1.7, 1.5	partly ground or broken
28.2/9154	—	—	—	—	—	fragments only
28.2/9188a	—	9.5	5.9	uneven bicone	biconical 1.8, 1.7	ground, facets
28.2/9188b	—	7.4	4.0	ellipsoidal short cylinder	biconical, wobbly, off center 1.9, 1.8	ground, facets
28.2/9188c	—	3.1	1.6	short cylinder	biconical, wobbly off center	ground, facets
28.2/9226a	—	5.6	4.2	short cylinder wedge profile	biconical, off center	ground, facets
28.2/9226b	—	4.1	2.7	short barrel wedge profile	biconical, off center	ground, facets

APPENDIX 4—*(Continued)*

Catalog no.	Shell type	Diameter	Length	Form	Perforation	Description
28.2/9226c	—	4.3	3.4	short cylinder	biconical 1.6, 1.4	ground
28.3/2214	—	4.1	2.6	short barrel	biconical 1.1, 1.2	ground
28.3/2248	—	3.9	2.4	conical short cylinder	biconical	ground, facets
28.3/2299a	*Busycon* sp.	10.0	6.2		large	ground, fragment
28.3/2299b	—	4.9	2.6	short cylinder wedge profile	biconical, off center	ground, facets
28.3/3189	—	3.4	1.2	short cylinder	conical	ground, split crosswise
28.3/3198	—	7.0	3.9	short barrel wedge profile	biconical, wobbly off center 2.1, 1.7	ground, facets
28.3/3215	—	8.4	4.2	short barrel wedge profile	biconical, wobbly, off center 2.8, 2.7	ground, facets
28.3/3449	—	3.2	2.5	short cylinder	biconical, wobbly	ground, facets
28.3/3450	—	3.3	2.3	short cylinder	biconical, wobbly off center	ground, facets
28.3/3452	—	5.8	3.8	short cylinder wedge profile	biconical, wobbly off center	ground, facets
28.3/3453a	—	3.1	2.6	barrel	biconical, wobbly	ground
28.3/3453b	—	—	—	—	—	fragment only
28.3/4271	—	5.4	1.5	short cylinder blank	conical, wobbly	not ground
28.3/5123	—	3.3	2.4	short cylinder	biconical, wobbly	ground, facets
28.3/5175a	—	5.1	2.6	short barrel	biconical, wobbly	ground, facets
28.3/5175b	—	—	—	—	—	fragment, bead
28.3/5216	—	5.5	3.6	irregular short cylinder	biconical, wobbly 1.5, 1.2	ground, maybe not finished

APPENDIX 4—*(Continued)*

Catalog no.	Shell type	Diameter	Length	Form	Perforation	Description
28.3/6128	—	6.6	4.0	triangular short cylinder	biconical, wobbly, off center 1.8, 1.5	ground, facets
AMNH 680 (*N* = 3)						
28.4/3356	—	7.4	4.2	disc	biconical; wobbly, off center	not ground, rough
28.4/3367	—	7.0	3.3	disc	biconical; wobbly, off center	step fracture on one face
28.4/3368	—	3.9	1.4	disc	biconical, centered	ground
Other *Pueblo* North Excavations (*N* = 14)						
28.1/5868	—	8.8	6.0	short cylinder, wedge profile	biconical, wobbly, off center	ground, facets or broken
28.1/5934a	—	8.9	6.8	short cylinder wedge profile	biconical	ground, facets
28.1/5934b	—	4.8	3.0	short truncated bicone, wedge profile	biconical, off center	ground
28.1/5931a	—	8.4	3.7	short barrel wedge profile	biconical, wobbly	ground, facets
28.1/5931b	—	8.0	4.1	short cylinder wedge profile	biconical, wobbly, off center	ground, facets
28.1/5931c	—	5.0	1.9	short cylinder	biconical, wobbly, off center	ground
28.1/8720	—	5.6	2.3	short cylinder blank	conical, broken in drilling	not ground
28.1/8725	—	6.2	2.5	short barrel	biconical, wobbly	ground, facets
28.1/8728	—	3.2	2.6	short truncated bicone	biconical, wobbly	ground
28.1/8731	—	7.0	3.0	short cylinder	biconical, wobbly, off center	ground, facets

APPENDIX 4—*(Continued)*

Catalog no.	Shell type	Diameter	Length	Form	Perforation	Description
28.2/7317	—	6.6	4.4	cone	biconical	ground
28.2/7322	—	6.9	4.9	short barrel, wedge profile	biconical, wobbly, off center	ground, facets
28.2/8016	—	8.4	5.2	squarish short cylinder wedge profile	biconical, wobbly, off center 2.0, 1.8	ground, facets
28.2/8338	—	8.8	5.9	short barrel	biconical, wobbly, off center 2.3, 2.4	ground, facets
The *Pueblo* South (*N* = 34) Fallen Tree (9Li8) (*N* = 27)						
28.0/7003[e]	*Busycon* sp.	8.9	2.6	short cylinder blank	biconical, wobbly	not ground
28.0/7009[e]	—	9.3	8.9	ellipsoidal barrel	biconical, off center 3.0, 2.8	ground, facets
28.0/7011.0001[e]	*Busycon* sp.	12.5	2.9	disc blank	biconical, wobbly	not ground
28.0/7011.0002[e]	*Busycon* sp.	6.5	1.1	disc blank	conical from interior	not ground
28.0/7011.0003[e]	—	4.0	2.3	short cylinder	biconical, off center	ground
28.0/7011.0004[e]	—	4.4	2.9	short barrel, wedge profile	biconical	ground
28.0/7016[e]	—	3.9	2.0	short cylinder	biconical, off center	ground
28.0/7019[e]	—	4.9	2.9	short cylinder blank	biconical, wobbly	partly ground
28.0/7020[e]	bivalve	11.7	0.6	disc blank	biconical, wobbly	not ground
28.0/7021[e]	—	7.6	2.4	short cylinder	biconical, wobbly, off center	ground
28.1/1907	—	7.3	3.6	short cylinder	biconical, wobbly, off center	ground, facets

APPENDIX 4—*(Continued)*

Catalog no.	Shell type	Diameter	Length	Form	Perforation	Description
28.3/2302[e]	*Busycon* sp.	7.2	2.4	short cylinder	biconical, wobbly, off center	ground, facets
28.3/2303[e]	*Busycon* sp.	12.3	2.7	short cylinder blank, from square piece	biconical, wobbly	not ground
28.3/2304[e]	*Busycon* sp.	8.2	3.5	short cylinder blank	biconical, wobbly	not ground , broken
28.3/2305[e]	—	7.6	6.1	short barrel wedge profile	biconical, wobbly, off center	ground, facets
28.3/2307[e]	*Busycon* sp.	9.8	1.8	disc blank	biconical, wobbly	not ground
28.3/2318[e]	*Busycon* sp.	8.2	3.5	short cylinder blank	biconical, wobbly	not ground
28.3/4574[e]	*Busycon* sp.	7.1	2.9	short cylinder	biconical, wobbly	broken
28.4/1818	—	8.3	2.6	irregular disc	biconical; wobbly, off center	not ground
28.4/2550	—	6.8	4.0	disc/short barrel	biconical; wobbly, off center	ground
28.4/2730	—	8.0	2.9	disc	biconical; wobbly, off center	rough
28.4/2830	—	—	—	—	—	—
28.4/4705	—	5.5	2.8	disc	biconical; wobbly, off center	gray, burned
28.4/4706	—	4.9	2.3	disc	biconical; wobbly, off center	ground
28.4/4707	—	11.2	6.5	large disc	biconical; wobbly	rough
28.4/4711	—	5.1	2.6	disc	biconical; wobbly, off-center	broken
28.4/4739	—	6.4	3.9	irregular bicone	biconical; wobbly, off-center	—

APPENDIX 4—*(Continued)*

Catalog no.	Shell type	Diameter	Length	Form	Perforation	Description
Structure 6 (*N* = 5)						
28.2/8559	—	4.8	2.4	annular	biconical 1.5, 1.8	ground, facets
28.2/8618	—	5.7	2.7	short cylinder	biconical, wobbly off center 1.6	ground, facets
28.2/8717	—	8.4	4.8	triangular short cylinder	biconical, wobbly, off center 1.5, 1.8	ground, facets
28.2/8780	—	8.8	5.0	short cylinder wedge profile	biconical, off center 1.4, 1.6	ground, facets
28.2/8808	—	7.0	3.7	short cylinder wedge profile	straight, off center 1.0, 1.0	ground, facets
Other *Pueblo* South Beads (*N* = 2)						
28.1/4212	*Busycon* sp.	7.5	4.3	short barrel, wavy profile	biconical, wobbly, off center	ground
28.1/8707	*Busycon* sp.	8.2	3.5	blank	undrilled	not ground
The *Pueblo* East (*N* = 6)						
28.1/1906	—	4.9	2.5	short cylinder	biconical	ground
28.1/4216	—	7.7	6.9	crude short barrel	biconical, wobbly	ground, facets
28.1/6048	—	6.7	4.0	short cylinder blank	biconical	partly ground
28.1/8052	—	7.5	2.6	ellipsoidal short cylinder	biconical, wobbly, off center, ground	Hardness 4
28.1/8704	—	5.8	2.2	short cylinder blank	biconical, wobbly	partly ground
28.3/3448	—	3.8	3.7	barrel	biconical	ground
The *Pueblo* West Structure 1-W (*N* = 11)						
28.1/5977a	*Busycon* sp.	5.2	2.7	short truncated bicone	biconical, off center	edge ground, facets

APPENDIX 4—*(Continued)*

Catalog no.	Shell type	Diameter	Length	Form	Perforation	Description
28.1/5977b	—	5.8	2.6	short cylinder	biconical, off center	edge ground, facets
28.2/9746	—	4.5	2.9	short cylinder	biconical off center	ground, facets
28.2/3735	—	5.0	2.3	triangular short cylinder	biconical 1.5	ground, facets
28.2/6018	—	6.8	3.2	subtriangular short cylinder	conical 1.5	ground, facets
28.2/6068a	—	6.7	3.8	short barrel	conical, off center 1.6	ground, facets
28.2/6068b	—	5.4	2.9	short barrel	biconical, wobbly, off center 1.3	ground, facets
28.2/6068b	—	6.1	5.1	short barrel	biconical 2.1, 2.0	ground, facets
28.3/0160a	—	8.0	4.7	short cylinder wedge profile	biconical, wobbly off center 1.8, 1.8	ground, facets
28.3/0237	—	10.0	6.0	elliptical short cylinder	biconical, off center 1.9, 1.8	ground, facets
28.3/1899	—	6.6	3.1	short barrel	biconical, off center 1.4, 1.4	ground, facets
Total Shell Beads						851

[a] Larsen and Thomas (1982).
[b] Thomas (2008).
[c] Pendleton (1986a).
[d] Thomas and McNeil (2002).
[e] Blair and Francis (2008).

COLOR
PLATES

PLATE 1: **A.** Type 1, 28.1/4874.0157; **B**. Type 2, 28.1/4766.0034; **C.** Type 3, 28.1/3258.0001; **D.** Type 4, 28.1/7424.0001; **E**. Type 5, 28.0/8978.0001; **F.** Type 6, 28.1/7284.0001; **G.** Type 7, 28.2/4008.0002; **H.** Type 8, 28.3/4253.0001; **I.** Type 9, 28.1/9153.0001; **J.** Type 10, 28.1/1778.0004; **K.** Type 11, 28.1/5480.0005; **L.** Type 12, 28.1/4071.2182; **M.** Type 13, 28.0/6706.0507; **N.** Type 14, 28.1/7513.0905; **O.** Type 15, 28.0/8237.0001; **P.** Type 16, 28.1/4641.0001; **Q.** Type 17, 28.2/1835.0001; **R.** Type 18, 28.1/8666.0001.

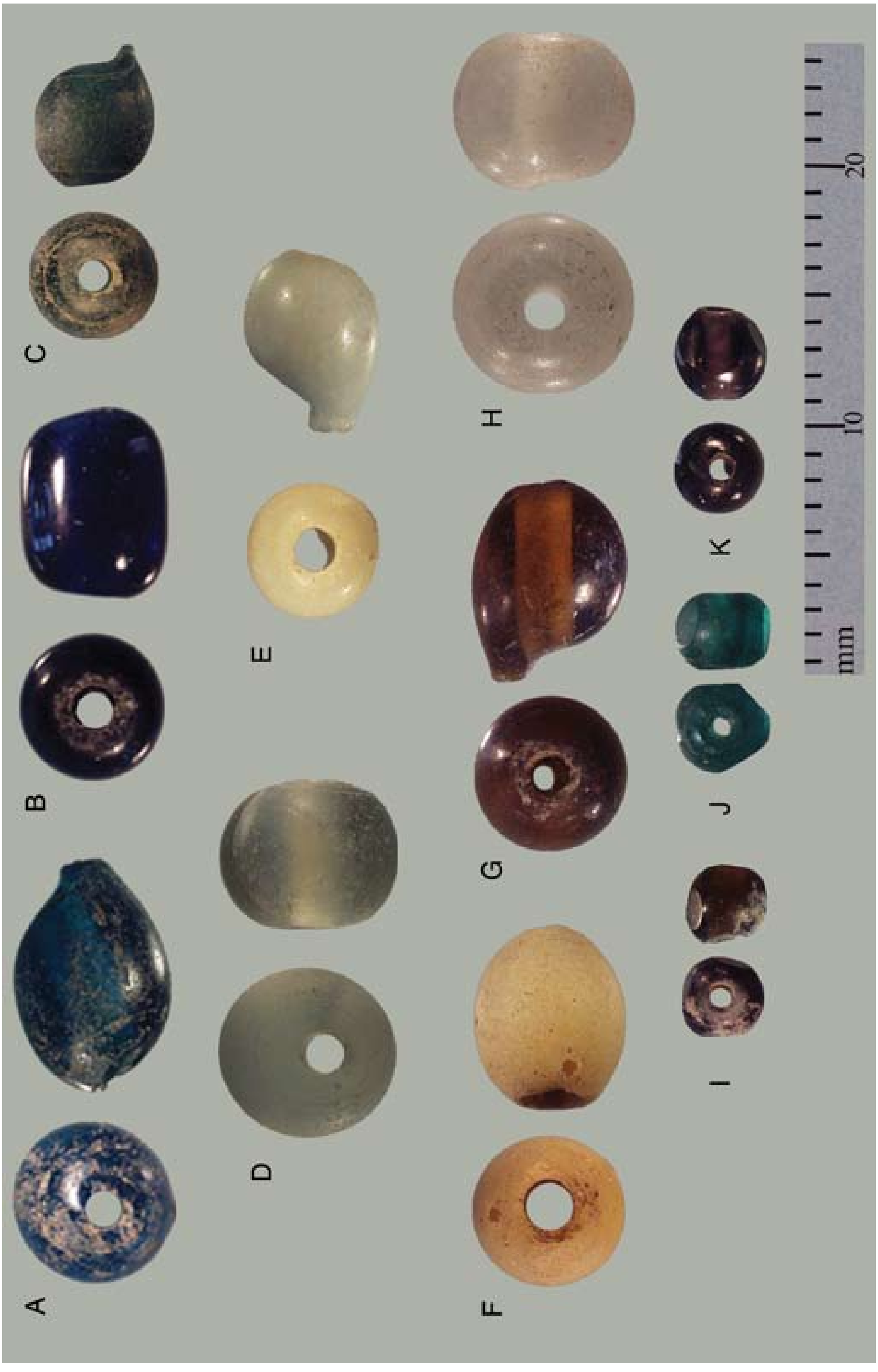

PLATE 2: **A.** Type 19, 28.2/0898.0001; **B.** Type 20, 28.0/4632.0001; **C.** Type 21, 28.1/4868.0002; **D.** Type 22, 28.1/4765.0017; **E.** Type 23, 28.1/7513.0904; **F.** Type 24, 28.1/5053.0091; **G.** Type 25, 28.1/4468.0011; **H.** Type 26, 28.1/2619.0001; **I.** Type 27, 28.1/2339.06617; **J.** Type 28, 28.1/7220.0005; **K.** Type 29, 28.3/2339.04351.

PLATE 3: **A.** Type 30, 28.1/4864.0097; **B.** Type 31, 28.2/5438.0001; **C.** Type 32, 28.1/4071.2353; **D.** Type 33, 28.3/3019.0001; **E.** Type 34, 28.1/2265.0004; **F.** Type 35, 28.1/0884.0003; **G.** Type 36, 28.0/9056.0761; **H.** Type 37, 28.3/2337.0699; **I.** Type 38, 28.1/0924.0004; **J.** Type 39, 28.1/2339; **K.** Type 40, 28.3/2337.3688; **L.** Type 41, 28.1/6628.0001; **M.** Type 42, 28.1/8668.1152; **N.** Type 43, 28.2/5601; **O.** Type 44, 28.3/3020.0001.

PLATE 4: **A.** Type 45, 28.1/7461.0001; **B.** Type 46, 28.1/4921.0001; **C.** Type 47, 28.1/4341.0001; **D.** Type 48, 28.1/9367.0001; **E.** Type 49, 28.0/6706.0001; **F.** Type 50, 28.1/4882.0007; **G.** Type 51, 28.3/2339.06621; **H.** Type 52, 28.1/1125.0061; **I.** Type 53, 28.1/4518.0001.

PLATE 5: **A.** Type 54, 28.1/8197.0002; **B.** Type 55, 28.1/5011.0004; **C.** Type 56, 28.1/4452.0001; **D.** Type 57, 28.1/0925.0001; **E.** Type 58, 28.1/7796.0001; **F.** Type 59, 28.1/6661.0001; **G.** Type 60, 28.1/6660.0001; **H.** Type 61, 28.1/0881.0001; **I.** Type 62, 28.1/7421.0018; **J.** Type 63, 28.3/2337.6438.

PLATE 6: **A.** Type 64, 28.1/5263.0049; **B.** Type 65, 28.0/9056.0755; **C.** Type 66, 28.1/8754.0120; **D.** Type 67, 28.1/8754.0156; **E.** 68, 28.2/8438.0001; **F.** Type 69, 28.2/3580.0007; **G.** Type 70, 28.1/7575.0004; **H.** Type 71, 28.2/4795.0001; **I.** Type 72, 28.1/7549.0215; **J.** Type 73, 28.3/2339.11617; **K.** Type 74, 28.1/5047.0197.

PLATE 7: **A.** Type 75, 28.2/8603.0002; **B.** Type 76, 28.1/5183.0001; **C.** Type 77, 28.2/9188.0001; **D.** Type 78, 28.0/4627.0001; **E.** Type 79, 28.2/3621.0001; **F.** Type 80, 28.1/6932.0002; **G.** Type 81, 28.1/2221.0001; **H.** Type 82, 28.1/9366.0001; **I.** Type 83, 28.1/5464.0020; **J.** Type 84, 28.1/1778.0007; **K.** Type 85, 28.2/3437.0003; **L.** Type 86, 28.1/1152.0062; **M.** Type 87, 28.3/2309.0002; **N.** Type 88, 28.1/1803.0002.

PLATE 8: **A.** Type 96, 28.1/0927.0004; **B.** Type 90, 28.2/9061.0001; **C.** Type 91, 28.1/1555.0025; **D.** Type 92, 28.0/4590.0001; **E.** Type 93, 28.2/8992.0001; **F.** Type 94, 28.1/7618.0001; **G.** Type 95, 28.1/4319.0002; **H.** Type 97, 28.1/8653.0002; **I.** Type 89, 28.1/1730.0007.

PLATE 9: **A.** Type 98, 28.1/1477.0001; **B.** Type 99, 28.1/1555.0001; **C.** Type 100, 28.0/4661.0017; **D.** Type 101, 28.1/4859.0001; **E.** Type 102, 28.0/8320.0001; **F.** Type 103, 28.1/6874.0029; **G.** Type 104, 28.0/4631.0001; **H.** Type 105, 28.1/5032.0001; **I.** Type 106, 28.1/4867.0001; **J.** Type 107, 28.1/6875.0013.

PLATE 10: **A.** Type 108, 28.1/1121.0001; **B.** Type 109, 28.0/6507.0009; **C.** Type 110, 28.0/6507.0001; **D.** Type 111, 28.1/8672.0094; **E.** Type 112, 28.3/2337.6173; **F.** Type 113, 28.3/2337.6301; **G.** Type 114, 28.3/2339.11686; **H.** Type 115, 28.1/7553.0016; **I.** Type 116, 28.1/5656.0016; **J.** Type 117, 28.1/4068.0117.

PLATE 11: **A.** Type 118, 28.1/7514.0006; **B.** Type 119, 28.1/1123.0065; **C.** Type 120, 28.3/2337.0767; **D.** Type 121, 28.1/3639.3929 ; **E.** Type 122, 28.0/6505.0004-.0013; **F.** Type 123, 28.0/9056.1552; **G.** Metal Bead, 28.2/5666.0001.

PLATE 12: **A.** Jet variety 1, 28.1/7327.0001; **B.** Jet variety 2, 28.3/2337.0268; **C.** Jet variety 3, 28.1/1360.0001; **D.** Jet variety 4, 28.1/3003.0001; **E.** Jet variety 5, 28.1/1117.0001; **F.** Jet variety 6, 28.1/5748.0001; **G.** Amber, 28.1/3884.0001; **H.** Carnelian variety 1, 28.0/5287.0001; **I.** Carnelian variety 2, 28.2/1580.0001; **J.** Cut crystal variety 1, 28.3/3476.0001; **K.** Cut crystal variety 2, 28.0/6730b.