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Spanish Artifacts from Santa Elena

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SPANISH ARTIFACTS FROM SANTA ELENA

BY

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with contributions by

Eugene Lyon, Richard Polhemus,
William Radisch and Carl Steen

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Dedicated to

Robert L. Stephenson

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PREFACE

This volume contains Parts 1 and 2 of a three-part presentation of the artifacts relating to the sixteenth century Spanish occupation of the colonial capital of La Florida at Santa Elena, located on Parris Island, South Carolina from 1566 to 1587. Part 1, by Stanley South, with contributions by Eugene Lyon, Richard Polhemus, William Radisch and Carl Steen, comprises the Spanish non-ceramic artifacts. Part 2, by Russell Skowronek, Richard Johnson and Stanley South, examines the Spanish imported ceramics. Part 3, incomplete at this writing, by Chester Depratter, deals with the Spanish-contemporary Indian pottery. This third part will be published as a separate volume at a later date.

The entire artifact inventory of the artifacts from Santa Elena is presented in this three-part volume, being those recovered from a number of expeditions to the site between 1979 and 1985. For comparative use the appendices contain the tabulated artifact inventory resulting from these expeditions. Synthesizing tables from these data are presented in the text. This information should prove useful to students of sixteenth century Spanish colonial history, particularly historical archaeologists involved in excavating sites of this period wherever they may be.

These expeditions and the resulting analysis of the material culture were sponsored through many grants, all of which involved a major contribution by the University of South Carolina, South Carolina Institute of Archaeology and Anthropology. This research was carried out under the Institute's Sixteenth Century Research Program begun in 1979. It is entirely appropriate, therefore, that this complete record of the results of research at Santa Elena be published in the Institute's *Anthropological Studies* series.

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Archaeology and Anthropology
March 12, 1988

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The primary acknowledgement for the existence of this synthesis of artifacts from Santa Elena and Fort San Felipe goes to the National Science Foundation for the grant (BNS 8501675) supporting the project as well as previous grants supporting projects during which the artifacts were recovered. Thanks to John Yellen, Program Director for Anthropology, Division of Behavioral and Neural Sciences of the National Science Foundation for his assistance. Also, without the support on previous projects of the National Endowment for the Humanities, the National Geographic Society, the National Geographic Magazine, the Explorers Club of New York, and the support and cooperation of the United States Marine Corps, this project would not have been possible. In a similar vein, the support of the University of South Carolina Institute of Archaeology and Anthropology and its director, Bruce Rippeteau, allowed the project to come to a successful conclusion.

Stanley South, the principal investigator, owes a particular debt of gratitude to the co-authors of this volume, Russell Skowronek, Chester DePratter and Richard Johnson and to those colleagues who made contributions herein, Eugene Lyon, Richard Polhemus, William Radisch and Carl Steen. Without the expertise and scholarly contribution of these colleagues, this volume would not have been possible.

The authors want to thank staff members of the University of South Carolina Institute of Archaeology and Anthropology for help with various aspects of this project: Dorothy Alford for her expertise with the budget, Gordon Brown for taking and processing the photographs with white backgrounds (Stan South took those with black backgrounds), Mari Custodio for printing many of the photographs used herein, Curtiss Peterson and Harold Fortune for a measured drawing of the barrel, Kenn Pinson, Amy Locklear, Katherine Gilbert, Reginald Bullock, and Barbara Burgess for their assistance with proofing and editing the volume, Diane Moses for her assistance with operation of the laser printer on which South printed the volume, Ann Salter for her dot-shading of the artifact drawings, Darby Erd for his drawing of a Spanish crossbowman and a porcelain ewer, Nena Powell for her assistance with documents, graduate students Anna Mulcahey and Charles Rinehart for indexing the documentary files, Glen Hanson for information on metal stars, and Richard Brooks for his assistance on numerous occasions to Stanley South on the word processor. Stanley South typed the volume on the word processor.

Stanley South particularly wants to thank William Radisch for his excellent work in researching many of the sources used in illustrating artifacts from paintings contemporary with Santa Elena. Also, he wants to thank graduate student Phil Corsi for his excellent assistance with processing, measuring and drawing many of the artifacts illustrated herein.Warm appreciation is also expressed to Michael Harmon and John Goldsborough who worked with Chester DePratter in the processing and analysis of the Indian materials contemporary with the Spanish occupation. Thanks also go to William Hunt and Guy Prentice for help with processing and analysis of the artifacts and to Guy Prentice for his drawings of the bandolier bag.

Thanks are due many colleagues who have assisted in various aspects of this artifact analysis through identification of function or other interpretation relevant to their area of expertise and have been cited for their personal communication herein. These helpful colleagues to whom we are grateful are: Kathleen Deagan for her ceramic expertise and valued collegial association through her excavation of Santa Elena's sister city of St. Augustine; Florence and Robert Lister for majolica consultation; Thomas Charlton for his help with Mexican Red Ware and other earthenwares, Ivor Noël Hume for help with many artifact identifications through the years (particularly in this volume the bandolier bag and pike point); David Hurst Thomas and Lawrence Babits for comparative data on lead shot; John Idol for his expert advice on matters of English usage; Joe Judge of the National Geographic Magazine for a grant allowing excavation of an area thought to be a Spanish house and for providing refreshment for the crew on a hot summer day; Vivian Brooks for consultation with Bill Radisch on metal stars on sixteenth century costume; Wolf Wolfensberger for comments on the Maltese cross and the Order of St. John; King Oba Oseijeman Adefumi I of the Kingdom of Oyotunji at Yoruba Village, South Carolina, for his expert knowledge of glass beads excavated at Fort San Felipe as related to African religious beliefs; Alaric Faulkner for his knowledge of French ceramics; Don Brockington for his recognition of the possible Maya connection for the Mexican Red Ware; John Walthal for his assistance with French ceramics, Paul Hoffman for his consultation on ball buttons and continuing support of Santa Elena research; Stephen Robert James, Jr., for his consultation on olive jars; Lewis Binford for consultation on rolled copper nails from eighteenth century French context; George Reilly, Janice Carlson, Steve Pine and Charles Hummel for assistance with identification of the metal involved in the ball buttons; Joseph Mountjoy for sharing his knowledge of Maya red earthenwares; and Steve Wise of the Parris Island Museum for allowing artifacts on exhibit to be photographed and measured for this study.

Russell Skowronek and Richard Johnson thank their junior co-author for the second part of the volume, Stan South, whose research through the years has revealed the data analyzed in the ceramic study and made possible this research volume. Thanks also to Linda South for her friendship and good meals for the Yankees Skowronek and Johnson.

Fellow ceramic analysis project participants Mike Harmon, John Goldsborough, Chester DePratter, Phil Corsi, Tom Cowan, Bill Hunt, Guy Prentice, and Jim Greiner are to be thanked for their help at different times in the process. Special thanks are further extended to Jim Greiner who volunteered to do most of the thankless jobs and continued working even during his hospital stay. Other volunteers on the ceramic analysis project included Steven Pine, Ross Peterson, Dave Brewer, Ben Zeigler, and Russ's sister, Lt. Commander Leslie Skowronek. Thank you.

Curtiss Peterson, an old Tallahassee friend of Skowronek, provided the skills of the conservator in exploding the "gunmetal" myth and restored our Santo Domingo pitcher during our ceramic analysis. Also helping was Steve Wise, Curator of the Parris Island Museum, who aided greatly in achieving the comprehensive range of the project, allowed office space in the museum for analysis, provided us with sleeping quarters, and acted as liaison with the Charleston Museum and the Huguenot Society of South Carolina.

Colleagues in other institutions who provided aid in the identification of the ceramic variants include (alphabetically by institution): Debra Peter, American Museum of Natural History; Jean Berry, Curator, Beaufort County Museum; Martha Zierden, The Charleston Museum; Charles Gay, The Caroliniana Library; Greg Falstrom, Charles Poe, Gary Shapiro, Kevin Smith, and Richard Vernon, Florida Bureau of Archaeological Research, San Luis Project; Anne Cordell, Charles Ewen, Bonnie McEwan, and Greg Smith of the Florida State Museum; Rochelle Marinnan of Florida State University; Thomas H. Charlton, University of Iowa; George Fischer, National Park Service, Southeast Archeological Center; Stan Bond, St. Augustine Historic Preservation Board; Olga Caballero, South Carolina Department of Highways and Public Transportation; and Theresa Singleton, South Carolina State Museum. Each of these individuals freely shared their expertise and data. Thank you all very much.

A special thanks from Russ Skowronek to Kathleen A. Deagan who gave him initial training and exposure to Spanish sites archaeology and who provided comments and support in this analysis project. Thanks, too, for the housing supplied by Barbara Johnson, Stan South and Bruce Rippeteau during the ceramic analysis project.

Thanks from Russ Skowronek and Richard Johnson to their vicarious friends whose presence got them through the summer of research devoted to ceramic analysis - Dick Estelle, the "Radio Reader" on National Public Radio, and the entertainers in the bars.

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PART 1

SPANISH ARTIFACTS AT SANTA ELENA

by

Stanley South

CHAPTER 1

INTRODUCTION

For seven years, beginning in 1979, various excavation projects have been carried out at Santa Elena, the colonial capital of Spanish Florida,on Parris Island, South Carolina. These projects have concentrated on data recovery, sampling and method testing. Analysis has focused on quantitative comparison of artifact fragments using the Carolina Pattern and the Brunswick Pattern, with intersite comparison with data from St. Augustine (South 1977; Deagan 1978). Reports from each season of field work have been published (South 1979, 1980, 1982, 1983, 1984, 1985a; South and Hunt 1986), with illustration through photographs and drawings of artifact types and classes. Due to this year-by-year publication of results it has not been thought wise to conduct a definitive analysis of the artifact types and forms each year. Now, after seven years of field research have been carried out, it is appropriate that a descriptive, taxonomic analysis be conducted of the Santa Elena assemblage gathered thus far.

This project was funded by a grant (BNS 8501675) from the National Science Foundation and the South Carolina Institute of Archaeology and Anthropology at the University of South Carolina and the results are presented in this volume. The analysis has been carried out in three parts, with the artifacts other than ceramics being conducted by South (Part 1), assisted by William Radisch and Phil Corsi, the Spanish pottery analysis carried out by Russell Skowronek, Richard Johnson and South (Part 2) and the Spanish contemporary Indian pottery study being done by Chester DePratter (Part 3), assisted by Michael Harmon and John Goldsborough. The three parts of the report present a descriptive taxonomy of the various artifact types and classes involved, resulting in a synthesized site assemblage for the Santa Elena artifacts recovered from the occupation by Spaniards from 1566 until 1587. Special studies were carried out by Eugene Lyon, Richard Polhemus, William Radisch, and Carl Steen and their reports are included herein.

Historical Background

Occupation of the area of Port Royal Sound, South Carolina, by Spanish colonists at the city of Santa Elena (1566-1587) was a major effort by Spain to gain a foothold in the New World. The significance of this capital city of Spanish Florida has been outlined by historians (Connor 1925; Hoffman 1978; Lyon 1976, 1984; Ross 1925; Salley 1925), but generally the importance of this chapter in America's colonial history has been overlooked or ignored in favor of the story of English settlement coming some one hundred years later.

Santa Elena was occupied almost two decades before North Carolina's "lost colony" became lost. A baby born in Santa Elena was over forty years old when Virginia's Jamestown was first settled. That same individual would be over a half century old before the Pilgrims landed at Plymouth, Massachusetts. The antiquity of Santa Elena alone is not the major basis for its significance. It was the major city for Spanish efforts in the Southeastern area of America to establish a foothold on the new continent. It was the Carolinas from which a mission in the Chesapeake Bay area was begun. In the 1560s the population of Santa Elena numbered more than 400. It was a major step by Spain toward curbing the French exploration and settlement begun in the Port Royal area in 1562.

Archaeologically Santa Elena offers a primary treasure in that beneath the plowed soil zone of Parris Island's surface is a sealed Spanish occupation zone where objects dropped by Spanish occupants and their Indian friends and servants remain untouched near and in the forts which once guarded the settlement. These forts and the city of Santa Elena, which had over 60 houses in 1580 (Connor 1930: 283), were abandoned in 1587 after Sir Francis Drake burned St. Augustine, bringing to a close the 21 year period of Spanish presence at Santa Elena (Hoffman 1978; Connor 1925; Lyon 1976; Ross 1925; and Salley 1925).

Project Background

Twelve projects have been undertaken on the Parris Island site of Santa Elena in Port Royal Sound, South Carolina. The first of these ($842), sponsored by the University of South Carolina, resulted in the discovery of the moat of Fort San Felipe and a concentration of artifacts thought to have been the debris thrown from a structure in the city of Santa Elena. This project consisted of the excavation of 42 sample squares in an area 90 by 420 feet, with the resulting data being computer programmed by SYMAP to reveal the greatest area of artifact density, primarily Spanish pottery and fired clay daub from the walls of structures. Several of the squares were found to have struck the edge of a 15 foot wide moat, and from this, the moat and shape of the fort was determined (Fig. 1) (South 1979).

The second project was funded by the South Carolina Institute of Archaeology and Anthropology and the National Geographic Society's Committee for Research and Exploration ($26,981). This project was carried out in the fall of 1979 and was designed to excavate the area of greatest density of Spanish pottery and fired clay daub under the assumption that such data from a sample square reflected the presence of a Spanish structure beneath the surface of the earth (Fig. 2). This assumption was confirmed by the discovery of a 12 foot wide hut of Spanish construction surrounded by a concentration of Spanish refuse thrown from the hut during its period of use between 1566 and 1576 (South 1980).

The second project at Santa Elena was also designed to reveal a section through the moat of Fort San Felipe ten feet wide and five feet deep. In addition to this sampling of the fort moat (1572-1576), test squares were placed in the four walls of Fort San Marcos, the fort guarding the second Santa Elena from 1577 until the abandonment in 1587 (South 1980). This work revealed intact cedar posts brought from Florida to build Fort San Marcos so that the danger of cutting local trees under fire from the Indians could be avoided.

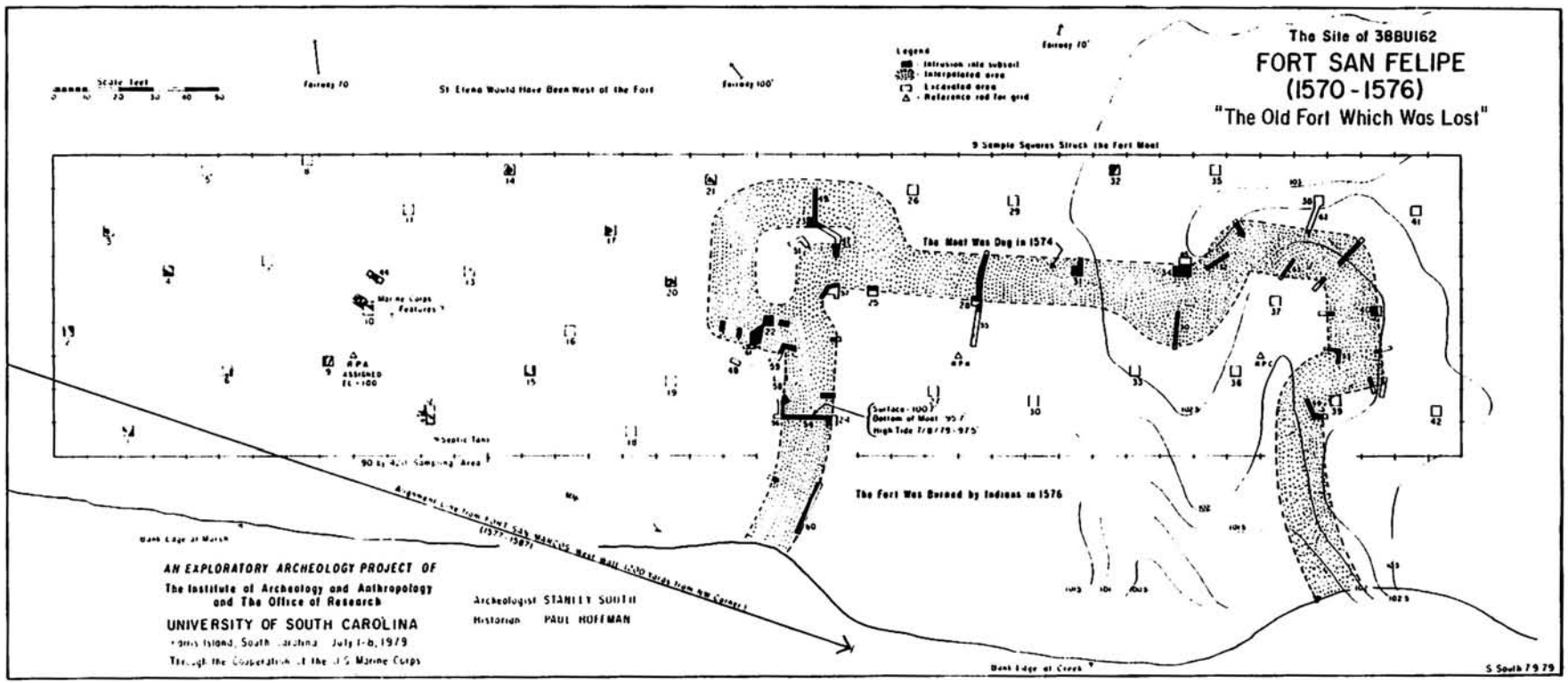


Figure 1. The outline of Ft. San Felipe as determined by sample squares and slot trenches in 1979.

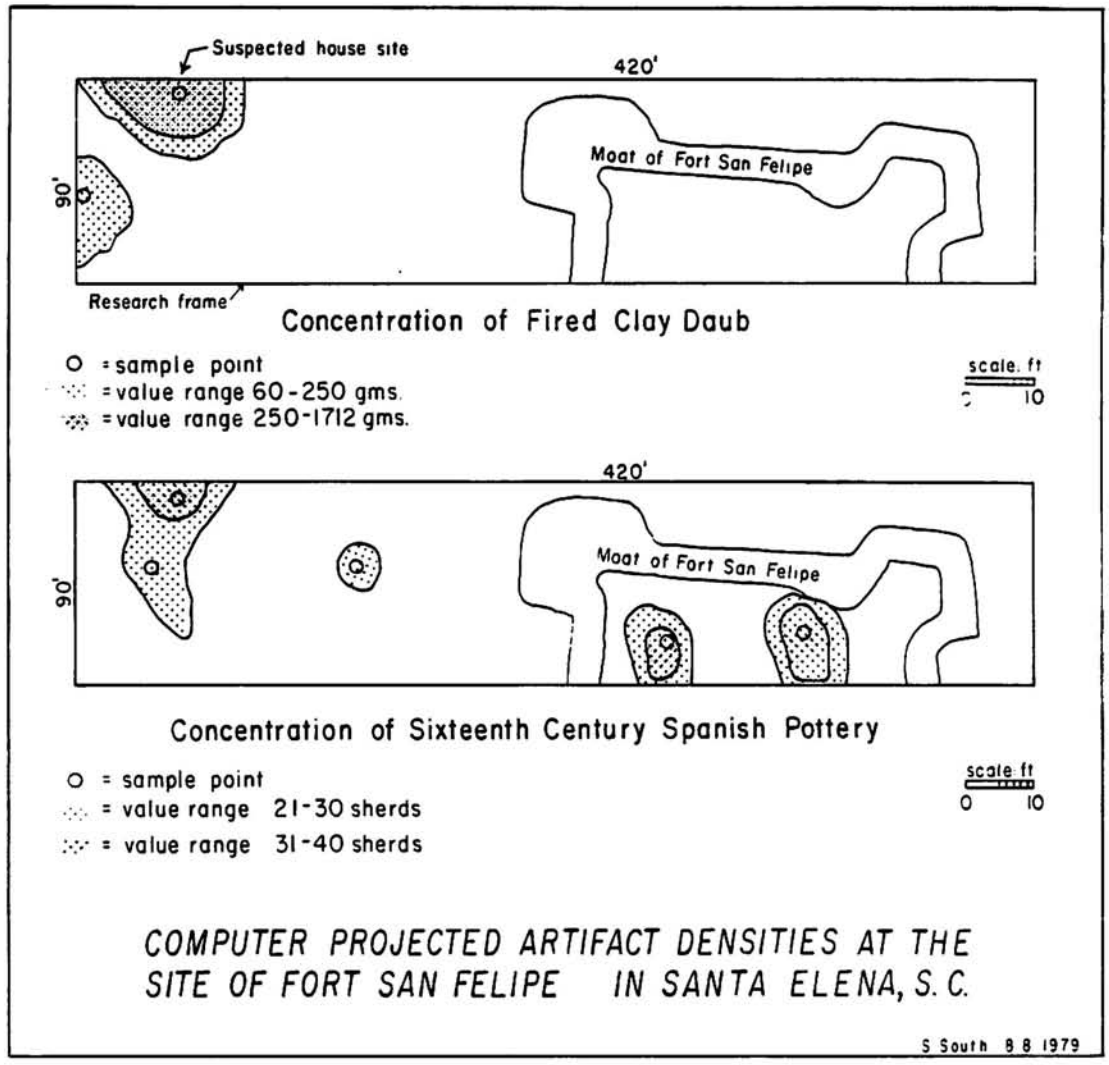


Figure 2. A. Concentration of fired clay daub predicted from sample squares.
B. Concentration of sixteenth century Spanish pottery predicted from sample squares.

The specific area of concentration of midden and fired clay daub from Spanish occupation of the site was also explored in the second project with the result that an area about the size of a football field was found to contain at least 12 structures and likely far more since only a one percent sample was excavated. This computer assisted program allowed the specific pinpointing of the most intensely occupied area of Santa Elena (South 1980).

The third project at Santa Elena, from June to August 1981, was funded by the National Geographic Society's Committee for Research and Exploration ($27,000). It was designed to build on the previous projects by excavating an area 30 by 100 feet to reveal three structures predicted by four sample squares dug in 1979. Each of the sample squares was indeed found to have been located at a structure, demonstrating the validity of the sampling method used to pinpoint structures (Figs. 3, 4, and 5).

The structures at Santa Elena were located around a central courtyard area 44 by 51 feet in size and were found to be parallel to each other, but at a slightly different angle than the two structures located in 1979. The structures vary in size, from the small 12 foot wide hut and 18 by 20 foot structures discovered in 1979, to the 42 foot long building revealed in the 1981 season of work.

One of the most interesting discoveries was the method of construction of the wattle-and-daub buildings used in Santa Elena. As postholes were dug for the upright posts for a building, on which wattling of cornstalks and canes was fastened, clay-daub processing pits were dug in the yard around the structure. Clay, water, moss and grass were mixed in these pits using the feet until a suitable mixture of daub was obtained for plastering onto the wattled walls of the structure. When the building was completed these processing pits were filled with refuse thrown from the newly occupied structure. The pits thus became filled with oystershells, clams, conch, pig bones, fish bones, hearth ashes, eggshells and broken dishes from Spanish majolica, olive jar fragments, Italian majolica, Mexican earthenware, Chinese Ming porcelain, copper aglets or lacing tips for fastening clothing, thimbles, dice, straight pins, a crucifix, and silver coins stamped with the arms of Spain, and other things.

Detailed excavation involving sifting of all soil is required. The Spanish occupation surface is intact and untouched by the plow, a rare phenomenon in American archaeological sites, allowing far greater detailed information to be recovered than is usually the case with historic sites. There can be no thought of using machines to strip away such a valuable document.

The largest and most impressive sixteenth century Spanish artifact yet recovered is the intact barrel removed from the well at Structure #2. This barrel has six iron bands and 22 wooden bands fastened together with small withes of reed so tightly woven that much of the lower half of the barrel has the appearance of basketry. The preservation of the barrel is so good that even the bung is still intact in the bung-hole. By means of a special framework for lifting and supporting the barrel from the hole, and by a technique of applying a supporting liner of plastic hose inside the barrel, it was lifted intact from its 400 year old bed. It is currently stored in water at the South Carolina Institute of Archaeology and Anthropology's waterlogged wood conservation facility awaiting conservation.

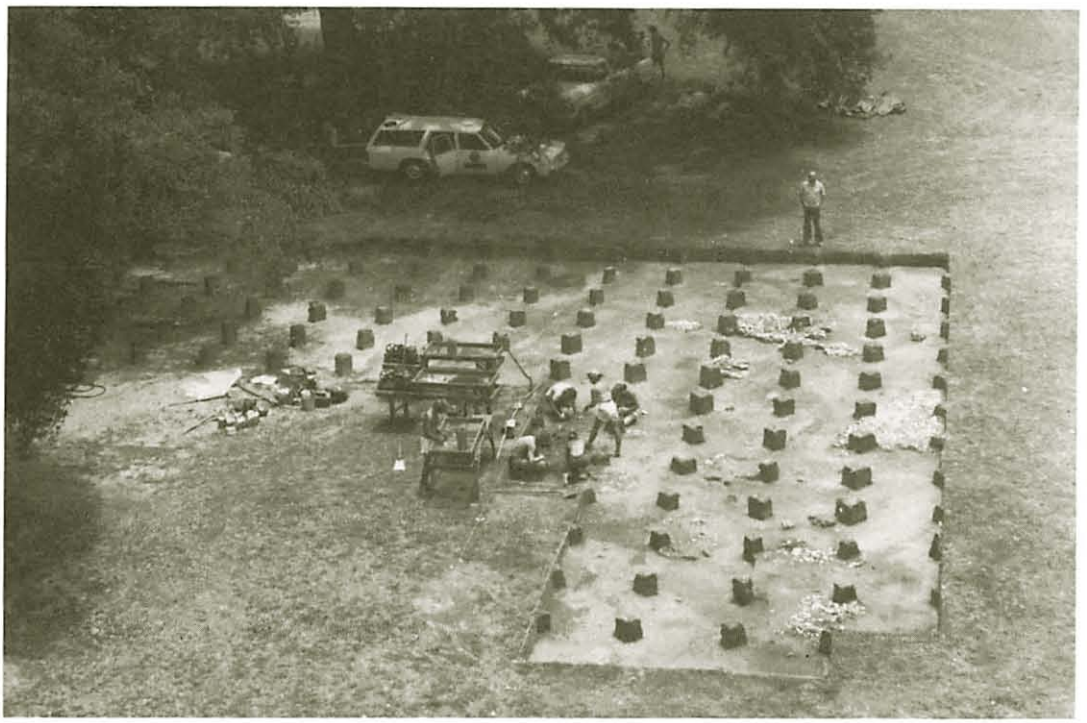


Figure 3. The 30 by 100 foot area opened in 1981 revealed oystershell midden and three Spanish structures.

Figure 4. Excavated features in Santa Elena with white plates at the postholes for Spanish structures in Santa Elena.

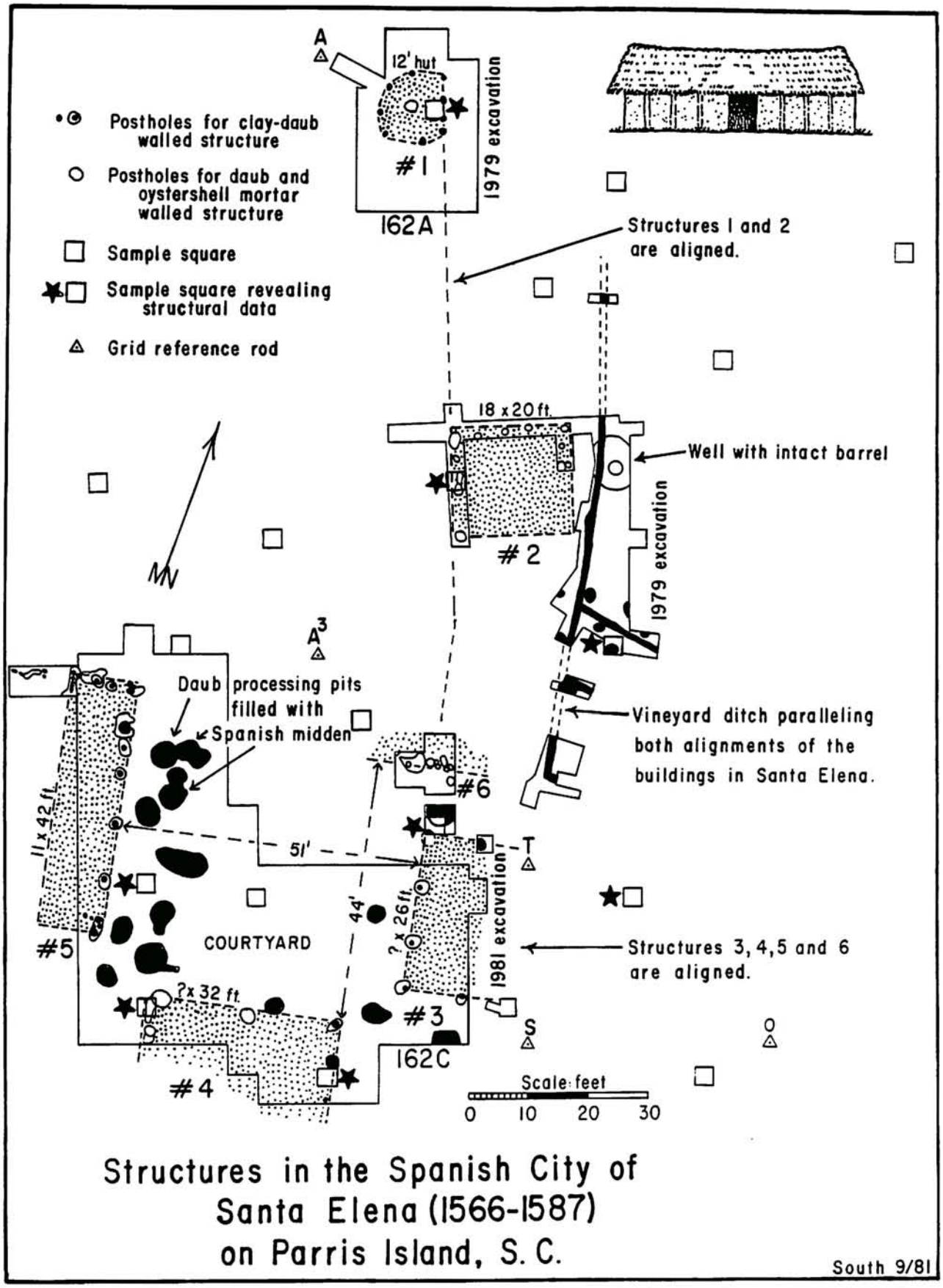


Figure 5. Santa Elena structures suggesting a courtyard arrangement.

Dramatic differences have been found to exist between various structure areas. Structure #2, for instance, has more Ming porcelain than any other ruin, apparently reflecting a higher status level for the owner than some of the other structures. Also reflecting status is a quantity of copper wire, wound with a kind of braid, called *bordado*, which was sewn onto the clothing of the upper class individuals.Also probably reflecting status is an almost completely restored majolica bowl. This type is known as Santo Domingo Blue on White (Goggin 1968), and has a drawing of a bird known as a *pardalot.*

The artifact record associated with the various ruins of buildings in Santa Elena is exceptionally intact. Not only do the excavations reveal data relating to status and function of the structures and their occupants, but sensitive analyses are being conducted that have great value to archaeological method, as well.

The ratio of Spanish pottery to Indian pottery in the Santa Elena features associated with Structures 3, 4 and 5 reveal that Structure 5 had far more Spanish refuse associated with it than did Structures 3 and 4, which were characterized by a higher Indian than Spanish pottery ratio. This is also reflected in the analysis of the pottery from the Spanish occupation zone overlying the features and architectural remains, providing insights into the relationship beween Spanish features and the overlying soil zones, a discovery of major methodological interest. The Spanish-Indian pottery comparisons also provide functional data relative to the presence of Indian women in Spanish households in Santa Elena (South 1982).

The fourth project undertaken at the Santa Elena site was funded by The Explorers Club of New York ($8,000). This research was designed to sample two areas thought to be possibly the location of the French fort built in 1562, known as Charlesfort (Hoffman 1978). Since 1923 the southern fort at Santa Elena was thought to be Charlesfort. However, the National Geographic Society project in 1979 demonstrated that this fort was actually the ruin of Fort San Marcos, the fort guarding the second Santa Elena, from 1577 to 1587 (Hoffman 1978; South 1980). The sampling strategy used to attempt to locate the actual site of Charlesfort failed to do so. The Explorers Club also funded work at Santa Elena, toward revealing the structures in Santa Elena, in conjunction with the second (1981) National Geographic Society project.

The fifth project, undertaken in the summer of 1982, was sponsored by the National Endowment for the Humanities ($40,000). This effort revealed the moat of the northwest bastion of Fort San Felipe, dug in 1574, and backfilled by the Spaniards in 1577 (Hoffman 1978). The moat was five feet deep and fifteen feet wide and was found to have been eroded until it was almost half filled with soil within two years after it was dug. The moat was dug by the Spaniards to provide additional protection for their four bastioned palisaded wall around two strong houses (Hoffman 1978).

Indians attacked the fort and drove the Spaniards from San Felipe and Santa Elena in 1576 and burned both the fort and the town (Lyon 1984). Ample evidence of this burning was discovered in the form of burned palisade posts lying like jackstraws in the moat, along with iron spikes and nails that held supporting timbers to the palisade wall around the bastion.

Also found lying on the berm of the bastion was an iron plate with a brass buckle from a suit of Spanish armor, as well as brass buckles and brass hooks for military uniform straps.

The sixth project at Santa Elena was sponsored by the National Geographic Society in the summer of 1982 ($25,000). This project allowed four units 20 by 30 feet in size to be excavated in widely spaced areas of Santa Elena, to recover evidence of architectural remains, and evidence of three additional structures was revealed. Also in these units numerous features filled with Spanish refuse were excavated and since each feature was capped with oystershell midden, the faunal remains of fish and other animals were remarkably preserved by the sweetened soil (Fig. 6). These remains have been analyzed each season by Elizabeth Reitz and are revealing valuable data on the diet of the Spaniards at Santa Elena (South 1980, 1982, 1983).

Microfaunal analysis by Paul Gardner (South 1980, 1982) and Margaret Scarry (South 1983, 1984) has revealed the use by Spaniards of gourds, chili peppers, watermelons, canteloupe, wheat, and corn at Santa Elena.

The National Geographic Society project of 1982 also involved a 1% sampling of a 90 by 420 foot area north of Fort San Felipe to determine the extent of Spanish occupation in this area. Many graves from burial of black residents of the island from the eighteenth to the twentieth centuries were discovered. Thought to be associated with these burials was a small pit in which almost 4,000 glass beads were cremated, making a string over 40 feet long. These date from the plantation period of the eighteenth century, postdating the Spanish occupation on the site, though Richard Polhemus feels they date one hundred years earlier (South 1983, South and Hunt 1986).

The seventh project at Santa Elena was funded by the United States Marine Corps in the summer of 1982 ($2,559). This was a stabilization project designed to allow the northwest bastion moat of Fort San Felipe to be protected and stabilized against erosion while at the same time providing a visual record of the location of the fort moat and bastion. This allows the many visitors to the site of Fort San Marcos and Fort San Felipe to visualize the two forts in relation to each other and to come to a better understanding of the significance of this historic site.

The eighth project at Santa Elena was carried out during the summer of 1983 inside Fort San Felipe through a National Science Foundation grant of $35,000. The primary goal of the NSF project was to test the predictive value of archaeological sampling methods (in this case a 3% sample) as seen in computer projections (SYMAP) compared with architectural data revealed in a totally excavated area of 30 by 120 feet (South 1984).

Documents reveal that two "*casas fuertes*" or fortified houses were built inside the area of the fort moat in 1572 and that two wells were dug at that time. It was thought that Fort San Felipe offered an excellent opportunity to compare artifact densities of Spanish pottery. Indian pottery, fired clay daub, etc., as revealed in a 1% sample taken in 1979, a 3% sample taken in 1983, and the total excavation of a 30 by 120 foot area, in relation to archaeological evidence of the two fortified houses known to have been inside the fort. The project fulfilled our greatest expectations.

The archaeological evidence for the "*casas fuerte*" was found to be a trench eighteen inches wide and two feet deep, with large postholes at 16', 20' and 24' intervals. Data from exploratory squares revealed that this structure measured 50 by 70 feet. Three wells were also located at the corners of the west end of the building.

Figure 6. Spanish features and vineyard ditches uncovered near the eighth tee of the Parris Island Marine Corps Golf Course during the National Geographic Society Project.

The major artifact classes recovered inside the fort were Spanish pottery and Indian pottery contemporary with the Spanish occupation. By plotting the SYMAP projection of Spanish pottery density above 20 sherds for 3%, and for the 100% excavation area, we can determine the degree to which the samples compare with the totally excavated area. This can be seen in Figure 7. The 3% sample revealed a major concentration of Spanish pottery along the south wall of the *casa fuerte,* with a concentration at the northwest corner. When the 30 by 120 foot area was totally excavated by 10' squares, the SYMAP revealed that Spanish pottery was concentrated most heavily in the same "L" shaped area projected by the 3% sample.

The ninth project at Santa Elena was the completion of the excavation inside Fort San Felipe, revealing the 50 by 70 foot *casa fuerte* and related features and the excavation of three wells. Two of the wells contained remains of wooden barrels and many seeds of watermelon, squash, hickory nuts and cockleburs so intact that attempts were made to sprout some of the seeds! This project was funded at $38,000 (South 1985a).

The tenth project involved the sampling of a large area in the eighth fairway of the Parris Island Golf Course to determine the density of the Spanish refuse and features in this area west of Fort San Felipe (South and Hunt 1986). The study revealed less refuse than in the area between the two forts where the greatest density had been seen. This project was sponsored by the National Endowment for the Humanities through a $11,000 grant. An adjunct project was funded by the *National Geographic Magazine* in the amount of $1,000 to explore the suspected area of a Spanish structure.

The eleventh project at Santa Elena, now underway, involves the transcription and translation of microfilm copies of original documents by Eugene Lyon. These documents relate to Santa Elena and are expected to provide a much needed data bank of information previously not available on Santa Elena. This project was funded at $10,000 by the Spanish Government and the same amount through the Translations Division of the National Endowment for the Humanities.

The twelfth project is the one reported in this volume, involving the description of the artifacts recovered in all the above projects, providing a synthesis of the material culture assemblage from Santa Elena and her forts recovered thus far. This project was funded by the National Science Foundation at $43,078.

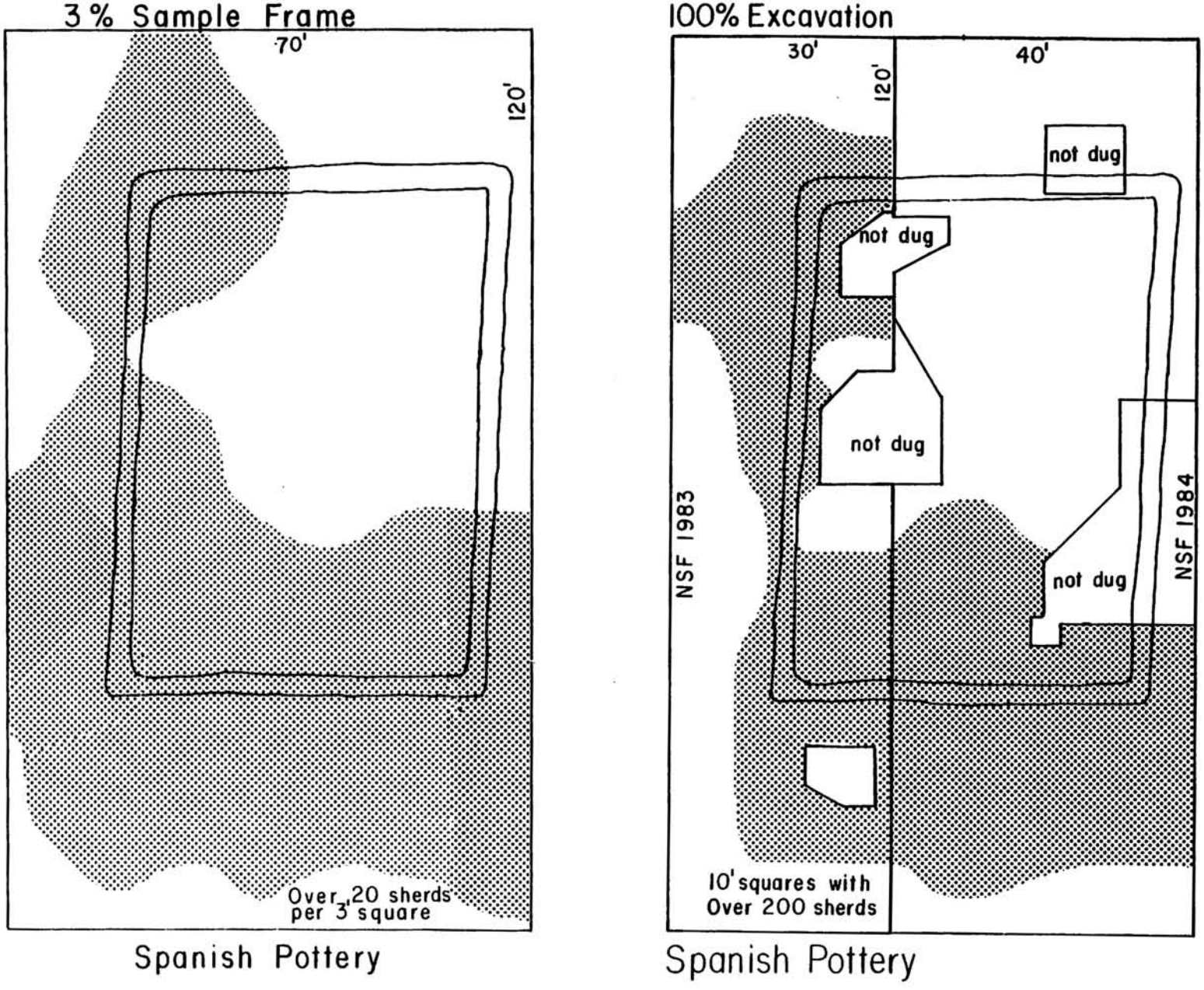


Figure 7. Comparison of SYMAP projections from a 3% sample frame and the excavated archaeological universe.

Theory, Project Goals and Methods

Theoretical Framework

There is a need today in historical archaeology for the study of nations and their colonial efforts from the perspective of their role in the world system (Wallerstein 1974; White 1975). The primary role of the Spanish cultural system was *economic exploitation, fortification for the protection of the settlement population, and the control of the native people through the mechanism of evangelization into the Catholic faith* (Lyon 1976, 1984). The primary function of culture is to harness energy for man's use, and the Spaniards at Santa Elena were involved in the endeavor to "maximize their economic efficiency" (Green 1986: 13).

The exploration of class differences at Santa Elena makes sense as a theoretical approach since the founder of the settlement, Pedro Menéndez and his family were obviously from the upper class, and controlled the laboring class and others in their utilization of energy resources available through the colonization effort. The archaeological study of the ruins of a city such as Santa Elena can be organized within the framework focused on the utilization of energy. Thus, *status, ethnicity, fortification, social structure of the Indians, social structure of the Spanish colonial system, trade, settlement and evangelization* can be seen to vary with the economic efficiency of the economic exploitation of energy resources carried out by those controlling classes involved. The archaeological record clearly reveals the contrast between the elite controlling class and the laboring class at Santa Elena. For this reason a number of the analyses used through the past years to examine the remains of the Spanish colonial system at Santa Elena have focussed on the elite vs the soldiers, the domestic Spaniards vs the Indians, the local Indians vs those represented by St. Johns Indian pottery imported to Santa Elena from the area of St. Augustine, etc. (South 1979, 1980, 1982, 1983, 1984, 1985a; South and Hunt 1986). The goals, research strategy, methods, tools and assumptions used in this analytical process are to be seen in the section to follow.

General Goals and Research Strategy

The two major Spanish colonial cities of the sixteenth century in the Southeastern United States were Santa Elena and St. Augustine. Comparison of data being recovered by Kathleen Deagan (1978) in St. Augustine with the material culture remains from Santa Elena is of major interest in that such data can provide answers to questions about:

a. the structure of buildings in Spanish colonial towns
b. the arrangement of buildings in Spanish colonial towns
c. the relationship of upper and lower socio-economic level homes
d. the material remains of upper vs lower class structures
e. the relationship between military vs civilian data
f. the relationship between the Spaniards and the Indians
g. the relationship of the town to the forts guarding them
h. the subsistence strategy of occupants of such towns and forts

i. the material remains in relation to the documents
j. the degree to which the religious, technological, social and trade relationships are reflected in the archaeological record
k. the persistence of borderlands through time (the Santa Elena area is the northern border of Spanish Florida)
l. the contrast between sixteenth century Spanish material remains and seventeenth century English data

These general questions relating to the broad goals of the sixteenth century Spanish colonial research are background for the more site specific goals of interest in the artifact analysis project reported in this volume. Of overall interest throughout the Santa Elena projects carried out thus far through the National Geographic Society, the Explorers Club of New York, the University of South Carolina, the National Endowment for the Humanities,and the National Science Foundation, has been the ideal opportunity offered by the Santa Elena site to help refine archaeological methods (South 1977; South ed., 1977). The projects carried out so far have:

a. systematically sampled the area of the city of Santa Elena
b. predicted from the sample where the structures should be located
c. predicted from the sample where Fort San Felipe was located
d. demonstrated through excavation the presence of six buildings once a part of Santa Elena, thus verifying the validity of the sampling method
e. demonstrated through excavation of a cross-section through the moat of San Felipe the validity of the sampling method used to locate the fort
f. discovered 4 wells which contained 3 wooden barrels, one of which was removed intact
g. demonstrated the relationship between daub-processing pits filled with Spanish refuse and the construction of the buildings in Santa Elena
h. demonstrated the relationship between Spanish features and the soil zones above the features in terms of the ability of stratified data to anticipate and predict the contents of underlying features
i. demonstrated the predictive relationship between three-foot sample squares as a monitor of architectural data and a larger 20 by 30 foot square
j. demonstrated the predictive value of a 1% sample inside Ft. San Felipe and a 3% sample in relation to the excavated universe from which the sample was taken
k. discovered and revealed a 50 by 70 foot *casa fuerte* structure inside Fort San Felipe and found that it was rebuilt and occupied during the second Santa Elena period.
l. conducted a taxonomic study of all artifact classes recovered from Santa Elena from 1979 through 1985, to provide a comparative base for use by other researchers working on Spanish sites in the Southwest, in Florida, and in the Caribbean
m. initiated a transcription and translation project to make available documentation on Santa Elena not previously available

These contributions to our knowledge of Santa Elena and her forts have involved a *quantitative analysis of the artifact types, classes, and groups* to abstract data on *chronology, ethnicity, status, class structure, Spanish-Indian relations, world trade and culture process*. In carrying out these goals the following tools and assumptions have been used:

1. artifact type variability as a measure of the link of towns, plantations, estates, and other ruins to the European power center
2. artifact type variability as a measure of elite vs laboring class occupancy
3. frequency of artifact types and fragments as a measure of status in domestic dwellings
4. artifact type and fragment frequency as a measure of occupation period (the Mean Ceramic Date Formula and Mean Majolica Date Formula - South 1977)
5. density of artifact fragments as an indication of entryways (the Brunswick Pattern - South 1977)
6. the presence of elite rank related artifact types (bordado, porcelain, majolica)
7. the presence of laboring class related artifact types (colonoware, earthenware)
8. artifact types as an indicator of world trade nework (ceramics from Spain, Italy, Caribbean, Mexico, China, etc.)
9. specific artifact types as indicators of religious belief system (crucifixes, figas)
10. artifact classes as indicator of functional areas (military, domestic, crafts)
11. architectural artifacts as indicator of structures (the Architectural Artifact Pattern - South 1978)
12. architectural artifact quality as indicator of elite socio-economic rank
13. artifact type frequency relationships as a measure of domestic household activity (the Carolina Pattern - South 1977)
14. artifact type ratios as a measure of function (military, domestic, crafts)
15. artifact type ratios as an indicator of ethnicity (slaves, Indians, Spaniards)
16. artifact type ratios as an indicator of male/female role differentiation
17. architectural size as indicator of elite socio-economic class dwelling (larger)
18. architectural size as indicator of public (military) structure vs private
19. architectural feature size (larger timber = larger posthole) in public buildings
20. larger nail size as indicator of public (military) vs private structure
21. archaeological features as indicators of military vs civilian function (broad ditches, moats, obtuse and acute angles)
22. the ratio of food preparation and consumption artifacts as an indicator of domestic household activities (the Kitchen Artifact Pattern - South 1977)
23. artifact types (pruning shears, hoes, etc.) and features (vineyard ditches) as indicators of agricultural practices
24. association of artifacts, architecture and features as functional, socio-economic status, ethnic indicators
25. burial features located within structures as a measure of religious belief system

These tools have been of considerable use in the various analyses carried out thus far in the area of Santa Elena and the forts of San Felipe and San Marcos (Fig. 8). The project we are concerned with here, however, addresses the artifacts recovered from the various projects in their entirety, providing a taxonomic summary of value to those involved with research in the Spanish colonial period of the sixteenth century. This study is, therefore, not a statement of theory or method so much as a descriptive catalog with reference value since so few sites of this period remain to be explored to provide a record of the Spanish material culture on the threshold of conquest of the New World. A statement of theory used at Santa Elena in relation to the arguments of relevance between theory and the archaeological record is seen, however, in a chapter by South, in a volume soon to be published by Leone and Potter (1987, in press).

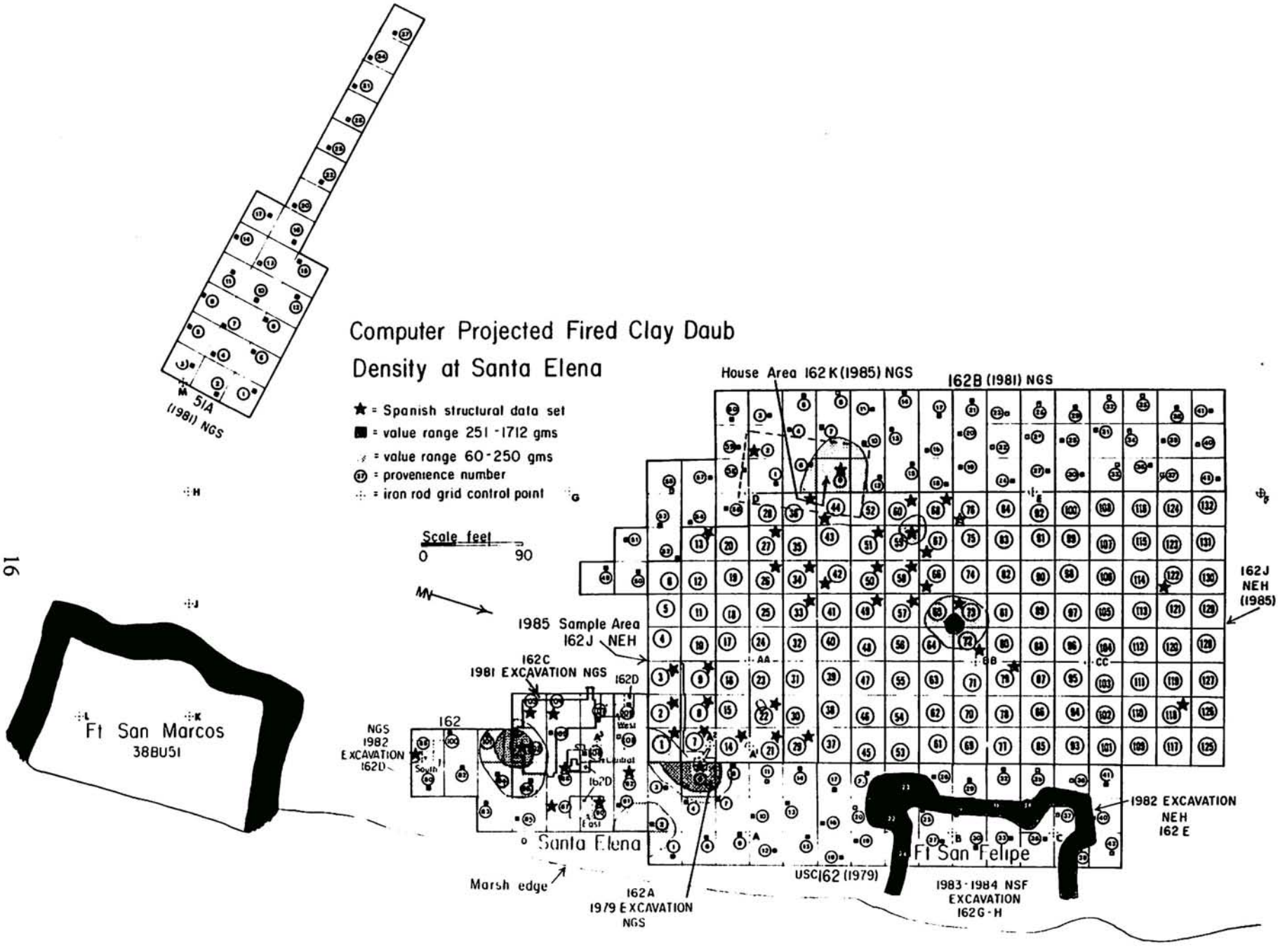


Figure 8. Location of research frames at Santa Elena showing the concentration of fired clay daub of the city in relation to Forts San Felipe and San Marcos.

Project -Specific Goals

The major goals of the analysis of the artifacts from Spanish Santa Elena are: 1) the taxonomic classification using tabulation of measurements, drawings and photographic illustration; 2) comparison of the artifacts with historical documents listing Spanish material from Santa Elena and Spanish Florida; 3) the illustration of the functional use of the artifacts in the Spanish cultural system at the sixteenth century temporal context through paintings, drawings and photographs; and 4) comparison of artifacts on an intersite basis, as in the case of Spanish contemporary Indian pottery, where the relationship between Irene, Altamaha, San Marcos and St. Johns pottery is examined.

To achieve these goals the artifacts were addressed as three assemblages, the Spanish imported pottery, analyzed by Russell Skowronek, Richard Johnson and Stanley South; the contemporary Indian pottery, analyzed by Chester DePratter, assisted by Mike Harmon and John Goldsborough, and all other Spanish artifacts, analyzed by Stanley South, assisted by Phil Corsi, Richard Polhemus, William Radisch and Carl Steen, with documentary research assistance by Charles Rinehart and Anna Mulcahey. These three analytical units form the three sections of this study.

Research Method

The first step in bringing a unifying order to the excavated assemblage of artifacts gathered over seven seasons of excavation was to separate the Indian pottery from the Spanish imported pottery (the two major artifact categories in terms of quantity of fragments) from the remaining artifacts. This resulted in the three categories of artifacts to be dealt with by the three teams of researchers. When this was done each team leader took charge of their assemblage and taxonomic classification was carried out.

The Stockton Profile Gauge was used with the ceramics to derive profiles of the various forms involved. These were then reduced using a pantograph and ink drawings were made. These in turn were graphically reduced to page size. Scale drawings of other artifacts were also made, accompanied by the appropriate measurements in those cases where such measurement would be of value to other researchers.

Artifacts representing the various taxonomic breakdowns into types were then photographed to illustrate more fully the attributes involved. These photographs along with the drawings form a major illustrative record of the assemblage.

The attribute measurements of the various artifact types were tabulated and these tables also form a major record for comparative use with similar data on an intersite basis. In most cases the data from these tables are abstracted and discussed in the text, with the tables themselves located in the appendix.

Research was carried out to establish the relationship of the types on an intersite basis and in the case of the Spanish artifacts this involved the world system of the sixteenth century, and in the case of the Spanish contemporary Indian pottery, it involved relationships on a regional basis as revealed in other archaeological studies involving similar pottery. The sixteenth century paintings showing artifacts comprised a major source of reference for the artifact types and these have been photographically copied and form a major comparative data base accompanying the descriptive data. In these paintings the function of the artifact in the Spanish culture of the period is seen, and this aided considerably in the identification of some of the artifacts whose function would otherwise have remained unknown.

In carrying out this research it became apparent that in many cases a single artifact type, aglets (lacing tips), or ball buttons, for instance, would provide enough information about status differences, differences between male and female dress, and class structure, to constitute a dissertation topic. It became necessary, therefore, to simply touch base with the documents in many cases, leaving the more definitive delving for future theses and dissertations addressing appropriate theoretical questions.

The major thrust of this study was descriptive, not quantitative analysis such as has already been carried out in the seven previous monographs on archaeology at Santa Elena. However, in tabulating various attributes of nails and musketballs, for instance, items found in some quantity, we had in hand for the first time data not previously available on Santa Elena artifacts as a total assemblage, and some graphs are used to present these data. In the case of musketballs, Carl Steen conducted a computer assisted study to summarize the data available, and this study is presented as a special contribution within this volume. Generally speaking, however, quantitative analysis was not a major goal of this study.

In other cases where large quantities of items are not present, in the case of copper stars, for instance, being made on the site at Santa Elena, research into the documents by William Radisch revealed their use as a clothing ornament, similar to sequins, but also likely having symbolic religious value in the number of points on the stars. Radisch's study of these interesting copper star artifacts is included herein as a special contribution to our study. The study of almost any artifact type reported herein could form the basis for a monograph of considerable length, but we had to refrain from venturing too far into such interesting challenges beyond the descriptive level.

A major justification for conducting such a taxonomic study as that presented here of the artifacts from Santa Elena is because they represent a Spanish colonial occupation of only twenty years, from 1566 to 1576 and from 1577 to 1587, thus constituting a time capsule of sixteenth century material culture only slightly broader than a shipwreck site. This provides a valuable temporal control allowing interpretations of other assemblages to be better understood from the perspective provided by Santa Elena, both of the Spanish artifacts and the Indian pottery contemproary with them.

An obvious method of approaching the analysis of artifacts at Santa Elena would be through a comparison of the documented lists of material goods known to have been shipped into Santa Elena and elsewhere in Spanish Florida. Several such lists have been supplied by Paul Hoffman and Eugene Lyon and are compared with the artifact assemblage from Santa Elena and Fort San Felipe. Translation of documents is now underway by Eugene Lyon, and it is hoped that in the future more such lists of material goods will be available for use in interpreting artifacts recovered archaeologically from Spanish colonial sites of the sixteenth and seventeenth centuries.

The primary approach at organization of the data, however, is not from the documented lists, but by use of the Carolina Artifact Pattern format used in all the previous reports on the Santa Elena artifacts (South 1977). This model allows the artifact types, classes and groups to be organized systematically along general functional lines. The artifact groups, classes and types used in this study, resulting from their presence at Santa Elena, are seen in Figure 9.

To present a taxonomy of sixteenth century Spanish artifacts from Santa Elena, there needs to be some assurance that the objects were indeed part of the material culture of sixteenth century Spanish occupation of the site. Artifacts from features containing only verifiable Spanish artifacts are those with the greatest archaeological integrity. We are dealing, however, with artifacts from the plowed soil zone, containing late eighteenth century and early nineteenth century plantation period artifacts, as well as United States Marine Corps material culture items from the early years of the twentieth century, as well as Spanish artifacts from the sixteenth century. How do we handle the problem of isolating only the sixteenth century Spanish objects? In most cases, this can be done through comparison with objects known to have come from closed context features such as the moat at Fort San Felipe backfilled by the Spaniards in 1577, or from daub processing pits filled shortly after they were dug by Spaniards constructing the buildings in Santa Elena. The copper stars are a good example of this. For two years as excavation was carried out at Santa Elena we would occasionally find a copper star in the plowed soil zone. We wondered if these interesting little objects were the result of occupation by the Spaniards, Indians, the English occupation during the plantation period, or the Marines passing the time of day during World War I. It was not until the third season of work that we found the copper stars with the by-products of their manufacture in a Spanish daub-processing pit feature, clearly demonstrating their origin within the Spanish occupation of the site. The ball buttons had a similar history of mystery within our knowing until we found them clearly associated with Spanish artifacts in closed context Spanish features.

There are a few artifacts, however, that are unique, such as small bone finials and knobs found in the plowed soil zone. Not enough are present to form a pattern and if they are not found in a Spanish feature we cannot say for sure that they are Spanish. When this is the case we state so and perhaps future excavation will produce parallel types in tight Spanish context. Some of these, however, may well prove not to be Spanish in origin, but we present some few of these here for the record, with the reservation as to their cultural affiliation clearly stated.

The list of artifacts recovered at Santa Elena is seen in Figure 9. There are 87 artifact types and classes in this list. An interesting comparison can be made by comparing this list of material goods in Spanish Florida from the archaeological record with lists surviving in the documentary record. Four such lists are seen in Appendix I, as compiled by Paul Hoffman. A total of 382 artifact types and classes are listed in these sources. This is by no means the definitive list of goods available in Spanish Florida in the sixteenth century, but simply four lists that are in hand at present.

KITCHEN
- Ceramics
- Glass
- Knives

ARCHITECTURE
- Nails
- Spikes
- Tacks

Locking bar brackets
- Pintles
- Latches
- Lime
- Lime mortar
- Oystershell mortar
- Fired clay daub

FURNITURE
- Drawer pulls
- Drawer pull brackets
- Tacks
- Brass nails
- Rivets
- Chest lock

ARMS
- Musketballs
- Lead sprue
- Bandolier bag
- Bullet mold
- Pike point
- Crossbow parts
- Crossbow bolt points
- Goatsfoot lever parts
- Arquebus parts
- Matchlock musket parts
- Sword
- Armor
- Armor buckles
- Armor hinges
- Armor hooks and eyes
- Artillery carriage ring
- Cannonballs

CLOTHING
- Buckles
- Ball buttons
  - Atauxia
  - Acero
- Aglets
- Hooks and eyes
- Bordado

CLOTHING (Cont.)
- Bells
- Copper stars
- Scissors
- Bale seal
- Thimbles
- Pins
- Iron wire

PERSONAL
- Beads
- Ornaments
- Crucifix
- Earring
- Coins
- Dice
- Gaming discs
- Keys
- Bone finials
- Book hinges

ACTIVITIES
- Woodworking gouge
- Auger bits
- Auger bit crescent "keys"
- Barrels
- Barrel bands
- Iron chain links
- Shears (pruning)
- Lead fishing weights
- Lead fishing weight curls
- Fishhooks
- Brassworking by-products
- Brassworking anvil
- Rivited sheet brass
- Brass discs
- Iron discs
- Mica discs
- Stone arrowheads
- Iron chisels
- Iron wedges
- Bone awls
- Iron cotter pins
- Iron discs and rings
- Iron eye pins
- Boat anchor
- Iron stake
- Unidentified iron objects
- Spanish period Indian pottery

Figure 9. Artifacts from Santa Elena Organized Using the Carolina Pattern Model

Eugene Lyon is presently working on translation of Spanish documents that will likely produce many more items of material culture than the lists seen here. These lists, however, form a good sample of the type of things being brought to Spanish Florida.

Only 89 items of the 382 types listed have been found in the archaeological record at Santa Elena and her forts, representing only 23.3% of the items. The historical record, therefore, is far richer in terms of our knowledge of material goods available to the Spanish colonists. Some goods listed are not likely to be recovered in the archaeological record, such as the many types of cloth and clothing and other perishable items seldom surviving for over 400 years in the earth. There are 139 of this type of goods, representing 36.4% of the 382 types seen in the lists. Other items that would likely survive in the archaeological record, such as axes, mattocks, hoes, shovels,and saws, were, however, not found. There are 154 of these items listed, comprising 40.3% of the material goods inventoried.

These figures illustrate that 76.7% of the material goods seen in these lists are not likely to be found or recovered in the archaeological record. Those items found archaeologically and also listed in the four lists we have examined here are seen in Figure 10. When we turn the tables around, however, and examine the items recovered in the archaeological record that were not mentioned in the documented lists, we find that of the 87 artifact types and classes recovered archaeologically (Fig. 9), 44, or 50.6% were not mentioned (Fig. 11). Half of the artifact types and classes recovered from Santa Elena and her forts, therefore, were not on the lists examined, and therefore *are known only through the archaeological record,* thus considerably enriching our knowledge of the material goods used by the Spanish colonists at Santa Elena.

In this report I use "artifact" to refer to a sherd, for instance. I use "artifact type" to refer to a taxonomic type, such as Columbia Plain majolica. I use "artifact class" to refer to several artifact types, ceramics, for instance, and I use "artifact group" to refer to a group of artifact classes, such as ceramics, glass, cutlery, etc., as a "Kitchen Group" of artifact classes, for instance (see South 1977). In the above listing of artifacts from Santa Elena I have used both artifact classes and types for convenience. If some classes, such as " ceramics" shown in Figure 9, were broken down into types, there would be far more types involved.

A synthesis of the various manipulations of the Santa Elena data in terms of artifact types, classes and groups has been carried out by South (Leone and Potter 1987: in press). These manipulations are outside the scope of this study; however, an example is seen as follows: The power center for the exploitation of Spanish Florida was in Santa Elena during the 1560s, with the controlling individuals residing there. This is in contrast to St. Augustine, which was a frontier garrison fort at the time. We can expect more artifact *types,* reflecting control of energy and resources by the elite ruling class to be found in Santa Elena than we can in the outpost settlement at St. Augustine. To test this hypothesis we compare the number of types recovered from Santa Elena (South 1979, 1980, 1982, 1983, 1984, 1985a, South and Hunt 1986), which is a total of 104, with types from excavations at St. Augustine (Deagan 1985:11-12), for a total of 71. This finding is in keeping with our expectations based on the documented history of the two settlements.

A comparison will sometimes be made in the pages to follow between the artifacts recovered in the town of Santa Elena and those from the fort of San Felipe.

DOCUMENTS: (Compiled by Paul Hoffman) [see Appendix I]
1. 1565-1569, AGI CD 941 Juan de Junco, St. Augustine
2. 1576, AGI EC 153A, NO. 1, Fol. 2 vo.4, Menéndez & the Royal Supply, Santa Elena
3. 1586-1588, AGI CD 942, Rodrigo de Junco 4. Spanish Florida, various sources

KITCHEN
- ollas and cazuelas of earthenware
- white earthenware vasos [majolica]
- tile vessels or labrillos [large pottery tubs]
- Flemish pitchers [jarros]
- earthenware vasos
- wine botijas [bottles]
- pots
- large earthenware jars [olive jars]
- plates [platos]
- bowls [escudillas]
- bottles of oil
- stewpots [casullas]
- close-stools (servicios),[chamberpots]
- stewpots [red lead-glazed earthenware]
- chests with 2 iron knives in each
- copper kettles
- copper caldrons

ARCHITECTURE
- nails
- spikes
- nails and pins
- door locks and keys

FURNITURE

ARMS
- lead musketballs
- arcabuz balls [arquebus balls]
- lead
- arquebuses
- mosquetes [muskets]
- crossbows
- hooks for crossbows [goatsfoot levers]
- hemp match cord [fuzes for matchlocks]
- pikes
- bullet molds
- gun carriages
- iron balls [cannonballs]
- armarde Poufano, [armadura profano?], [lay armor or common armor]
- sword belts

CLOTHING
- ornamental braid for shirts [bordado]
- atawxia buttons [gilt ball buttons]
- Paris trumpets
- bells
- wire thread
- hooks and eyes
- pins

PERSONAL
- mirrors

ACTIVITIES
- augers, drill
- hooks
- lead weights [fish nets and lines]
- chisels
- pipes [kegs]
- barrels
- iron hoops
- bungs, plugs, wads
- chains
- cinch straps with bells [horse tack]
- iron fittings for cinch [buckles]
- anchors

FOOD
- hazel nuts
- olives
- live chickens
- live cows, calves [beef]
- beans
- wine [vineyard ditches]
- squash, gourds
- flour [wheat]
- corn
- fish

Figure 10. Spanish artifacts recovered at Santa Elena mentioned in selected documents as present in Spanish Florida.

glass
lime
lime mortar
oystershell mortar
fired clay daub
drawer pulls
drawer pull brackets
tacks
brass nails
rivets
chest locks
bandolier bag
copper stars
scissors
bale seal
thimbles
beads
ornaments
crucifix
earring
coins
dice
gaming discs
bone finials
book hinges
gouge
shears
fishhooks
brassworking by-products
brassworking anvil
rivited sheet brass
brass discs
iron discs
mica discs
stone arrowheads
iron wedges
bone awls
iron cotter pins
iron discs and rings
iron eye pins
iron stake
Spanish contemporary Indian pottery
Unidentified iron objects

A total of 44 classes of objects were not mentioned in the documents, out of 87 found.

Figure 11. Artifact classes recovered archaeologically but not mentioned in the four documented lists of material goods (Appendix I and Figure 10).

The contrast here is between a domestic occupation area in contrast to a military occupation inside the fort. Santa Elena was occupied from 1566 to 1587, and it is assumed that most Spanish artifacts recovered from this twenty year period. The fort of San Felipe was built in 1572 and burned in 1576, but there was also a blockhouse built on the same site in 1577, during the second decade of Spanish occupation on the site (South 1984; 1985a).

A control for the identification of Spanish artifacts comes from the artifacts recovered from Spanish features, daub processing pits for use in the construction of the wattle-and-daub structures, the contents of the fort moat, Spanish dug ditches and refuse deposits. These artifacts from tight archaeological context are then used to identify artifacts from the plowed soil A-zone and the less disturbed B-zone lying above the features also containing artifacts from post-Spanish occupations, the early nineteenth century plantation period and the twentieth century Marine Corps period.

The proveniences we are dealing with are either Spanish features or the one-foot thick level (A and B), above the subsoil level. The site number is 38 (South Carolina), BU (Beaufort County), 162 (the Santa Elena and Fort San Felipe site). Fort San Marcos is 38BU162-51, but, with the exception of oystershell mortar, the artifacts from sampling on this fort are not included in this study. A letter designation was added for each season of work at the site in order to allow easy separation of the artifacts from various seasons of work. The various accession numbers and letters involved in this study are as follows:

SITE 38BU	Sponsor	Data Base	Year	MS #
162	USC	a 42, 3-foot square sample frame	1979	150
162	NGS	exploratory trenches Structure #2, S. E.	1979	165
162	NGS	well #141 at Structure #2 - Santa Elena	1981	184
162	NGS	10' section of moat of Ft. San Felipe	1979	165
162A	NGS	Spanish hut site - Santa Elena	1979	165
162B	NGS	a 54,3-foot square sample - Santa E.	1979	165
162C	NGS	a 30 by 100 foot block excavation S.E.	1981	184
162D	NGS	4, 20 by 30 excavation areas - S. E.	1982	188
162E	NEH	NW Bastion of Ft. San Felip	1982	188
162F	Ex.Club	28,3-foot square sample frame north of Ft. San Felipe (not included here)	1982	188
162G	NSF	a 30 by 120 ft. block excavation Ft.S.F.	1983	190
162H	NSF	a 40 by 120 ft. block excavation Ft.S.F.	1984	196
162J	NEH	a 132, 3-ft. sq. sample frame-S.E.	1985	200
162K	NG Mag.	a 20 by 20 block excavation - S. E.	1985	200

The analysis of artifacts presented in this volume was carried out on all the Spanish artifacts recovered in the above projects. We are concerned in this study with the Santa Elena artifact types as reflected in the list of types and classes seen in Figure 9, which represents the outline we will use in the chapters to follow. The first artifact class seen in that listing under the Kitchen Artifact Group is ceramics. This is a major artifact class that is dealt with in Part 2 of this study. Therefore, glassware is the first of the many artifact classes to be covered in the pages to follow. Ceramics, glassware, and knives are the only three classes of artifacts represented in the Kitchen Group of artifact classes at the Santa Elena site.

CHAPTER 2

THE KITCHEN GROUP OF ARTIFACT CLASSES

Glassware

Eighty-one fragments of glass have been found in Santa Elena in Spanish features and these have been used as a control for separating Spanish glass from nineteenth century glass in the soil layers lying above the Spanish features. The glass fragments from features and from the archaeological levels are tabulated in Appendix II. From the fragments in the Spanish features we find that there are five glass types that can be identified taxonomically, ribbed green, striped, thin clear, and thin pale green. These are shown in Figure 12. A single fragment of a blue handle was also found.

The ribbed green type is characterized by a dark green to gray-green (occasionally clear) color with ribs or ripples, sometimes appearing to form a spiral pattern. This ribbed type is seen on a tumbler in a Velázquez painting from ca. 1618 (López-Rey 1968: Plate 13), and on the base of a Venetian bowl dating from the second half of the sixteenth century (Haynes 1948: Plate 11b), illustrated in Figure 13. Probably because fragments of this type come from tumbler and basal areas of vessels the average thickness from features is greater than for the other types present, being 1.29 mm, with a range of .80 to 2.10 mm.

The striped glass type is characterized by white stripes or "stringing" (Haynes 1948:63) applied over a clear to gray-green metal (Fig. 12). One fragment had red stripes also. A good illustration of the striped glass type is seen in a decanter in a painting of 1622, by Juan Van der Hamen (López-Rey 1968: Plate 35), illustrated in Figure 13. More elaborate versions of this decorative technique were known as *latticinio* glass, such as the covered vase seen in Figure 13, from the sixteenth or seventeenth century (Haynes 1948: Plate 13b). The average thickness of this type is almost the same as that for the ribbed green type, being 1.28 mm for those fragments from features, with a range from .95 to 2.00 mm.

The thin clear type of glass is sometimes so thin as to resemble sherds of lightbulbs, a name which crew members use to describe this diagnostic Spanish glass. This type is thinner than the two previously described types, averaging 1.19 mm in thickness, with a range of .60 mm to 2.25 mm for the fragments from the Spanish features. One fragment of this type glass has small dimples forming a pattern on the surface, which can be seen in the photograph in Figure 12, caused by protection of lead oxide in the dimples. Illustration of globular glass forms is seen from a painting of ca. 1622 (Figs. 13 and 14), by Juan Van der Hamen (López-Rey 1968: Plate 35). Wine glass rim forms are also present in Santa Elena and this form and a decanter are illustrated in Figure 14, from a painting by Murillo from the mid-1600s (Bensusan n.d.: I, 49) and by Velázquez from 1618 (Troutman 1967:36, Plate 4), as well as Velázquez ca. 1617-18 (López-Rey 1968: Plate I).

The thinnest glass is the thin pale green type, (which the crew calls "pale green lightbulb glass") with an average thickness of only .81 mm, and a range of .50 mm to 1.55 mm. This glass is a pale green color, due perhaps, to the thinness and may well appear as darker green in basal fragments. This type may be represented by the tumbler seen in Velázquez' 1617-18 painting (López-Rey 1968: Plate I), and an enamelled French goblet dating from the second quarter of the sixteenth century (*Journal of Glass Studies* 1961: 140, Plate 21, Vol. 3), illustrated in Figure 14. However, the lightbulb like thinness is more like the globular stemmed glassware (bottom left in Figure 14) from the ca. 1622 "Still-Life" by Juan Van der Hamen (López-Rey 1968: Plate 35).

Figure 12. Glass types. **Ribbed** (top row), 162C-77B, 162H-99B,162C-268, 162C-268, 162D-19B. **Striped** (second row), 162H-172H, 162H-172H, 162C-181B, 162D-21B. **Thin green** (third row), 162D-67, 162-93B, 162E-44C, 162E-44C. Handles, dimpled, mirror and **Thin clear** (bottom row), 162J-100B, 162H-172C, 162H-276, 162E-38D, 162E-96.

Figure 13. A ribbed glass tumbler and a decanter (top left), from"Three Men at Table" by Velázquez, ca. 1618 (Hermitage). From López-Rey 1968: Plate 13. A striped glass decanter and clear wine glass (top right), from"Still-Life" by Juan Van der Hamen, ca. 1622 (Prado). From López-Rey 1968: Plate 35. A striped, *latticiniio* type covered Venetian glass vase (lower left), from the sixteenth to seventeenth century, from Haynes 1948: Plate 13b. A Venetian glass bowl with ribbed pedestal (lower right), from the second half of the sixteenth century, from Haynes 1948: Plate 11b.

Figure 14. A thin clear wine glass is shown (upper left), in "A Boy Drinking" by Murillo, from the mid-seventeenth century (National Gallery, London). From Bensusan n.d.: Plate VI, pp.i, 49. An enamelled French goblet from the second quarter of the sixteenth century (top right), (Bayerisches Nationalmuseum, Munich, No.60/67). From *Journal of Glass Studies,* The Corning Museum of Glass, Vol. 3, 1961:140. Stemmed clear glassware (bottom left), ca. 1622, from "Still-Life" by Juan Van der Hamen (Prado). From López-Rey 1968: Plate 35. A thin green tumbler (center) from "Musical Trio" by Velázquez, ca. 1617-1618 (West Berlin, Staalliche Museum). From López-Rey 1968: Plate 1. A thin clear glass flask (bottom right) from "The Cook" by Velázquez, dates from 1618 (National Gallery of Scotland, Edinburgh). From Troutman 1967:36; Plate 4.

Deagan (1978: 43) reports red glass from sixteenth century St. Augustine contexts, but none of this type have been found at Santa Elena. A single handle fragment of blue glass was recovered from the C level of well 172 in Fort San Felipe (Appendix II). Deagan reports relatively little sixteenth century glass from St. Augustine (1978:43). At Santa Elena, only 28 fragments of glass were recovered from domestic contexts, with 65.4% of the 81 sherds from features coming from inside Fort San Felipe. We would expect that possession of glassware in Spanish colonial Santa Elena would likely have been in the hands of the controlling social class, Pedro Menéndez and his family, with virtually none found in the hands of the working class individuals.

Although much of Spanish glass may have come from Venice through trade, by the fifteenth century Catalonia was making good glass. Spanish Netherlands also may have exported glass to Spain (Haynes 1948: 74).

Knives

Two iron knives were recovered from Santa Elena, one having a flat tang for insertion into a bone or wooden handle, and the other designed to function without the addition of a bone or wooden covering (Fig. 15). Outline drawings of these knives are seen in Figure 16, along with relevant measurements. An interesting feature is the "Y" shaped butt end on the iron-handled knife. This artifact was obviously a totally blacksmith made item. It is illustrated in South (1982: 29) in situ in a Spanish pit filled with oystershell midden and thought at the time of excavation to be a scissors fragment, but later found to be a knife with iron handle. The knife with flat iron tang was recovered from the top six inch level of the moat of Fort San Felipe. A knife with this type flat tang is seen in a painting by Velázquez, dated 1618 (Troutman 1967: 36, Plate 4), seen in Figure 17.

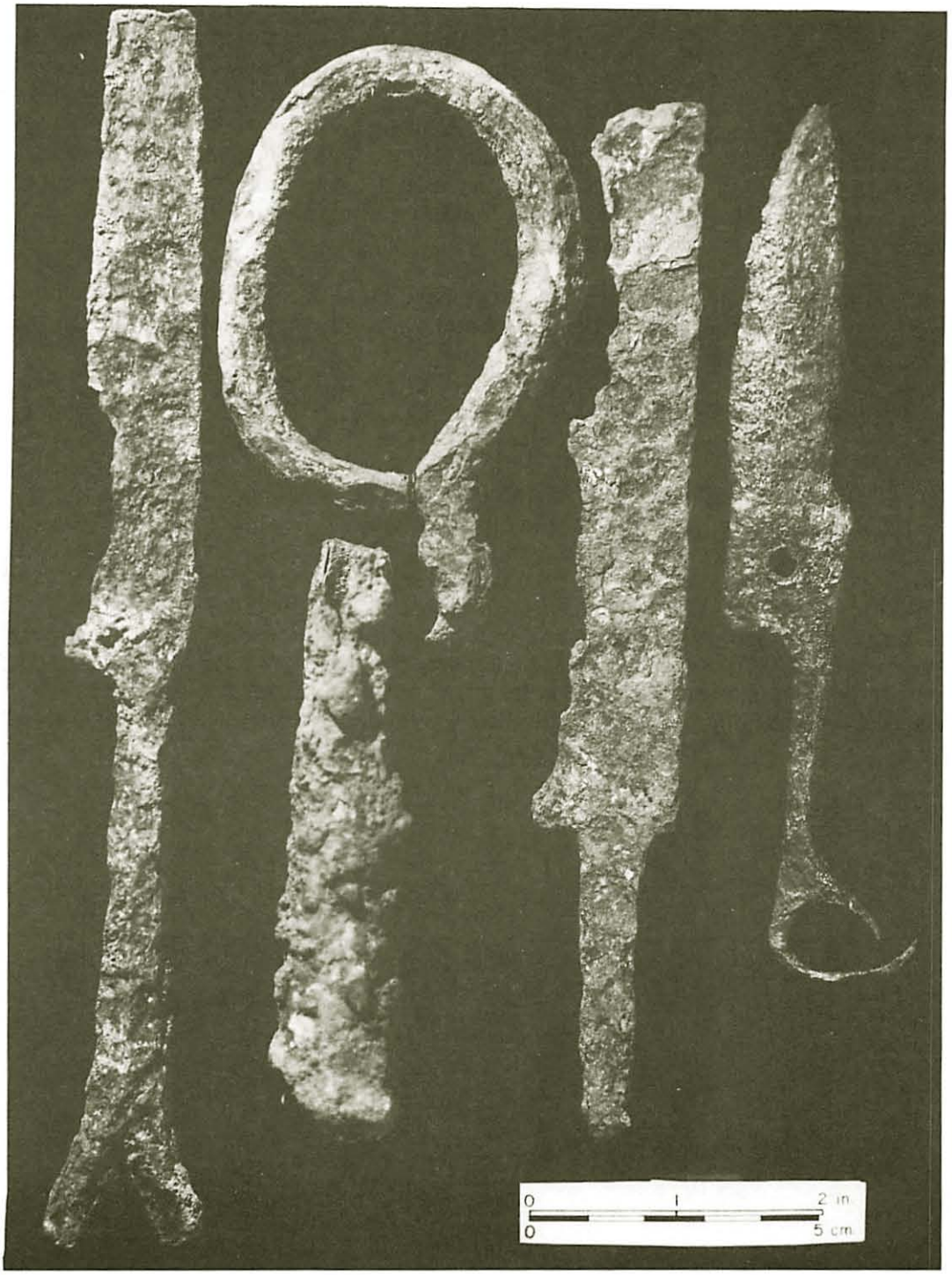


Figure 15. A knife with iron "Y" shaped handle (left, 162C-76A). The eye from a pruning shears (top, 162-136). A tapered, hollow matchlock fuze tube from an arquebus (bottom, 162C-171). A knife with a tang for fastening a handle of bone or wood (second from right, 162-66A). A scissors half (right, 162J-135).

Provenience	Length (mm)	Width of blade at junction with handle	Blade Thickness (mm)
Left:: 38BU162-66A	182.0	22.6	4.5
Right:: 38BU162C-76A	215.0	21.7	3.5

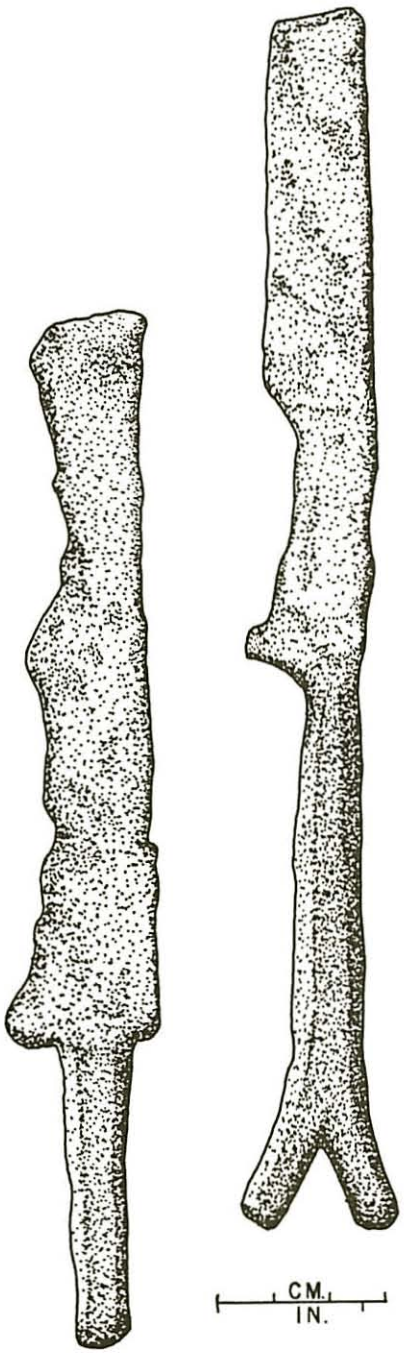


Figure 16. Iron knives with provenience and metric data.
Figure 17. Illustration of flat tang type knife lying on a majolica bowl, from "The Cook" by Velázquez, dated 1618 (National Gallery of Scotland, Edinburgh). From Troutman 1967:36; Plate 4.

CHAPTER 3

THE ARCHITECTURE GROUP OF ARTIFACT CLASSES

Nails

Building a Model

Nails are a major by-product of architectural construction at Santa Elena and Fort San Felipe. To conduct an analysis of nails a classificatory system dividing nails according to class and type must be developed. The best method of achieving this goal would be a system taking into account both the historically documented data and the archaeologically recovered nails. In 1979, Eugene Lyon wrote a summary of the documented information available at that time on Spanish nails, in a paper entitled, "Towards a Typology of Spanish Colonial Nails" (Lyon 1979, Appendix III). This provided the historical documentation necessary for a nail type model and the excavated nails from Santa Elena and Fort San Felipe provide the empirical data needed for such a study. Would an eighteenth century nail model for naval nails be found to apply to sixteenth century nails from Santa Elena?

The model reported in the section to follow was developed and written in October 1985, for use in the subsequent analysis of all nails from Santa Elena and her fort of San Felipe. Several questions needed to be addressed through nail analysis as follows:

1. Could existing documented nail models from the eighteenth century be used as an analysis model for Santa Elena dating two hundred years earlier?
2. Would nails from Santa Elena fit such a documented nail model?
3. What is the relationship between broken and clinched nails (as evidence of discard) and whole nails revealing loss through burning of structures, accidental loss?
4. Which nail types or sizes were most used in construction in Santa Elena?
5. Can a functional relationship between nail head type (rose headed, L-head, T-head) be found to exist in relation to nail size?
6. It is assumed that larger structures, thus larger timbers, thus larger nail sizes, would be present inside Fort San Felipe than in the domestic area of Santa Elena. Would this hypothesis be found to be valid when tested against nail size data from the town and the fort?
7. Could an analysis of clinched nails provide some insight as to the thickness of the two boards being bound together by the clinched nails?

To address these questions historical information was abstracted from the Lyon study (Appendix III) as follows:

Historical Documentation

(Lyon 1979: 2)

CLAVOS DE PESO (major spikes and nails used in shipbuilding) are as follows:

Encolamiento mayor (over 24")
Encolamiento
Cinta Mayor
Cinta
Media Cinta

Costado Mayor
Costado
Medio Costado
Escora Mayor
Escora
Media Escora (ca. 4")

SMALLER NAILS (Lyon 1979:3)

Barrotes
Tillados (refers to flooring)
Estoperoles (short tacks with wide round heads)

A 1513 DECREE OF THE CITY COUNCIL OF BILBAO (Lyon 1979:5)
(Guiard, La Industria Naval, p. 56)

Barrote nails to weigh no more than 90 lbs. per 1000
Tillado nails to weigh no more than 25 lbs. per 1000

Half *barrote* and half *tillado* accordingly, per 1000

(Lyon 1979:2)

SHIP'S CARPENTER *(carpintero de ribera)* (slightly longer nails than joiner's nails)
JOINER *(carpintero de blanco)* (flater heads than ship nails)

SCALE DRAWING OF NAILS (Lyon 1979:6) (AGI *Mapas y Planos, Ingenios y Muestras, 34)*

Analysis of the Documents

The above reference to *encolamiento mayor* (over 24"), at the top of the list of *clavos de peso,* and the term *media escora* at the other (ca. 4"), allows the interpretation that the types listed between these sizes are graduated between a nail length of 24" and one of 4". What the increments are between we do not know from this information alone.

From the 1513 decree relating to *barrote* nails and *tillado* nails weighing 90 lbs. per 1000 and 25 lbs per 1000, with half-weights for each, we can derive the following table of nail weight in ounces and grams (with each gram weighing .035 oz.).

		each nail		grams
barrote	= 90 lb. per 1000	= 1440 oz.	= 1.44 oz.	divided by .035 = 41.1 ea.
1/2 *barrote*	= 45 lb. per 1000	= 720 oz.	= .72 oz.	divided by .035 = 20.6 ea.
tillado	= 25 lb. per 1000	= 400 oz.	= .40 oz.	divided by .035 = 11.4 ea.
1/2 *tillado*	= *12.5* lb. per 1000	= 200 oz.	= .20 oz.	divided by .035 = 5.7 ea.

By converting the pound weight to grams we see that a half-*tillado* nail weighs about 5 grams, a *tillado* nail about 10 grams, a half-*barrote* nail 20 grams, and *barrote* nails weigh about 40 grams, each size being double the weight of the previous size. It would appear from these figures that although the decree of 1513 was stated in terms of pounds, the original system must have evolved using metric weight. Since the decree of 1513 (Guiard, la Industria Naval, p. 56) is related to the naval industry, we might assume that the weights specified here are for *carpintero de ribera,* or ship's carpenter nails.

Valuable data lie in the scale drawing found in Lyon (1979:6; AGI *Mapas y Planos, Ingenios y Muestras,* 34), (Appendix III). Here we see joiner's nails *"carpintero de blanco,"* compared in length with ship's carpenter nails *"carpintero de ribera."* Note the flat head profile of the joiner's nails. Scaling directly from this drawing we can determine the length of each named nail type. The following table summarizes these data, beginning with the largest nail type shown.

Nail type name	Joiner nail length in mm	Ship's carpenter nail in mm
Escorria	160	185
Media escoria	110	150
Alfaxia	70	100
Barrote	55	80
Media barrote	45	65
Qurarto de barrote	35	-

By comparing this list with the *clavos de peso* list of nail types we see that *escora* and *media escora* types appear on both lists, thus placing this list of smaller nails as an extension of the lower range of nail sizes as follows:

Nail type name	Known size range mm (Joiner's)	(Ship's Carpenter)	Known weight per nail in gms (Joiner's)	(Ship's Carpenter)
Encolamiento mayor (over 24")				
Encolamiento				
Cinta mayor				
Cinta				
Media cinta				
Costado mayor				
Costado				
Medio costado				
Escora mayor				
**Escora*	160	185		
**Media escora (ca. 4")*	110	150		
Alfaxia	70	100		
Barrote	55	80		41.1
Media barrote [1/2 barrote]	45		65	20.6
Qurto de Barrote	35	?		
Tillado [same as above?]				11.4
1/2 Tillado				5.7

*match point for the two lists

From these data we see that the *barrote* is 41.1 grams per nail, with the half *barrote* being half that at 20.6 grams. It follows, therefore, that the "*quarto de barrote,*" (1/4 *barrote)* should be about 10 grams in weight, since a full *barrote* is 41.1 grams. We have no weight for the *quarto de barrote,* but we do have a weight for the *tillado,* which is 11.4 grams, with the 1/2 *tillado (medio tillado)* being 5.7 grams. It follows from these data that the *tillado* is very likely the same nail size as the *quarto de barrote* .

Given these data of size and weight we might theoretically reconstruct a model nail table of length and weight by filling in the missing parts of the pattern we already have in hand. If such a model table is in hand we can then measure all the nails from Spanish Santa Elena or other contexts and see how the size and weights relate to our hypothetical model based on the data presented above. In so doing we should have a reasonably tight fit between the documentary data presented here and the archaeologically recovered nails and spikes.

Nail Length

We might assume that the nail lengths shown on the eighteenth century scale drawing are the ideal for the various nail types and that blacksmiths making these nails could control the length within fairly narrow ranges. This is possible through the heading process, where any excess shank length can be compensated for by allowing more of the iron to become part of the head of the nail, while the length of the nail remains consistent. Therefore, we can use the given nail lengths as the ideal mode around which variation in length would cluster. For instance, the ideal joiner's nail size for *media barote* is 45 mm, with that for the next larger size, *barrote,* being 55 mm. The mid-point between these ideals is 50 mm, the most distant point from the mode of each type. By picking the mid-point between each known nail type we can construct a nail length range representing a mode around which variability clusters. The size ranges thus created for the known nail types are seen as follows for metric and equivalent sizes in inches.

Nail type name	KNOWN SIZE RANGE			
	JOINER'S NAILS		SHIP'S CARPENTER NAILS	
	Metric mm	Inches	Metric mm	Inches
Escoria	135- 184	5 1/4+ - 7 1/4	168-203	6 1/4 - 8
Media escoria (ca. 4")	90-135	3 1/2+ - 5 1/4	125-168	5+ - 6 1/4
Alfaxia	63-90	2 1/2+ - 3 1/2	90 -125	3 1/2+ - 5
Barrote	50-63	2 + - 2 1/2	73-90	3+ - 3 1/2
Media barrote	40-50	1 1/2 + - 2	57-73	2 1/4 - 3
Quarto de barrote (tillado)	30-40	1 1/4 - 1 1/2		

By using these measurements from the documents for the six nail types at the smaller end of the nail size range we can interpolate from these to the larger sizes up to the largest, *encolamiento mayor* , which we know to be over two feet in length. The range in size for the *escora* nails is two inches, from 5 1/4 to 7 1/4 inches. If we take a similar range for each of the nail types larger than this we can derive a general model for the entire range of nail sizes as seen in Table 1.

TABLE 1: SPANISH NAIL SIZE MODEL

JOINER'S NAILS

Nail Type No.	Nail Type Name	Known Nail Length mm	Nail Size Range mm	Nail Size Range (in.)
17	*Encolamiento mayor (over 2')*		610+	24+
16	*Encolamiento*		*530+ - 610	*21+ - 24
15	*Cinta mayor*		*480+ - 530	*19+ - 21
14	*Cinta*		*430+ - 480	*17+ - 19
13	*Media cinta*		*380+ - 430	*15+ - 17
12	*Costado mayor*		*330+ - 380	*13+ - 15
11	*Costado*		*280+ - 330	*11+ - 13
10	*Medio costado*	*255	*230+ - 280	*9+ - 11
9	*Escora mayor*	*207	*185+ - 230	*7 1/4 - 9
8	*Escora*	160	135+ - 185	5 1/4+ - 7 1/4
7	*Media escora*	110	90+ - 135	3 1/2+ - 5 1/4
6	*Alfaxia*	70	63+ - 90	2 1/2+ - 3 1/2
5	*Barrote*	55	50+ - 63	2+ 2 1/2
4	*Media barrote (1/2 barrote)*	45	40+ - 50	1 1/2+ - 2
3	*Quarto de barrote (tillado)*	35	30+ - 40	1 1/4+ - 1 1/2
2	*Half tillado*	*25	*20+ - 30	*3/4 - 1 1/4
1	*Estoperoles (wide headed tacks)*	*20	*15+ - 35	*5/8 - 1

SHIP'S CARPENTER NAILS

17	*Encolamiento mayor (over 2')*		610+	24+
16	*Encolamiento*		*555+ - 609	*22+ - 24
15	*Cinta mayor*		*505+ - 555	*20+ - 22
14	*Cinta*		*455+ - 505	*18+ - 20
13	*Media cinta*		*405+ - 455	*16+ - 18
12	*Costado mayor*		*355+ - 405	*14+ - 16
11	*Costado*		*305+ - 355	*12+ - 14
10	*Medio costado*		*255+ - 305	*10+ - 12
9	*Escora mayor*		*204+ - 255	*8+ - 10
8	*Escoria*	185	168+ - 204	6 1/4+ - 8
7	*Media escora*	150	125+ - 168	5+ - 6 1/4
6	*Alfaxia*	100	90+ - 125	3 1/2+ - 5
5	*Barrote*	80	73+ - 90	3+ - 3 1/2
4	*Media barrote (1/2 barrote)*	65	57+ - 73	2 1/4 - 3
3	*Quarto de barrote (tillado)*			
2	*Half tillado*			
1	*Estoperoles (wide headed tacks)*			

* Interpolated data
Fractional data rounded to 1/4 inch

Nail Weight

The weight of four nail types is known from the documents as follows:

Nail type name	Weight in grams for each nail
Barrote	41.4
Half-*Barrote*	20.6
Tillado	11.4
Half-*Tillado*	5.7

It is tempting to continue the neat pattern seen here to determine the weight of individual nails in other types. If we do this, taking the double gram weight in each case, we have a nail weight scale as follows for the ship's carpenter nails for the primary nail types.

Nail type number	Weight of ship's carpenter nails in grams
17. *Encolamiento mayor*	
16. *Encolamiento*	(1280.0)
15. *Cinta mayor*	
14. *Cinta*	(640.0)
13. *Media cinta*	
12. *Costado mayor*	
11. *Costado*	(320.0)
10. *Medio costado*	
9. *Escora mayor*	
8. *Escora*	(160.0)
7. *Media escora*	
6. *Alfaxia*	(80.0)
5. *Barrote*	41.1
4. *Media barrote (1/2 barrote)*	20.6
3. *Quarto de barrote (tillado)*	11.4
2. Half *tillado*	5.7
1. *Estoperoles* (wide-head tacks)	

( ) = interpolated weight

Here we have no control over the upper part of the list so we do not know how accurate our predictions might be. It should be noted that the weights we do have appear to relate to each other *within a class*. For instance, a *media barrote* is half the weight of a *barrote* nail, and a half *tillado* nail is half the weight of a *tillado* nail, but a *tillado* is not half the weight of a *barrote*, the *barrote* weighing 90 lbs. per thousand, with a *tillado* weighing only 45 lbs. per thousand nails. Therefore, we have no way of determining the relationship between the various nail *classes* (groups of types) other than by means of a conjectural model we are trying to create here. If the model is functional in that weighed and measured nails are found to consistently fit within the weight and length ranges for the various classes, then we have created a model with some degree of "fit" to that originally in use within the Spanish cultural system, albeit the model is two hundred years later than the nails we are measuring. The model for Spanish nail *classes* for joiner's nails by weight and length is seen in Table 2 as follows:

TABLE 2: SPANISH NAIL CLASS MODEL USING WEIGHT AND LENGTH

JOINER'S NAILS

Class Code	Nail Class Name	Length Class Range mm	Length Class Range inches	Weight Range grams
	Encolamiento	530+ - 610+	21+ - 24+	960 - 1600
	Cinta	380+ - 530	15+ - 21	480 - 960
E	*Costado*	230+ - 380	9+ - 15	240 - 480
D	*Escora*	90+ - 230	3 1/2+ - 9	120 - 240
C	*Alfaxia*	63+ - 90	2 1/2+ - 3 1/2	60 - 120
B	*Barrote*	30+ - 63	1 1/4 - 2 1/2	8 - 60
A	*Tillado*	20 - 30	3/4 - 1 1/4	3 - 8
	Estorperoles	15 - 25	5/8 - 1	

This process moves us from a very particularistic level to a more generalized one, which is necessary since we are dealing with more unknowns than with the nail length data alone. To test the degree of fit of this model with the largest spike recovered from the northwest bastion of Fort San Felipe (38BU162E-98), we measure the spike and weigh it. It weighs 332 gms. Using the weight range for the nail classes we see that this weight falls into the *costado* nail class. It appears, therefore, that this nail from the northwest bastion is what the Spaniards at Santa Elena may well have called a *costado* class nail.

In making use of the nail weight and length model presented here a difficulty is seen in weighing archaeologically recovered nails in that the scaling of rust from the iron nails through four hundred years of time has reduced the weight of the nail. Some nails, however. were subjected to fire or embedded in an environment where virtually no rusting has taken place. Naturally preserved nails such as this can well be used to establish a set of data that can be used with the Spanish Nail Class Model developed here. Such nail *weights* are expected to be seen to cluster around modes represented by each nail class. Nail *lengths* are expected to cluster around the nail type modes in the center of the ranges seen in the Spanish Nail Size Model. If such unimodal curves for nail types and classes developed here are seen to occur when data from Santa Elena are applied, we will have assurance that the models have a reasonably good "fit" with the empirical model used in the sixteenth century Spanish colonial system.

Nail Size and Function

In the previous model building section we have created two models for use in classifying nails by length and weight consistent with surviving information from the Spanish records. By measuring and weighing nails and comparing the resulting patterns with the models the nails can be placed into one of the classes or types used by the Spaniards who used the nails. We will now address the question of how these nails functioned in the system.

The first clues can be found in the Spanish names for the various classes of nails. The following list with a general statement as to the meaning of the word involved was completed through the help of Eugene Lyon (personal communication 10/8/1985). Since the list of nail class names comes from a naval source, the names we have relate to shipbuilding. The joiner's nails, however, also carried the same names, though the length for each class was slightly shorter (a greater length being needed to carry the extra stress joined timbers were subject to on ships as opposed to house construction or for use in holding the larger timbers needed in constructing fortifications).

Encolamiento "a joining together" of major timbers, beams, etc.
Cinta "wales around the hull of a vessel"
Costado planking along the sides of a vessel
Escora shoring supporting a vessel in dry dock
Alfaxia -
Barrote the cross of the main yards of a vessel where a beam is fastened to the underside of the yardarm as a cross brace
Tillado the decking or roofing over the bow and stern of a ship, equivalent to flooring in a house
Estoperoles large wide-headed tacks used inside ships to fasten esparto grass matting used to pad the cargo during shipment

By examining the length of the nail classes in the nail class model we see that nails from 5/8" long to 3 1/2" include the *alfaxia, barrote, tillado* and *estoperoles* used to fasten flooring, braces for yardarms, matting, etc., requiring relatively little strength or length. Such nails can be smaller than those involved in bracing heavy timbers. Larger nails, beginning with the *escora* class, which is an intermediate class between large and small nails (3 1/2 - 9 inches), are used to fasten heavier timbers together, from building the shoring supporting a vessel in dry dock to joining together major beams to insure a tight fit between the mortised timbers. These larger size nail classes are *costado, cinta,* and *encolamiento.* It appears, therefore, that the 17 types of Spanish nails known from the documents can be seen as forming two large groups, a structural framing group involving the larger four nail classes, and a smaller nail group used in finish work such as flooring. These are the two basic groups of nails dealt with by Willis (1984) in his analysis of the nails from Puerto Real.

Nail Heads

Since size is a major functional variable we have dealt with it in terms of a nail type model based on the Spanish documents in relation to nail length. Another attribute of nails providing a clue to function is the head. Noël Hume states in regard to handwrought nails from the seventeenth and later centuries, "The heads varied according to the purpose for which they were to be used, the most common being the 'rose head' that generally had five hammered facets spreading out and down from a central point; others were L-headed and were used as trim and flooring nails, while another variant, also used on floors, had a flat disc head hammered over on opposite sides of the shaft and was therefore known as a T-head" (Noël Hume 1970:252).

In our study of Spanish nails from Santa Elena we will use these same basic head attributes, with "T" being used to designate T-headed nails, "L" the L-headed type, and "R" the flat to domed round rose head nails. Willis (1984:96) states that the L and T-head nail form allowed "the countersinking of the nail head flat with a finish surface parallel to grain." This may well have been the function of such nails in the smaller sizes, such as for flooring, but some of the larger size Spanish nails have L-heads made by simply hammering over the

large end of the spike to a right angle with the shank and beating this mass of iron into a flat head forming an L-headed spike, the head of which is too large to have functioned to fit between the grain of wood. These large L-head spikes are more like railroad spikes in the shape of their L-head. In such cases the function of the head is related to the holding power rather than to allow it to disappear into the body of the timber it is holding. These large L-head spikes have such large heads that they sometimes have multi-faceted heads, but since they are basically L-shaped we will deal with them as L-headed nails.

The T-headed spikes, however, may well have been designed to be pounded into the body of the wood, or into a groove, allowing the surface to remain flush since they are hammered into a narrow shape no wider than the width of the shank. This narrow shape is well designed to allow countersinking.

The rose headed nails with several hammer blows forming the head are usually round to rectangular when viewed from the end. Such nail heads were designed to sit on the surface of the wood after the shank was driven into the wood. The degree of dome to this rose head determines whether it is a joiner's nail with fat to low dome profile, or a high domed head, which designates it as a ship's carpenter nail. At this time, before any of the analysis has been carried out, my impression is that most of the Santa Elena nails are the low head profile joiner's nails.

Some of the nails from Santa Elena would have come from Spain, whereas some would have been made in the town on the forge known to have been there (Eugene Lyon, personal communication). Some of the nails I have noticed from Santa Elena are neatly made with a number of hammer strokes forming the rose head in a symmetrical manner. Other nails, however, such as some of the large L-head spikes, have roughly hammered heads showing far less care was taken in their manufacture. We might conjecture that the ones more expertly made would have been made in Spain by more experienced blacksmiths, but we have no justification for thinking that locally made nails would be less expertly made than imported ones.

The large wide-headed tacks called *estoperoles* are remarkable in that their head appears to be as wide as the shank is long. These were used inside ships to fasten grass (*esparto)* matting to stanchions for containing cargo during shipment (Appendix III). When the cargo was unpacked the mats were removed and many of these may well have been reused in Fort San Felipe for containing soil during the construction of the earthen fortifications. If such were the case a larger number of these *est operoles* would likely be found in the area of the fort, or they may well have also been used in the town of Santa Elena for partition walls, fastening lathing strips, or other purposes. The distribution of the *esterpoles* within the town and fort is of interest, therefore regarding their reuse.

In Willis' study of nails from Puerto Real (1984: 100), he found that there were differences in distribution of framing nails, structural nails, flathead nails, rose head nails and finish nails. His numbers were so small, however, that it is not certain how much interpretive value this distribution has toward understanding function.

Bent Nails

Raymond Willis measured bent nails from the top of the head to the center of the bend in order to arrive at some estimate of the thickness of the timbers and boards the nails were holding (1984: 105). I feel that this process would reveal thicker boards than were actually involved, since the bending of a nail by separating two boards fastened with nails produces a bend that would lie *outside* the part of the nail embedded in the headed half of the nail. A more accurate measure of the board thickness likely involved would seem to be the

measurement from the head of the nail *to the point at which the bend begins*. This measurement should be taken on the *inside* of the bend. There is a difference, by the way, between right-angle *clinched* nails and those with obtuse angles formed when boards fastened with nails are *prized* apart, resulting in nails with obtuse bends. Clinched, or right angle bent nails, are good indicators that the nail went through *two* boards, protruding through the back of the boards where it was then bent over at a right angle to the shank. Such nails are good clues to the thickness of the two pieces of wood they once went through. Half the distance from head to clinch would be an estimate of the two boards involved, assuming both boards were the same thickness, which may well have not been the case, but half the distance is the best compromise we can come to given the fact that *two* boards were likely involved, not one.

A good way to determine the thickness of timbers and boards into which nails have been fastened is sometimes seen in the differential rusting of the nail. If one of the boards burned and the other did not, then one end of the nail may well be preserved by the heat tempering of the nail causing it not to rust, whereas the other end did rust. The thickness of the wood members involved can be quite accurately determined in such cases. Obviously, this method is available only on some few of the nails.

Nail Fragments

Broken nails, headless nails and nail sections are sometimes seen, as a result of breakage during salvage operations. Obviously such nails cannot be used in length or weight analyses and, therefore, attributes of such nails are not recorded beyond presence and absence.

Using the attributes discussed in the previous pages we can now construct an analysis table for use in recording the characteristics of the nails recovered from various contexts at Santa Elena and Fort San Felipe. As we have seen, the largest nail recovered from Fort San Felipe is a *medio costado* class nail. This means that the larger, *cinta* and *encolamiento* nail classes will not be present in the analysis, leaving only 10 types to be used in our analysis (Table 1).

Because the wide head of the *estoperoles* tacks, the width of the head in relation to the length of the shank is an important attribute to record. For this reason both head width and shank length are recorded. The provenience for each nail is recorded as well. The presence of nail fragments is also noted and the nail length is recorded. Also tabulated are data on nail heads, whether "L," "T," or "R". Any of the high-domed ship's carpenter nails have an asterisk placed beside the provenience number to indicate this attribute.

Bent nails have the total length and head attributes recorded in the usual manner, but have a "head to bend" and "bend to point" measurement as well. A "C" is used to indicate the right angle clinched nails. Nail weight in grams is recorded for those nails showing little or no loss of weight by scaling of rust. The weight is used to determine which nail class letter is predicted by the weight and this is recorded in the "CLASS" column. Some nails will be straight but will reveal, through burning, rusting or other physical clue on the body of the nail the thickness of the wood it was once fastened into. These data are recorded under the "STRAIGHT NAIL" column. The resulting analysis form is seen illustrated in Figure 18.

SPANISH NAIL ANALYSIS FORM

* = Ship's carpenter nail (domed)
C = clinched nail (rt. angle)
R = flat or rose head nail
L = L-head nail
T = T -head nail

(-) = no head				CLINCHED (C)		STRAIGHT		CLASS	NAIL
PROV.	TYPE 1			OR BENT NAIL		NAIL	WT.	(wt/gm	FRAGS.
NO.	HEAD	TYPE 1	TYPES	HEAD TO	BEND TO	HEAD TO	(gms.)	(letter)	(letter)
	(mm)	SHANK	2 TO 10	BEND	POINT (mm)	RUST (mm)			
		(mm)	(mm)	(mm)					

Figure 18. Spanish nail analysis form.

Nail Description

As the analysis of nails was carried out it became obvious that virtually all the nails were joiner's nails and not the high domed and faceted ship's carpenter nails mentioned in the above model. Only two domed ship's carpenter nails were represented in the nail assemblage. The Spanish nails are characterized by having a flat to domed head,with some of the rose heads appearing like toadstools. They are usually more massive in appearance than wrought nails from eighteenth century British colonial contexts. Only ten types are represented at Santa Elena and these are illustrated in the drawing in Figure 19 and in the photograph in Figure 20. All nails were *wrought* by a blacksmith.

Nails such as we are dealing with here are illustrated in a painting of 1547, by Pedro de Campaña, showing Christ being taken down from the cross (Jedlicka 1964: 10, Plate 11), (Fig. 21). Another good view of nails is seen in the same figure, showing "The Dead Christ" by Carracci, painted prior to 1609 (Caravaggio 1985:110). A rose headed and a T-headed nail and a pair of nail pullers are illustrated in this painting. The nails are typical of those from Santa Elena and Fort San Felipe.

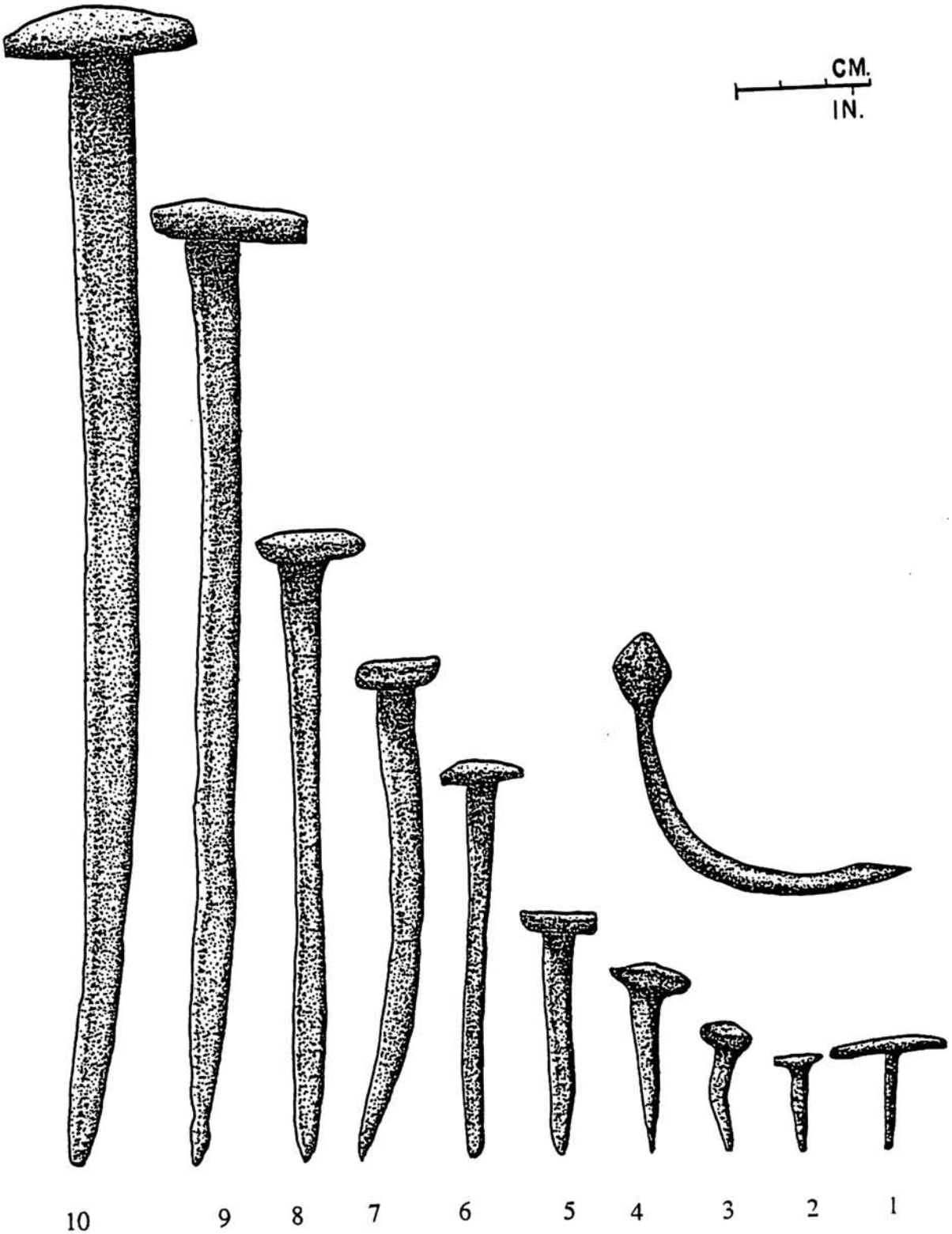


Figure 19. Spanish joiner's type nails and spikes. A bent ship's carpenter nail.

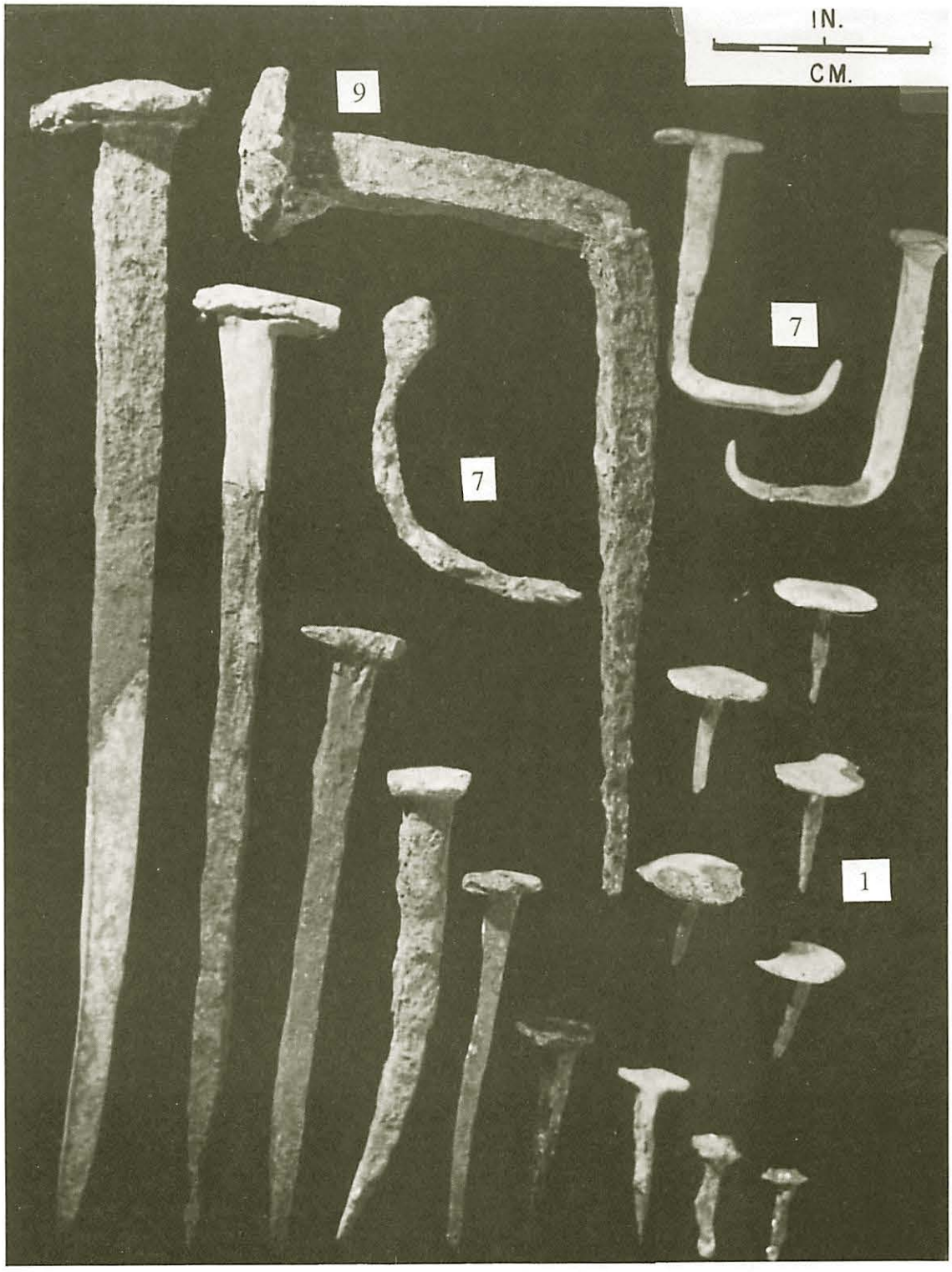


Figure 20. Spanish nail types. Left to right, types 10 through 2. Type 10, (162E-98); Type 9, (162E-120); Type 8, (162E-96); Type 7, (162E-98); Type 6, (162E-96); Type 5, (162-10A); Type 4, (162C-357); Type 3, (162C-175); Type 2, (162E-43C). Center right, five *estoperoles* tacks. Center, a bent ship's carpenter nail, Type 7, (162C-257). Center top, A clinched Type 9 nail, (162E-96). Top right, two clinched Type 7 nails, (162E-38C and 162E-38D).

Figure 21. Spanish nails at the feet of Christ. From "The Dead Christ" by Annibale Carracci (Staatsgalerie, Stuttgart), ca. 1609 (Above). From *The Age of Caravaggio,* Metropolitan Museum of Art: 1985. Left, from Pedro de Campaña,"Descent from the Cross" of 1547 (Seville Cathedral). From Jedlicka 1964:10:Plate 11.

In regard to nails and Santa Elena (named for the Spanish discovery of the area on St. Helena's day), it is of interest that St. Helena is often portrayed with a hammer and nails. The reason for this relates to St. Helena's excavations in historical archaeology, which makes her something like the matron saint, not only of Santa Elena, but of the field of historical archaeology! As additional inspiration to historical archaeologists, she undertook her excavation at the age of 80! (Ferguson 1958: 73).

St. Helena was the mother of Constantine the Great, the Roman Emperor who was converted to Christianity. To demonstrate her piety she traveled to Jerusalem and carried out excavations on the Mount of Calvary to recover evidence of the crucifixion of Christ. Her excavations uncovered three crosses and a sign on which was inscribed "Jesus of Nazareth, King of the Jews." Her dig was obviously a success, but as is often the case with archaeology, her excavation raised additional questions. Which of the crosses was the *vera cruz* or True Cross on which Christ was crucified? To discover this she conducted an experiment. She had a very sick man to be placed on each cross and when he touched the True Cross he was healed. Thus, through experimental testing, she was able to discover which excavated cross was the one she sought through her excavations.

However, further questions remained to be answered.Where were the nails used to fasten Christ to the cross? They had not been found during the first dig, so St. Helena caused a second expedition to be undertaken with the research problem designed to locate these historical artifacts. Whatever methods she used, they were successful in locating some of the nails, which were said to be, "shining as gold." She gave two of these to her son, Constantine, as souvenirs of her excavations. He fastened one to his helmet and the other to the bridle of his horse as symbols of his mother's venture into historical archaeology to prove her piety and devotion to Christianity (Ferguson 1958: 73).

Using the Model for the Nail Analysis

Using the above analytical outline all nails from Santa Elena and Fort San Felipe were tabulated individually by provenience location and the results are seen in the tables in Appendix IV. These data were then used to tabulate nail size using ascending metric length (Appendix V), and then were grapically plotted as seen in Figure 22. From this graph we see that nail types six and seven are the major sizes used at Santa Elena and Fort San Felipe. We notice, too, that when compared with the nail size model developed in the above section, the empirical nail graphs show no correlation at all with the predictive model. There is, therefore, no direct correlation between the historically derived model and the data from Santa Elena and Fort San Felipe. This does not affect its use as a taxonomic model, however.

We can address the hypothesis that larger nail sizes would be used in Fort San Felipe than in the domestic area of Santa Elena by looking at these same nail data in tabular form as seen in Table 3. From this table we see that large nail sizes 7 through 10 comprise 36.6% of the nails from Santa Elena domestic contexts, whereas these sizes comprise 52% of the nails from the fort. These data support our argument that larger timbers and thus larger nails would be involved in fortification construction on historic sites (South 1985b). It should be noted that the postholes for such construction were three times the size of those in the domestic dwellings.

TABLE 3: COMPARISON OF NAIL SIZES IN SANTA ELENA AND FT. SAN FELIPE

Nail Type No.	Nail Size Range mm	Santa Elena Count	Santa Elena %	Ft. San Felipe Count	Ft. San Felipe %
1	(Large headed tacks, estoperoles, not included here.)				
2	20 - 30	12	2.74	6	1.57
3	30+ - 40	19	4.35	16	4.18
4	40+ - 50	37	8.47	17	4.44
5	50+ - 63	47	10.75	36	9.40
6	63+ - 90	162	37.07	109	28.46
7	90+ - 135	124	28.38	140	36.55
8	135+ - 185	26	5.95	43	11.23
9	185+ - 230	9	2.06	10	2.61
10	230+ - 280	1	0.23	6	1.56
Total		437	100.00	383	100.00
Large nails, types 7-10 =		160	36.61	199	52.00

An interesting contrast emerged from the comparison of the quantity of nails from the domestic town versus the military fort. The ratio of excavated area in Santa Elena compared to the fort is 1 to 1.7. The 437 nails from Santa Elena multiplied by 1.7 is 743, the projected number of nails for the fort if the quantity of nails used in Santa Elena and the fort were the same. However, rather than a figure as large as 743, the fort nail count is only 383, less in fact than for Santa Elena, being a ratio of 1 to minus 1.1 for the fort. This tells us that far fewer nails were used in the *casa fuerte* than in Santa Elena structures. Perhaps this has to do with the use of larger timbers in the fort, where nails may have been of less use than mortise and tenion construction. In wooden forts, therefore, the nails and spikes may be larger in size but fewer in number than in domestic post-and-lintel wattle-and-daub construction.

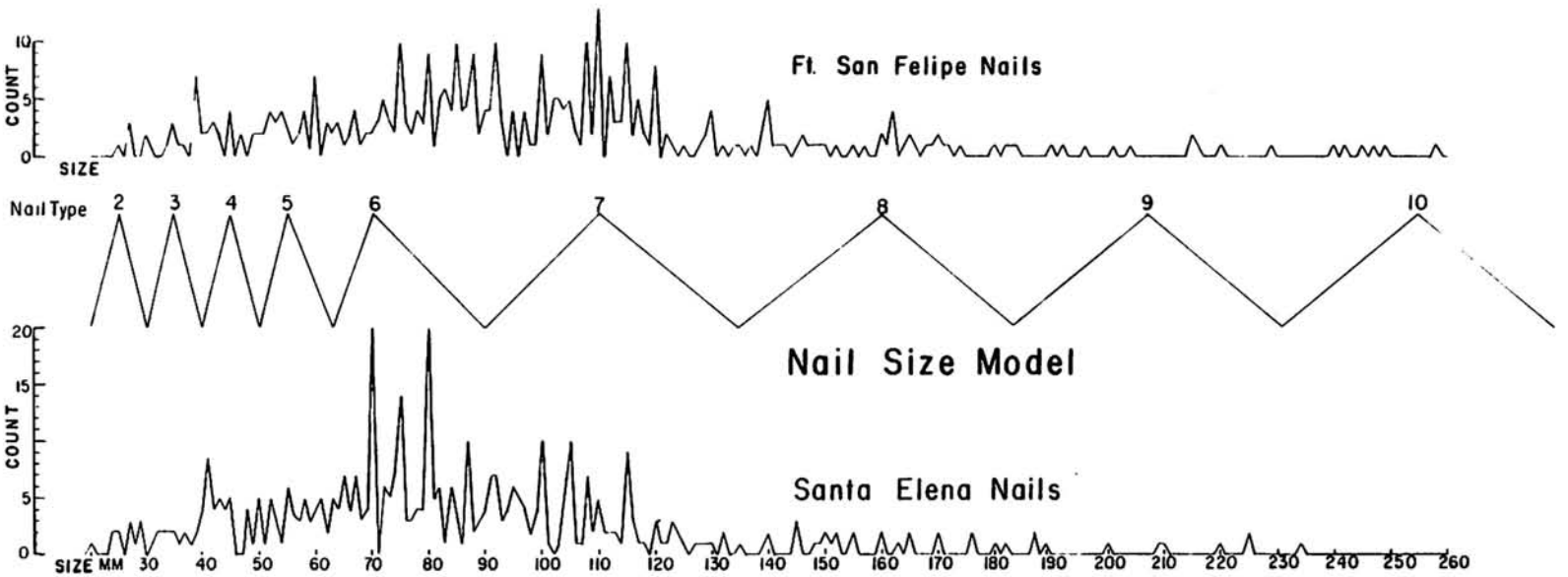


Figure 22. Graphic comparison of nail size from Santa Elena and Ft. San Felipe in relation to the nail size model.

Nail Head and Broken Nail Analysis

Using the analytical model developed in the previous section a comparison can be made between nails with rose heads, L-heads, T-heads, and nail fragments without heads. These data are tabulated in Appendix VI, and a summary is seen in Table 4. From the 1497 headed nails recovered, 90.3% are of the rose head type. Only 11 nails had L-heads and only 135, or 9.0%, were T-headed nails. It would appear from these data that the L-head type is very likely simply a variant of the T-head type. T-head nails (and I would also now include L-head nails with T-head nails as a functional category) are characterized by having the cross bar of the "T" flush with the width of the shank of the nail.

TABLE 4: WHOLE AND BROKEN NAILS IN SANTA ELENA AND FT. SAN FELIPE

	SANTA ELENA			FT. SAN FELIPE				
ROSE HEAD NAILS	Count	%	%	Count	%	%	Total	%
Whole	368	47.36		342	59.58		710	
Broken	409	52.64		232	40.42		641	
TOTAL	777	100.00	88.8	574	100.00	92.40	1351	90.30
L-HEAD NAILS								
Whole	7			1			8	
Broken	3			-			3	
TOTAL	10		0.9	1		0.20	11	0.70
T-HEAD NAILS								
Whole	62	69.66		40	87.23		102	
Broken	27	30.34		6	12.77		33	
TOTAL	89	100.00	10.3	46	100.00	7.40	135	9.00
TOTAL HEADED NAILS	876		100	621		100.00	1497	100.00
TOTAL WHOLE NAILS	437	32.00		383	42.00		820	36.00
Total Broken Nails (with heads)	439			238			677	
Total Broken Nails (without heads)	491			290			781	
TOTAL BROKEN NAILS	930	68.00		528	58.00		1458	64.00
TOTAL ALL NAILS	1367	100.00		911	100.00		2278	100.00

It should be pointed out that we use the term nails and spikes as a general term, with spikes being those larger nails in the upper size range of the nail size continuum. It is interesting to note that in our contemporary merchandising of nails the term spike is used for nails ten inches long and longer, and are sold as 10" spikes, 12" spikes, etc., whereas those smaller nail sizes are sold by the pennyweight, as ten penny nails, twenty penny nails, etc. We might suggest that the term spike might well begin with our Type 10, *medio costado* size for those nails over nine inches. The term spike, however, is simply a term for the larger size nails.

Table 4 illustrates the dramatic relationship between broken (assumed to be discarded) nails, comprising 64.0% of the 2,278 nails recovered at Santa Elena and Fort San Felipe, with whole nails comprising only 36.0% of the nails. These whole nails may well have resulted from the *defacto* process of the town and fort burning in 1576. The presence of so many broken, discarded nails in the archaeological record is clear indication that such artifacts were not at a premium as trade goods with the Indians or other recycling processes, but were discarded in great numbers in refuse deposits.

Bent and Clinched Nail Analysis

In the pioneering study by Willis of bent and clinched nail function (Willis 1984), the formal treatment of such nails was carried out with the view of interpreting the size of the wooden members fastened together with these nails. Head to bend measurements were taken to indicate the thickness of the wood the nails were once driven into. Bent nails are those nails having something like a 45 degree angle and may have received this bend through the process of the board through which they were driven being prized away from another board in the process of salvaging wood. The head to bend measurement may, in such cases, reflect the thickness of the wood through which the nail was driven. Such nails could simply have received their bends through the process of being driven into the wood and then discarded rather than being straightened to be driven again. In the present study we have used the head to bend measurement as a clue to possible lumber thickness involved.

With clinched nails, *i.e.*, those nails whose bends are at right angles to the shank, we might asume that such nails were driven into *two* boards to fasten them together where the opposite side of the boards was visible so that the point of the nail could be hammered over at a right angle by the carpenter. This would eliminate such nails from being used in floorboards since floorboard nails cannot be clinched but would simply fasten as straight nails into the joist beneath. Large nails would have pilot holes driven to receive them, of course. Clinched nails are illustrated in Figure 20. In regard to flooring nails, there is considerable evidence to indicate that the houses in Santa Elena did not have wooden floors, the hard packed earth serving as a floor instead.

Using these ideas of interpreting board thickness from nails, all clinched and bent nails were measured using the nail analysis model seen in Figure 18. The results of the original tabulation are seen in Appendix IV. From these data, tables of bent and clinched nails were derived, and these are seen in Appendix VII. From these data, bent and clinched nail Tables 5-8 were derived.

Bent Nail Board Thickness

In Table 5 the metric distance from the top of the nail head to the point where the bend begins for nail types from Santa Elena and Fort San Felipe are tabulated. From this table we can see that nail types 5 through 7 are most frequently seen in Santa Elena, with types 6 and 7 being most frequently seen in the fort. By deriving the average head to bend length from Table 5, and converting to inches, we have the interpreted board thicknesses seen in Table 6. From these data we can see that boards from 3/4" to 5 7/8" are possibly represented. It is interesting to note that there is a tendency for thicker boards to be represented by bent nails from the fort than from Santa Elena domestic contexts. This is in keeping with our hypothesis based on our arguments of relevance.

TABLE 5: BENT NAIL TABULATION FOR SANTA ELENA AND FT. SAN FELIPE

SANTA ELENA HEAD TO BEND MEASUREMENT (mm)

NAIL TYPE	2	3	4	5	6	7	8	9	10
mm	15	20	18	23	35	70	100	35	0
	18		20	30	55	65	25		
				20	30	35			
				32	35	28			
				32	42	50			
				20	57	35			
					55	40			
					60	40			
					40	45			
					35	30			
					25	55			
					25	90			
					60	60			
					30	65			
					40	65			
					22	45			
					35	50			
					40	30			
						70			
						60			
S.E.TOTAL	33	20	33	157	721	1028	125	35	0

FT. SAN FELIPE HEAD TO BEND MEASUREMENT (mm)

	20	35	55	55	150	110		
		45	75	140				
		40	65					
		36	50					
		45	71					
			70					
			40					
			50					
			55					
			45					
			93					
			70					
FT. SAN FELIPE TOTALS	20	201	739	195	150	110		

TABLE 6: INTERPRETED BOARD THICKNESS FROM BENT NAILS

	SANTA ELENA		FT. SAN FELIPE	
NAIL TYPE NO.	AVERAGE BENT NAIL HEAD TO BEND (mm)	AVERAGE INTERPRETED BOARD THICKNESS (head to bend) inches	AVERAGE BENT NAIL HEAD TO BEND (mm)	AVERAGE INTERPRETED BOARD THICKNESS (head to bend) inches
2	16.50	5/8"		
3	20.00	3/4"		
4	16.50	5/8"		
5	26.20	1"	20.00	3/4"
6	40.00	1 5/8"	40.20	1 5/8"
7	51.40	2"	61.60	2 1/2"
8	62.50	2 1/2"	97.50	3 7/8"
9	35.00	1 3/8"	150.00	5 7/8"
10	-		110.00	4 3/8"

Clinched Nail Board Thickness

Right angle clinched nail head to bend distances are seen tabulated in Table 7. Nail types 6 through 8 are seen to predominate in Santa Elena, with types 6 and 7 doing so in Fort San Felipe. In order to derive an interpreted board thickness for clinched nails we have to assume that both boards being held by the clinched nail were equal in size, though we know in reason this may well not have been the case. For instance, a one inch board may have been battened to a four inch supporting member for a door, for a clinched nail head to bend distance of 5 inches. We have no way of knowing this, so we must simply divide the distance by two, and arrive at an interpreted board thickness of 2 1/2 inches. Although no other alternative exists, we must simply recognize that interpreting board thickness from head to bend measurements are simply rough guides toward understanding the general size range for timbers once fastened by bent and clinched nails. The interpreted board size range is seen in Table 8. The board size range is interpreted as from 1/2" to 1 3/4" using clinched nails.

Related to the interpretation of bent and clinched nails is the column seen in the analysis model in Figure 18, indicating "Straight nail head to rust" measurements. It was thought that some nails had a clear distinction between one end and the other resulting from the nail being fastened in a timber when it burned, causing one end of the nail to rust at the usual speed while the other end rusted more slowly or not at all. As analysis was carried out it was found that only four such nails were found in the assemblage.

TABLE 7: CLINCHED NAILS FROM SANTA ELENA AND FT. SAN FELIPE

SANTA ELENA CLINCHED NAIL HEAD TO BENT MEASUREMENT (mm)

NAIL TYPE	2	3	4	5	6	7	8	9	10
			30	21	40	40	105	170	140
			20	35	45	78	70		
				20	25	20	80		
					53	30	100		
					27	20	160		
					50	40	35		
					25	97	50		
					20	80	110		
					35	30	100		
					55		100		
					40				
					40				
					40				
					40				
					45				
SANTA ELENA TOTALS		50	76		580	435	910	170	140

FT. SAN FELIPE CLINCHED NAIL HEAD TO BEND MEASUREMENT (mm)

26	33	55	70	70	70	80
	38	25	70	60		
	28	60	70			
		45	55			
		58	70			
		54	65			
		64	55			
			58			
			54			
			60			
			54			
			65			
			60			
			40			

FORT TOTALS	26	0	99	361	846	130	70	80

TABLE 8: INTERPRETED BOARD THICKNESS FROM CLINCHED NAILS

NAIL TYPE NO.	SANTA ELENA AVERAGE CLINCHED HEAD TO BEND (mm)	SANTA ELENA AVERAGE INTERPRETED BOARD THICKNESS (1/2 head to bend)	FT. SAN FELIPE AVERAGE CLINCHED HEAD TO BEND (mm)	FT. SAN FELIPE AVERAGE INTERPRETED BOARD THICKNESS (1/2 head to bend)
3	-	-	26.00	1/2"
4	25.00	1/2"	-	-
5	25.30	1/2"	33.00	1 1/4"
6	38.70	3/4"	51.60	1"
7	48.30	1"	60.40	1 1/4"
8	91.00	1 3/4"	65.00	1 1/4"
9	170.00	2 1/2"	70.00	1 3/8"
10	140.00	2 3/4"	80.00	2 5/8"

Nail Weight Analysis

The nail analysis model building process involved the development of a Spanish nail class model using weight and length, seen in Table 2. This is a more generalized model than that based on nail length in that it sometimes combines three nail types into a single nail class, based primarily on the names used in the Spanish documents involved. The five classes of nail types involved are: A. *tillado,* B. *Barrote,* C. *Alfaxia,* D. *Escora,* and E. *Costado.*

The theoretical reasoning for testing nail weight against nail length is seen in the model building section presented previously. The major question involved was whether the documented data for weight per 1,000 nails could be used as a reliable means for classifying nails according to class. In the analysis of nails, therefore, it was necessary to weigh nails to answer this question. However, most of the Spanish nails were so badly rusted that it was impossible to imagine that anything like the original weight would still be found when the nails were weighed. Therefore, only those nails that had been burned or had been lying in an oxygen reduced atmosphere preventing rusting, were used in the weight analysis. These were tabulated as seen in Table 9.

Table 9 records the weight in grams for the non-rusted nails, based on measurement of length, and the nail class code used to combine several types into nail classes. The question asked is whether the nail weight is in conformity with the nail types based on length as predicted by the nail weight model seen in Table 2. The answer was yes, it does conform in 16 cases, but no, it does not conform in 21 cases. This clearly reveals the variability of weight of nails of the same length as being far too great to be a reliable classifying attribute. We will, therefore, not use nail weight in future analyses of nails even though originally nail weight was an important attribute used in the making and selling of nails. Rusting reduces the value of weight as a criterion, leaving nail length as the primary attribute of taxonomic value.

TABLE 9: COMPARISON OF NAIL LENGTH AND WEIGHT MODELS

SANTA ELENA

PROV. NO.	NAIL TYPE NO.	NAIL WEIGHT (gms)	WEIGHT CLASS CODE	NAIL WEIGHT CODE IN CONFORMITY WITH TYPES BASED ON LENGTH? Yes	No
Site 38BU					
162-66E	7	55.00	B		*
162C-265	7	34.00	B		*
162D-67	7	43.50	B		*
162C-43B	8	158.00	D	*	
162C-217B	8	82.00	C		*
162C-331B	8	166.00	D	*	
162C-171	8	142.00	D	*	
162D-67	8	145.00	D	*	
162C-67	8	98.00	C		*
162D-67	8	69.50	C		*
162-66D	8	134.00	D	*	
162C-2B	9	240.00	E		*
162C-32B	9	160.00	D	*	
162C-176	9	306.00	E		*
162C-176	9	197.00	D	*	
162D-67	9	282.00	E		*
162D-67	9	94.00	C		*

FT. SAN FELIPE

162E.96	6	11.00	B		*
162E.120	6	21.00	B		*
162E.38C	6	15.00	B		*
162E.38C	7	22.00	B		*
162E.38D	7	24.00	B		*
162H-261	7	50.00	B		*
162E.96	8	63.00	C		*
162G-222	8	122.00	D	*	
162G-227	8	95.00	C		*
162G-244	8	139.00	D	*	
162H-261	8	123.00	D	*	
162H-337	8	175.00	D	*	
162E.37D	9	136.00	D	*	
162E.38D	9	182.00	D	*	
162H-92B	9	143.00	D	*	
162E.96	10	232.00	D		*
196E.98	10	330.00	E	*	
162E.120	10	246.00	E	*	
162E.43C	10	237.00	D		*
162E.43D	10	122.00	D		*
162G-17A	10	257.00	E	*	
TOTALS				17	21

WEIGHT CLASS CODE B = Types 3-5; C = Type 6; D = Types 7-9; E = Type 10.

As the nails were being measured and weighed it became apparent that there was a great variability in the size of the head, with rose heads varying from large toadstool-like domes to much smaller rectangular shapes. The shanks of the nails also showed much variability, with a nail with a half-inch stock being the same length at times as one with a quarter-inch stock. In such cases the weight difference would be great. Our study here has demonstrated that because of this variability, and because of the severer rusting attributes of nails in the ground over the years, weight is not a good attribute to use in taxonomic classification of nails.

Estoperoles (Large Headed Tack) Analysis

Nail type 1 is a large headed iron tack called *estoperoles* . These were used inside ships to fasten grass matting *(esparto)* to stanchions for holding cargo in place during shipment (Lyon in Appendix III). When the cargo was unpacked the mats were removed and some were likely reused in Santa Elena. I have suggested that they may have been used to hold woven mats in place to contain earth in gabions at Fort San Felipe. If this were the case one might expect to find many in the fort. These tacks are illustrated in Figures 19 and 20.

A total of 35 of these tacks were found in Santa Elena and 41 in Fort San Felipe. The tabulation of these Type 1 nails is seen in Table 10. From this table it can be seen that the average distance across the head of the tacks is 22 mm, with the average length of the shank being 28 mm. The head width is about 80% of the length of the shank. The wide head allowed for greater purchase of the tack on the matting they were designed to hold.

The greatest concentration of these tacks was found at the northwest bastion of Fort San Felipe, where 24 of the 41 tacks found in Fort San Felipe were recovered. This bastion was built up higher than the surrounding area of the fort to elevate the artillery piece located there. The tacks may well have been used to fasten matting to secure earth around the bastion. Charcoal fragments of small sticks in the northwest bastion area may be the remains of such mats, or possibly from faggots.

TABLE 10: ESTOPEROLES (Type 1 tacks) FROM TOWN AND FORT

SANTA ELENA			FT. SAN FELIPE		
PROV. NO. SITE 38BU-	HEAD WIDTH (mm)	SHANK LENGTH (mm)	PROV. NO.	HEAD WIDTH (mm)	SHANK LENGTH (mm)
162-22C	25	41	162E-4A	23	28
162-33C	22	36	162E-23B	22	30
162B-16B	19	26	162E.96	17	24
162C-6B	28	46	162E.96	19	25
162C-38B	23	24	162E.98	22	28
162C-50B	29	20	162E.98	20	25
162C-162B	20	29	162E.120	23	25
162C-169B	19	25	162E.120	24	22
162C-179B	22	22	162E-38C	25	25
162C-207B	25	20	162E-38C	22	32
162C-175A	18	30	162E-38C	22	35
162C-175	21	25	162E-38C	25	28
162C-236	20	32	162E-38C	20	26
162C-288	24	24	162E-38C	19	27
162D-2B	24	27	162E-38C	24	26
162D-3B	21	38	162E-38C	25	29
162D-4B	27	30	162E-38C	20	30
162D-4B	24	31	162E-38C	23	29
162D-4B	24	22	162E-38C	24	27
162D-5B	20	27	162E-38C	22	28
162D-6B	19	32	162E-38D	19	28
162D-6B	25	29	162E-38D	19	27
162D-6B	21	27	162E-39C	23	30
162D-7A	21	25	162E-40C	25	25
162D-18B	22	30	162E-40C	21	29
162D-42	23	27	162E-40C	21	27
162D-66	25	30	162E-40C	25	25
162D-68	20	25	162E-40C	23	33
162D-72	18	25	162E-40D	20	27
162D-72	24	30	162E-40D	24	30
162D-98	21	21	162E-40D	20	25
162D-124	25	31	162E-41D	22	27
162J-3B	21	25	162E-40A	18	25
162J-66B	20	25	162G-77A	20	23
162K-2B	22	28	162H-333C	25	33
			162H-78A	25	32
			162H-78B	26	25
			162H-89A	25	30
			162H-89B	21	29
			162H-89B	21	28
			162H-89B	25	33
TOTALS	782	985		909	1140

The head of estoperoles tacks is about 80% the length of the shank.
The average shank is about 28 mm, and the average head is 22 mm across.

Door Hardware

Three "U" shaped iron brackets, designed to be driven into wood, are probably door locking bar brackets or staples for holding a sliding wooden beam for bolting a door (Figs. 23 and 24). The three locking bar brackets are 2", 7" and 11" to the broken point. The longer ones may be brackets similar to towel racks in use today.

An iron door latch for securing a door is also seen in Figures 23 and 24. The hook, fastened by a staple, fit into a staple driven into the door jamb when locked. A latchkey or string was used to lift the latch from the outside by means of a hole in the door. What may be an iron latchkey was recovered from a Spanish pit (Figs. 23 and 24). The key was held by the flattened end, with the right-angled opposite end being inserted into a hole in the door to lift the latch or to slide a locking bar in and out of the locking bar bracket. It is interesting to note that the end of the latchkey is the same basic shape as the end of the key with a central hole seen in Figure 24, suggesting their similar function, access through a locked door.

A single iron pintle was found in a Spanish shell midden deposit (Figs. 23 and 24). The tang end is bent at an acute angle, probably from an attempt to drive it into a wooden jamb without drilling a pilot hole first. This size pintle was probably used to hang a wooden shutter or board and batten door. An illustration of the door and latch of a sixteenth century wattle and daub structure for a common settler is seen in Manucy (1985:50).

The eye pins for hanging the door or shutter onto the pintle were found in some quantity (Figs. 23 and 24). Some of those found are so delicate that they were probably used for some other function, such as eyes for door latches, eyes for fastening chains, etc.

Building Materials

Fired Clay Daub

The houses of Santa Elena were built of wattle and daub construction, which is posts set into postholes in the ground with vines or cane or cornstalks or similar wattle forming a framework onto which clay mixed with grass or Spanish moss was plastered to make the wall (Connor 1930: 283). When the town was burned in 1576 the heat from the burning of such houses fired the clay walls to a brick-like consistency known as fired clay daub. It was on the basis of this fired daub that the original sampling strategy was carried out at Santa Elena to obtain computer assisted clusters of such daub as indicators of the location of Spanish structures (South 1979:3), (Fig. 2). Fired clay daub in association with iron nails, fired clay floors, posthole features, and Spanish pottery have proven to be a highly predictive means of locating Spanish structures from sample squares (South 1982).

Clay-lined daub processing pits have been found to be located around each Spanish house (Fig. 5). These were used to mix clay, sand, water and Spanish moss and grasses to produce a suitable daub to form the walls of the Spanish structures.

A small, twelve foot wide hut was found to have piles of fired clay daub beside each posthole, with iron nails in each pile of daub (South 1980). The structure was shaped like a "D," with a central hearth, revealing a central smokehole was present, similar to houses of the Indians of the period. An interpretive sketch of such a clay-walled hut is seen in Figure 25.

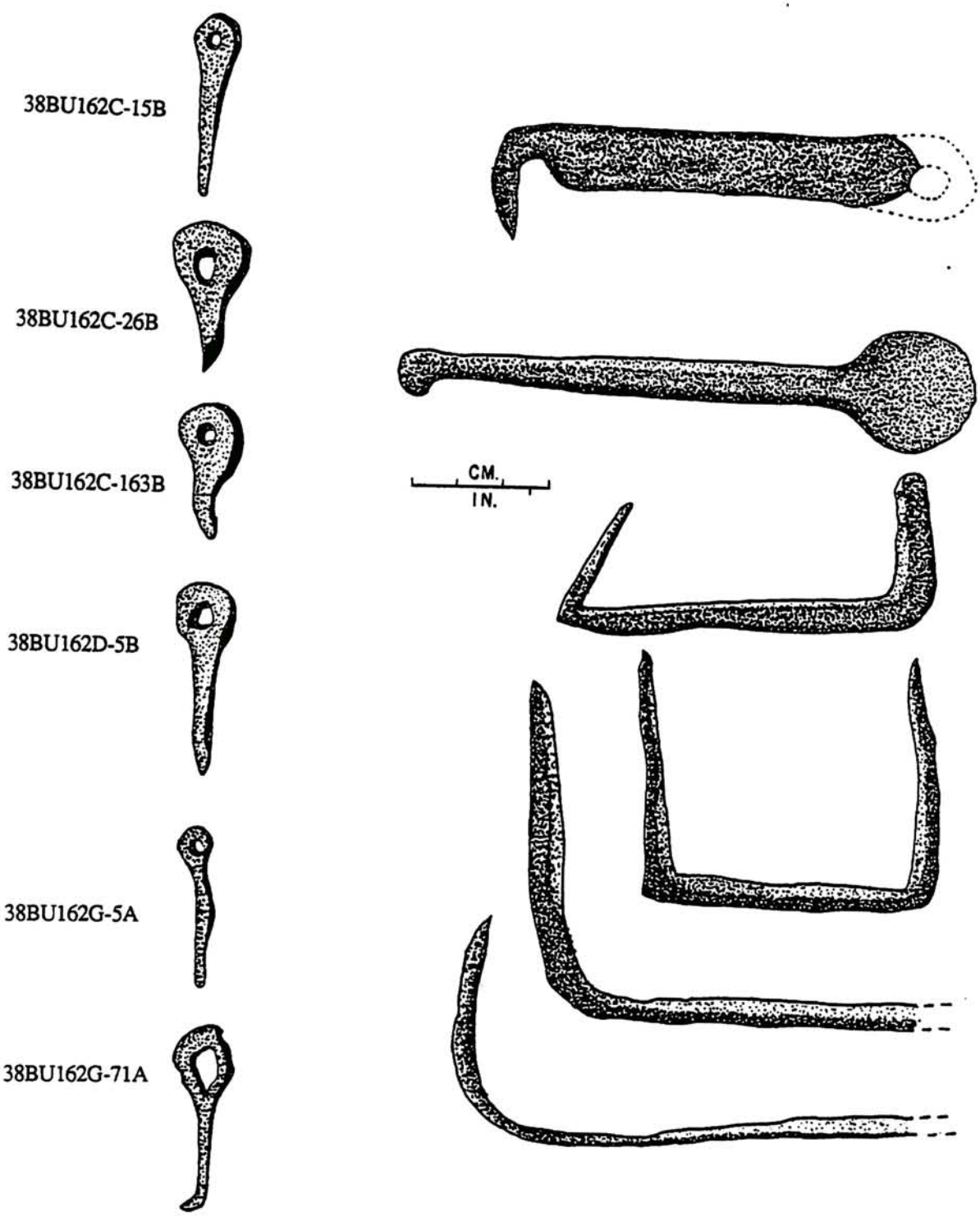


Figure 23. Architectural hardware drawings. Left, eye pins. Right, (top down), shutter latch, latch key or thumb latch, pintle with bent point and locking bar brackets, (162H-79B, 162D-67, 162G-268, 162G-248, 162A-127. 162E-39C).

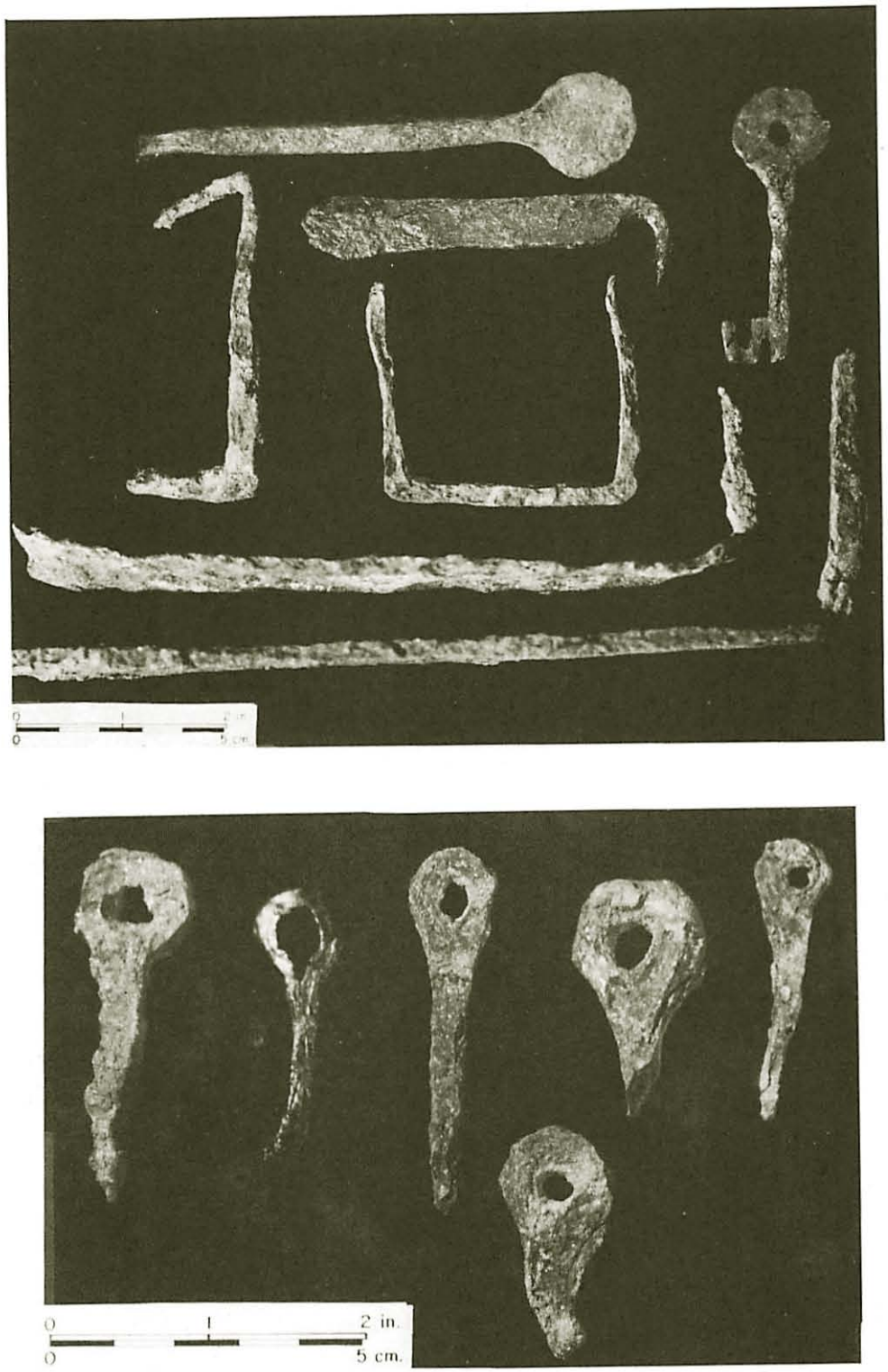


Figure 24. Architectural hardware. **Top:** Latch key or thumb latch (162D-67); (top center) shutter latch (162H-79B); (top right) key (162C-171); (left) pintle with bent point (162G-268); (center and bottom) door locking bar brackets (162G-248,162A-127, 162E-39C). **Bottom:** Eye pins for pintles, etc. (left to right)162D-5B,162G-71A,162C-15B,162C-26B,162G-5A (bottom) 162C-163B.

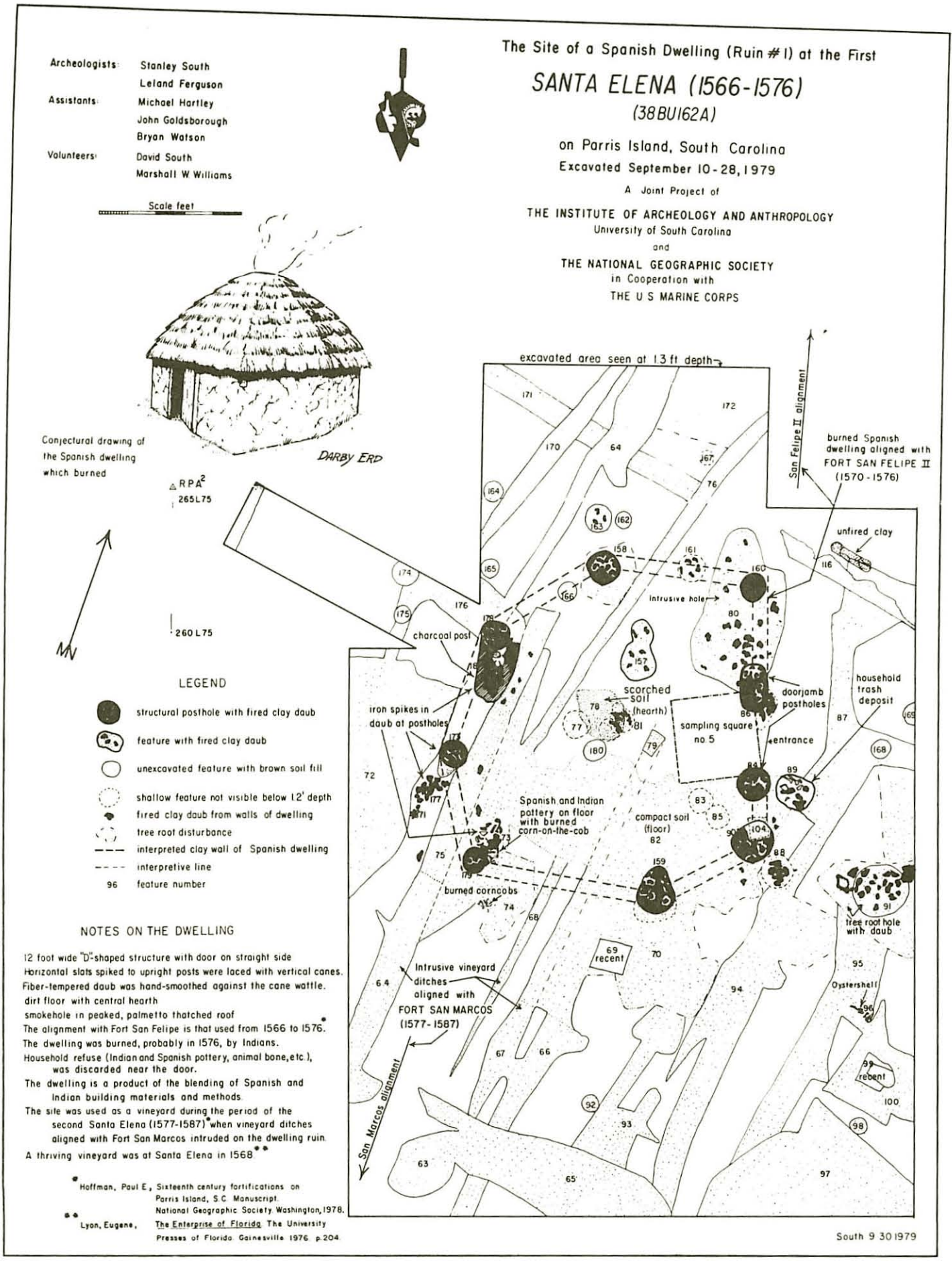


Figure 25. The site of a Spanish dwelling at the first Santa Elena.

The nails found in each pile of fired clay daub suggest that perhaps horizontal wooden boards or slats were nailed against the side of the upright posts, with the spaces between woven with upright wattling. The presence of impressions of cornstalks in some of the fired clay daub indicates one type of wattling being used at Santa Elena (Fig. 26).

The differential rusting of nails from burning while embedded in the post suggests that the horizontal slats or boards were 1 5/8 inches thick. The roof was likely formed by roof poles placed on the topmost slat or stringer of the wallplate, with a smokehole left in the center to allow smoke from the central hearth fires to escape through the roof, a standard Southeastern Indian practice (South 1973: 145-171). Horizontal supports were likely used to fasten the roof poles into a firm framework to support a palmetto thatched roof surface (Salley, ed. 1959: 41). Such a structure using Spanish nails and spikes and perhaps a European type door, was still very much the architecture of the Southeastern Indians known from the period of the sixteenth century (Lorant 1946: 33-116). It appears, therefore, that the Spanish at Santa Elena were adapting to the local construction techniques for building their houses in their capital city in the New World (South 1980: 13).

Rectangular structure data were also found at Santa Elena (South 1982:33) and an interpretive drawing of this type building is seen in Figure 5, based on the excavation seen in Figure 4, and on studies by Manucy (1979: 46a, 1985:50-51). Structures 3, 4 and 5 appear to have been arranged around a courtyard (Fig. 5).

The clay walls of the buildings have impressions of the grass and Spanish moss used to help bond the clay onto the wattling and also show impressions of cornstalks used to support the clay (Fig. 26). Some of the daub fragments are so large that the smoothly hand-trowelled surface of the clay wall on both sides of the wall can be seen. The following measurements of these wall fragments, revealing the thickness of the walls, were taken from Structure 4 (Fig. 5), (38BU162C-336):

mm	
26.8	
40.0	
47.8	
55.5	
45.5	
31.5	
46.5	
43.3	
336.9	divided by 8 = 1.58" average wall thickness

These measurements reveal a wall varying from one inch to 2 1/4 inches in thickness, with an average thickness of 1 5/8 inches.

The distribution and density of fired clay daub fragments have been a valuable asset in determining the location of the burned structural remains in Santa Elena (South 1979, 1980, 1982, 1983, 1984, 1985a). The computer assisted daub density concentrations can be seen in Figures 2 and 8.

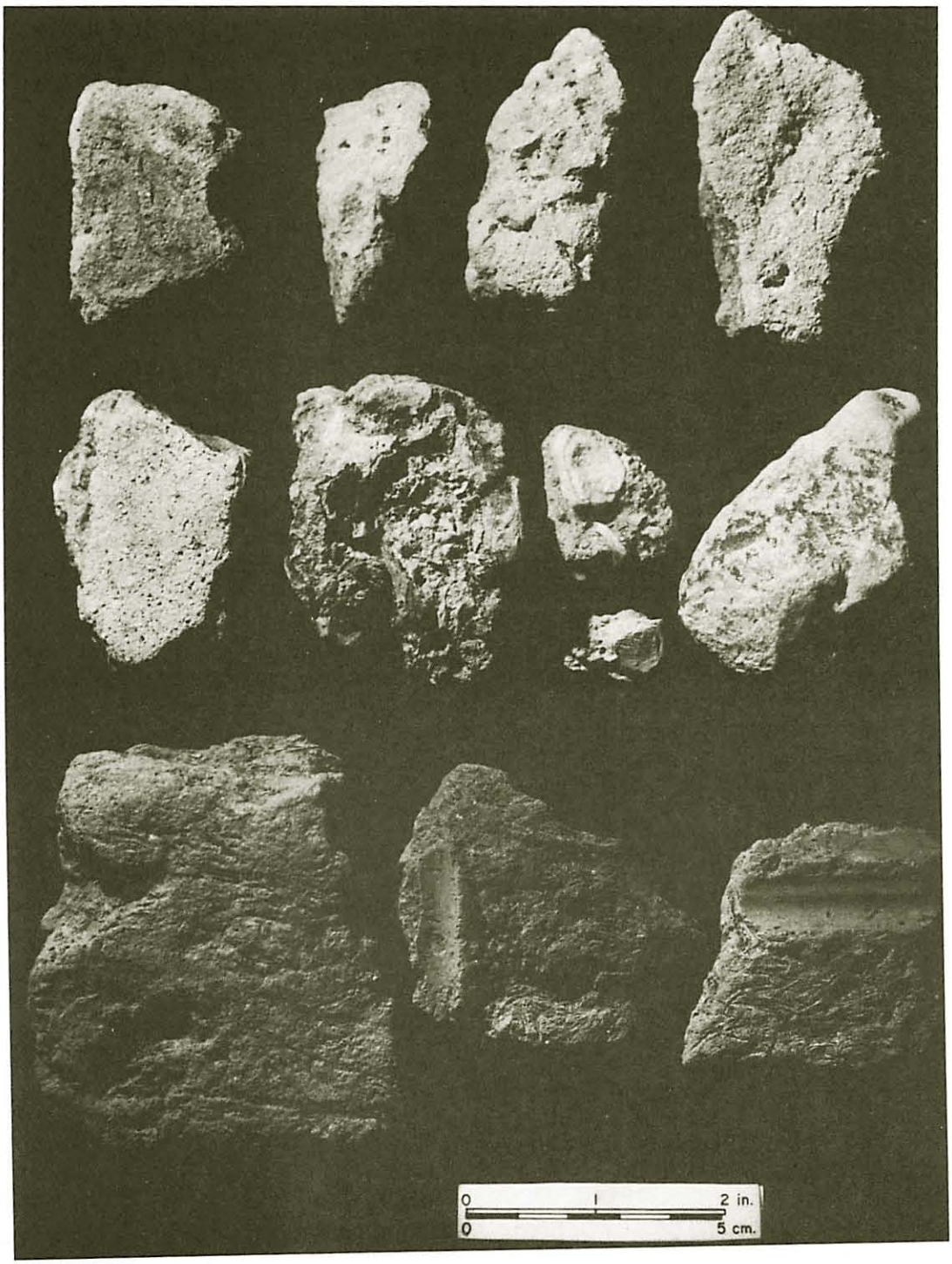


Figure 26. Architectural construction materials, lime lumps, lime mortar, oystershell mortar and fired clay daub. **Top row:** Lime mortar from Ft. San Felipe, 38BU162G-172A. **Row 2:** Oystershell mortar from Ft. San Marcos, 38BU51-39C. Right: Lime lump from Ft. San Felipe, 162H-91B. **Bottom row:** Fired clay daub from Santa Elena, 162C-336.

The long rectangular houses have antecedents in Spanish domestic architecture and are seen today in Hispanic folk architecture, as well as in Mexico (Manucy 1979: 8a). "The remarkable similarity of present-day Mayan huts to sixteenth-century representations of Florida Indian structures makes these traditional constructions in the Yucatan peninsula of unique interest" (Manucy 1979: 44). The post-and-thatch construction is similar to the floor plans we have found at Santa Elena. The hearth on the floor, the sabal palmetto thatch, the use of wattles, and the vertical post walling are shared attributes. Manucy has provided sketches for the rectangular, thatched-roof structures in Spain as well as Mexico, and an adaptation of the Santa Elena data to these parallel forms is seen in the sketch in Figure 5. The flat-roofed structures known to have formed half of the houses in Santa Elena in 1580 (which were coated with oystershell lime mortar) would have looked very similar, but without the gabled thatched roof, also like Mexican parallels (South 1982: 40).

Lime Lumps and Lime Mortar

During the excavation of the large fortified house (*casa fuerte)* inside Fort San Felipe (built in 1572 and burned by Indians in 1576), it was found that after this structure was burned a new blockhouse was built using the same postholes originally containing much larger posts (South 1984: 32-50). This blockhouse was built in 1577, the same size (50 by 70 feet) as the original *casa fuerte* had been. A most interesting fact revealed during the excavation of this stucture was that around each posthole there had been placed a mass of lime lumps in the upper part of the hole (South 1984: 37-44), (Figs. 27 and 28). It is thought that these lime lumps were placed around each post to reduce the moisture and help prevent the posts from rotting and having to be replaced about every four years (South 1984: 38-39).

The *casa fuerte* burned in 1576 had no lime used in its construction. In fact, there is no evidence for the presence of lime in Santa Elena until 1577, when six barrels of lime were ordered from Havana (Connor 1930: 13). The lime lumps seen in Figures 27 and 28 around the blockhouse posts are thought to be from this first shipment since it was at that time that the blockhouse was constructed. Lime lumps, at Santa Elena, therefore, are thought to represent a period dating after 1577 (South 1984:22).

Some of the lime lumps were burned to make lime for use in building lime mortar walls. A mass of such lime mortar was found in the top level of the fill in well 172, located at the southwest corner of the blockhouse (South 1984: 52), (Fig. 26). This lime mortar wall was trowelled smooth on one side and appears to have been applied against a planed wooden surface. Some of the fragments measured as follows (38BU162G-172A):

mm
48.5
40.0
26.4
37.0
36.0
38.0
40.0
265.9 divided by 7 = 38.0 = 1 1/2"

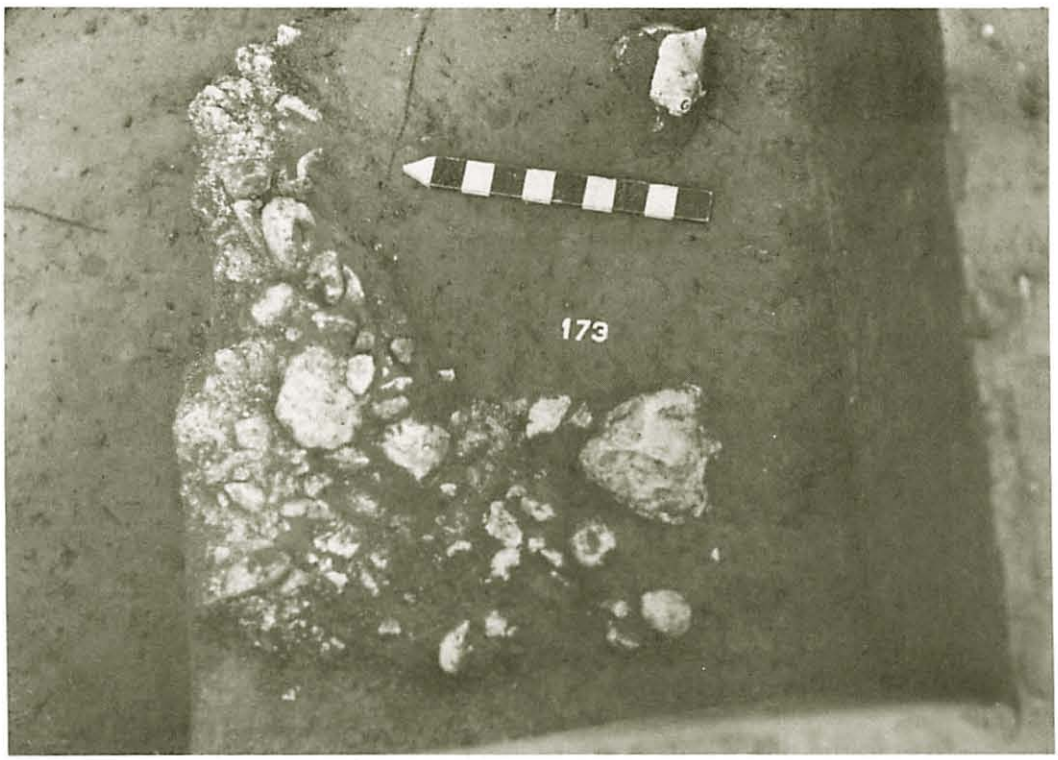


Figure 27. Plan view of *casa fuerte* posthole 173, showing angle of second post outlined by a lime lump mass.

Figure 28. Profile view of *casa fuerte* posthole 173, showing the thickness of the lime lumps around the second post.

The average wall thickness is close to that for the fired clay daub wall thickness. One fragment was 16.7mm, or 5/8" thick, much thinner than most. Fragments of lime mortar walls and a lime lump are illustrated in Figure 26. The use of lime mortar made from burning oystershells was begun by 1580 (Connor 1930: 283), resulting in yet another kind of mortar, oystershell mortar. After that time it was no longer necessary to ship barrels of lime to Santa Elena to be burnt to make mortar. This means that the presence of lime mortar in a ruin or feature at Santa Elena or Fort San Felipe probably indicates construction took place between 1577 and around 1580.

Oystershell Mortar

There were more than 60 houses reported to have been in the second town of Santa Elena in 1580 (Connor 1930: 238; Hoffman 1978: 40). This information comes from a letter from Pedro Menéndez Marqués to the king of Spain, written from Santa Elena, March 25, 1580, in which he says:

> This village is being very well built, and because of the method which is being followed, any of the houses appears fortified to Indians, for they are all constructed of wood and mud, covered with lime inside and out, and with their flat roofs of lime. And as we have begun to make lime from oyster-shells, we are building the houses in such a manner that the Indians have lost their mettle. There are more than sixty houses here, whereof thirty are of the sort I am telling your Majesty (Connor 1930: 283).

This reveals that half of the sixty houses in the second, rebuilt Santa Elena had flat roofs covered with lime mortar made from oystershells. The wording, "And as we have begun to make lime from oyster-shells," sounds as though making oystershell mortar was only recently begun. Oystershell mortar, therefore, in a feature or ruin would suggest construction after around 1580. When sample excavation was carried out inside Fort San Marcos, built in 1577 and altered many times after that time (Hoffman 1978), considerable oystershell mortar was found (Fig. 26). This oystershell mortar was smoothed on one side and had been plastered against wood on the other, in some cases. The thickness of some of the fragments from Fort San Marcos walls is seen as follows (38BU51-39C):

mm	
22.0	
15.0	
18.0	
18.3	
15.0	
17.6	
21.5	
18.6	
21.3	
20.0	
20.0	
14.0	
14.0	
22.7	
258.0	divided by 14 = 18.4mm = 3/4"

These data reveal that the oystershell mortar walls within Fort San Marcos were less than half the thickness of the fired clay daub house walls in Santa Elena or the lime mortar walls (or roof) of the blockhouse inside Fort San Felipe. This likely relates to the use of oystershell mortar against a wall of boards at Fort San Marcos as opposed to application to wattling, where thicker walls may have been necessary.

Flat-roofed structures such as those described in 1580 may well be an adaptation to the Southeast from the Southwest, an area familiar to the Spaniards. In the Southeast, however, lime mortar would be necessary to prevent the clay walls from dissolving with the frequent rains. Flat roofs would also eliminate the use of palmetto thatch subject to fire-arrows such as those shown by Le Moyne illustrating Indians burning an enemy village in the 1560s (Lorant 1946: 97). This is probably what is meant by the houses being built so "that the Indians have lost their mettle," *i.e.*, they could not set the roofs on fire (South 1982:39).

Summary of Structural Data at Santa Elena

Of the six structures found at Santa Elena thus far, five are rectangular and one is "D" shaped, or generally round, in the traditional shape of the Southeastern Indians. The four structures found in the area excavated in 1981 are far more regular and impressive than the hut discovered in the 1979 season.

These rectangular structures are much larger than the 12 foot wide hut and probably are more typical of the houses in Santa Elena than the hut was, it being thought to be the residence of a servant, slave, or single soldier. The 42 foot long Structure #5 is an impressive building, apparently designed to hold more individuals than Structures #3 or #4 (Fig. 5).

These buildings were constructed by placing posts in holes dug to accommodate upright wall posts that, in turn, supported lintels. In some instances, horizontal beams or slats may have been fastened to the upright posts, through which vertical cornstalks or canes were interwoven. This framework then held the daub (processed with grass or Spanish moss, water and sand, in processing pits dug in the yard around the house), which was shaped into a wall (South 1982: 39).

During the second Santa Elena period, after 1577, lime mortar was used against wooden supports, made from limestone imported from Havana. After 1580, however, oystershell mortar was used as a coating over flat-roofs and daub walls of buildings, probably designed using a construction model familiar to Spaniards from use in the Southwest. From what we know of the fired clay daub, lime lumps, lime mortar and oystershell mortar from the documents we are able to temporally separate features and structures in some instances and assign them to the first or the second Santa Elena.

CHAPTER 4

THE FURNITURE GROUP OF ARTIFACT CLASSES

Furniture Hardware

Brass Handles, Balusters, and Domed Tacks

Brass Latch

A small brass mace shaped object of unknown specific function was recovered in the Spanish level, or B-zone in Santa Elena (Figs. 29, 30, 32). It is thought to be a latch for opening a box because a similar shaped object was seen to function in that manner on a wooden box recovered from the wreck of the Mary Rose, dating from 1545 (traveling exhibit, Charleston, S. C., 1986). The notches around the end are designed to give purchase for the thumb as the latch is moved to the left and right to release the catch of the box.

Brass Handle and Balusters

A brass handle and baluster to hold it were recovered from the B-zone or Spanish level of the site, with a second baluster being recovered from Spanish Feature 117, demonstrating the Spanish context for these objects (Figs. 29, 30, 32). The handle and balusters for holding the handle probably were from a small drawer in a piece of furniture. The mounting post for both balusters is broken off, as is the handle, indicating some violent treatment of the objects. One baluster has what appears to be an indistinguishable brassmaker's mark (Fig. 32).

Domed Brass Tacks

Two cast brass, hexagonally faceted tacks were recovered, one from the plowed soil zone (162H-74A) inside Fort San Felipe, and the other from the top part of the filled well (162G-146) in Fort San Felipe, indicating the Spanish connection for these objects (Figs. 29 and 30). A similar tack with a smoothly domed head, and made of iron with a polished surface, was found in the plowed soil zone (162H-110A) in Fort San Felipe, as was a small domed furniture tack (Figs. 29 and 30). These tacks, particularly the larger type, are similar to those illustrated by Velázquez in a painting dating from 1628-29 (López-Rey 1968, Plate 104), and shown in Figure 34.

Small Brass Tacks , Rivets, and A Brass Nail

Small Tacks

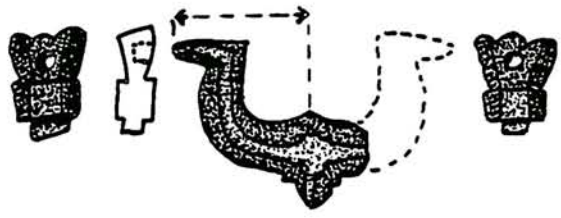
Small brass tacks were recovered from Spanish features at Santa Elena and are also probably from furniture (Figs. 31 and 35). The scarcity of these brass objects from Spanish contexts suggest that these are upper status items not present in all households.

Rivets

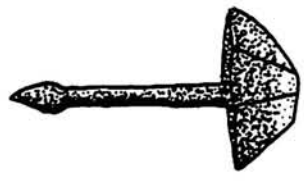
Three small rivets were recovered from Spanish feature 162D-67, and a larger one, once fastened to sheet iron (162D-11A), from the plowed soil zone were probably used with leather and iron, perhaps in conjunction with furniture, horse tack or other function (Figs. 3l and 35).

LATCH
38BU162C-147B
(B-Zone of Sq.)

BALUSTER
162C-117
(Spanish pit)
HANDLE AND
BALUSTER
162C-137B
(B-Zone of Sq.)

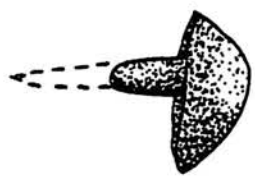


CAST BRASS TACK
162H-74A
(Plowed soil zone)



CAST BRASS TACK
162G-146
(Well)

IRON TACK
162H-110A
(Plowed soil zone)



SMALL BRASS TACK
162G-59B
(B-Zone of Sq.)

Figure 29. Furniture hardware drawings.

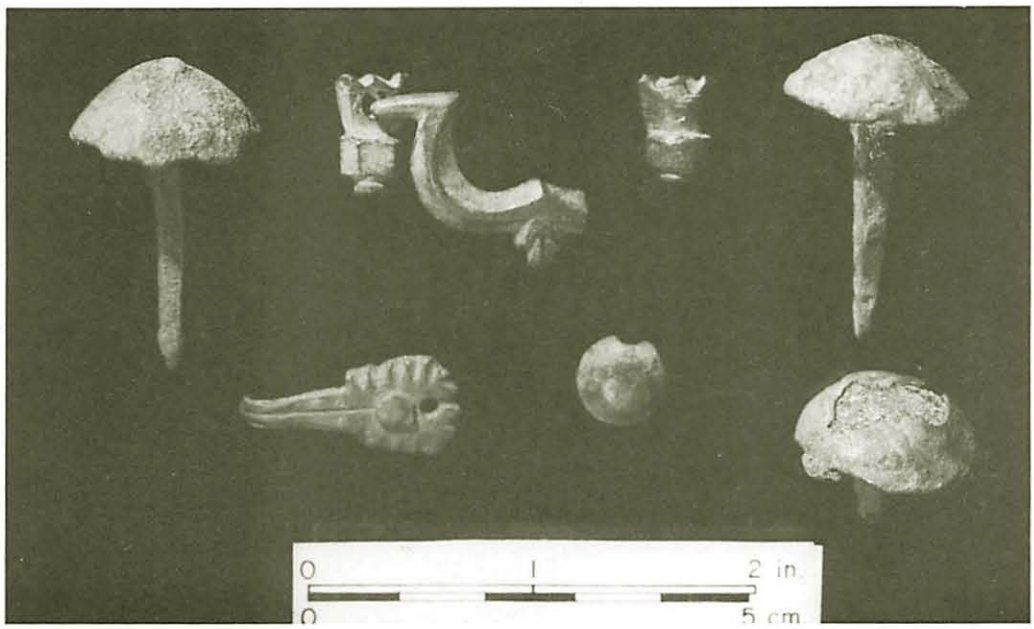
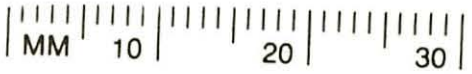
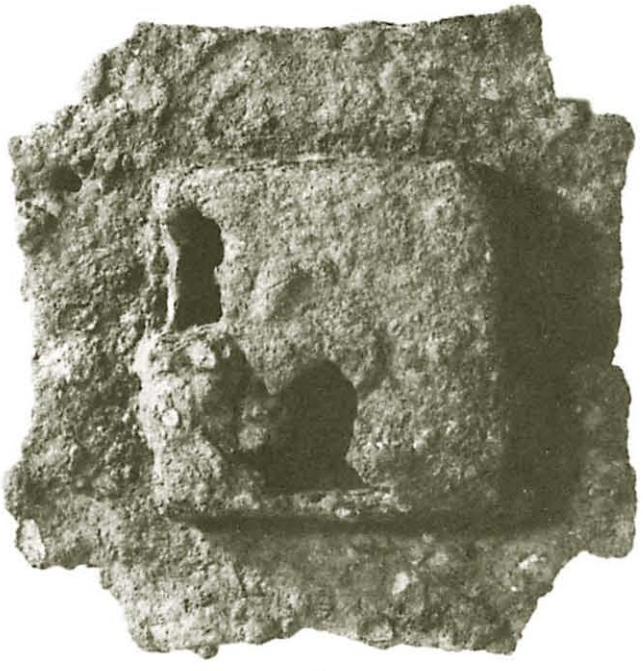


Figure 30. Furniture hardware. Furniture tacks, handles, balusters, and latch. **Top**: (162H-74A, 162C-117, 162C-137D, 162C-137B, 162G-146). **Bottom:** 162C-147B, 162G-59B, 162H-307A.

Figure 31. Copper rivets and tacks, nail, buckle tang and mica disc fragment. Left to right, large copper rivet (162D-11A), iron buckle tang (162C-51B), brass nail (162D-115, three small rivets (162D-67), copper wire ring (162H-307A), two small brass tacks (162D-38 and 162D-63), mica disc fragment (162E-37C).

Figure 32.





A

Figure 33.

Figure 34.

Figure 32. Brass latch and front and back of brass baluster for drawer handle, (162C-147B and 162C-117).
Figure 33. Iron chest lock (162C-275).
Figure 34. A folding stool with large tacks, from"Calabazas" by Velázquez, ca. 1628-29 (The Cleveland Museum of Art, Leonard C. Hanna, Jr. bequest). From López-Rey 1968: Plate 104.

38BU 162D-67 Small copper rivets from a Spanish pit.

38BU162D-11A Copper rivet from the plowed soil zone.

BU162D-115 Brass nail from a daub processing pit.

BU162C-51B Brass tang from an iron buckle in the B-Zone.

BU162D-38 Brass tack from a daub processing pit.

38BU162D-63 Brass tack from a Spanish pit.

BU162H-307A Brass wire loop from casa fuerte posthole.

Figure 35. Upholstery tacks, rivets and other small items.

Brass Nail

A single nail made of spiraled brass, flattened on the end, was found in a Spanish daub processing pit (162D-115). This type of nail is made from a triangle or diamond shaped piece of metal twisted into a spiral and then hammered over at the top. It is a type used in Mexico and is seen as a substitute for iron nails when they are not affordable or available. They are reported from eighteenth century Fort Michilimackinac, probably from the French component since such nails have never been seen on British colonial sites in my experience (Lewis Binford, personal communication, 1959 and 1975). This nail is illustrated in Figs. 31 and 35.

Summary of Furniture Hardware

From the scarcity of furniture related items at Santa Elena it is obvious that not a great number of pieces of furniture were worn out or destroyed to allow metal fragments to become part of the archaeological record during the two decades of occupation of the city. The implication is that virtually no Spanish furniture with brass or iron fittings were brought to Santa Elena, except perhaps, storage chests. This is supported by the absence of furniture items on the inventory lists seen in Figure 10.

CHAPTER 5

THE ARMS GROUP OF ARTIFACT CLASSES

Lead Shot Analysis

Introduction

During the first sampling of the Santa Elena site 11 lead shot were recovered. The question of their association with sixteenth century Spanish occupation, or with the later nineteenth or twentieth century period was of interest. These were programmed for SYMAP projection of clustering (Dudnick 1971), with the result that a cluster was shown at the same place where a suspected Spanish structure was suggested by clustering of fired clay daub and Spanish pottery (Fig. 2), (South 1979). This revealed that the lead shot were very likely associated with the Spanish structure, which proved upon excavation to be a small hut.

As excavation was carried out through the years many more lead shot were discovered. Those from definite Spanish contexts, such as a group found lying on the bottom of the moat of Fort San Felipe (Fig. 36), apparently being in a bag or pouch when dropped, are most definitely from good Spanish context (38BU162E-41E). Those found in the plowed soil zone A, or in the somewhat disturbed B-zone beneath, are more suspect as to Spanish association. Context, then, is an important consideration when conducting an analysis of the lead shot from Santa Elena and Fort San Felipe.

In conducting the analysis of lead shot there were two major considerations, shot diameter in millimeters and shot weight in grams. The purpose of the analysis was to determine whether, through shot diameter or weight, a mode or standard size or sizes (in the sense of most prevalent) could be derived that would reflect the Spanish use pattern at Santa Elena in the two decades of the sixteenth century involved (1566-1587).

A second consideration was whether the shot were molded in bullet molds, or whether they were formed through some other method, such as dropping through sieves into water (Held 1957: 67-68). Tabulation of the absence of a mold mark or seam was taken to mean that the shot was formed by dropping. Only 7 shot were found without mold marks and these ranged in size from 3.1 to 5.9mm. All these were from features, not from the topsoil zones A or B. It was also noticed that all of the remaining 336 shot in the study measured over 6mm in size (1/4"). This data split is easily explained by the fact that we used 1/4" screen for topsoil zone levels and 1/8" screen for all features. Thus, we would only retrieve shot (or beads or anything else, for that matter), less than 6mm in size, from features where 1/8" screen was used. Given these data we have combined the 7 small shot with the larger, mold made shot in this analysis.

The range of shot size is from 3.15mm to 20.00mm (1/8" - 3/4"), and is illustrated in Figure 37. Tabulation of shot by size and weight for Santa Elena and Fort San Felipe is seen in Appendices VIII and IX.

Some shot had been altered after molding, or had other distinguishing attributes and these were tabulated also. Some shot had been bitten, often many times, as though being constantly rolled in the mouth while being bitten. Others had deeper bites that indicated great pressure had been applied by the teeth. This *bit* classification is seen in Figure 38.

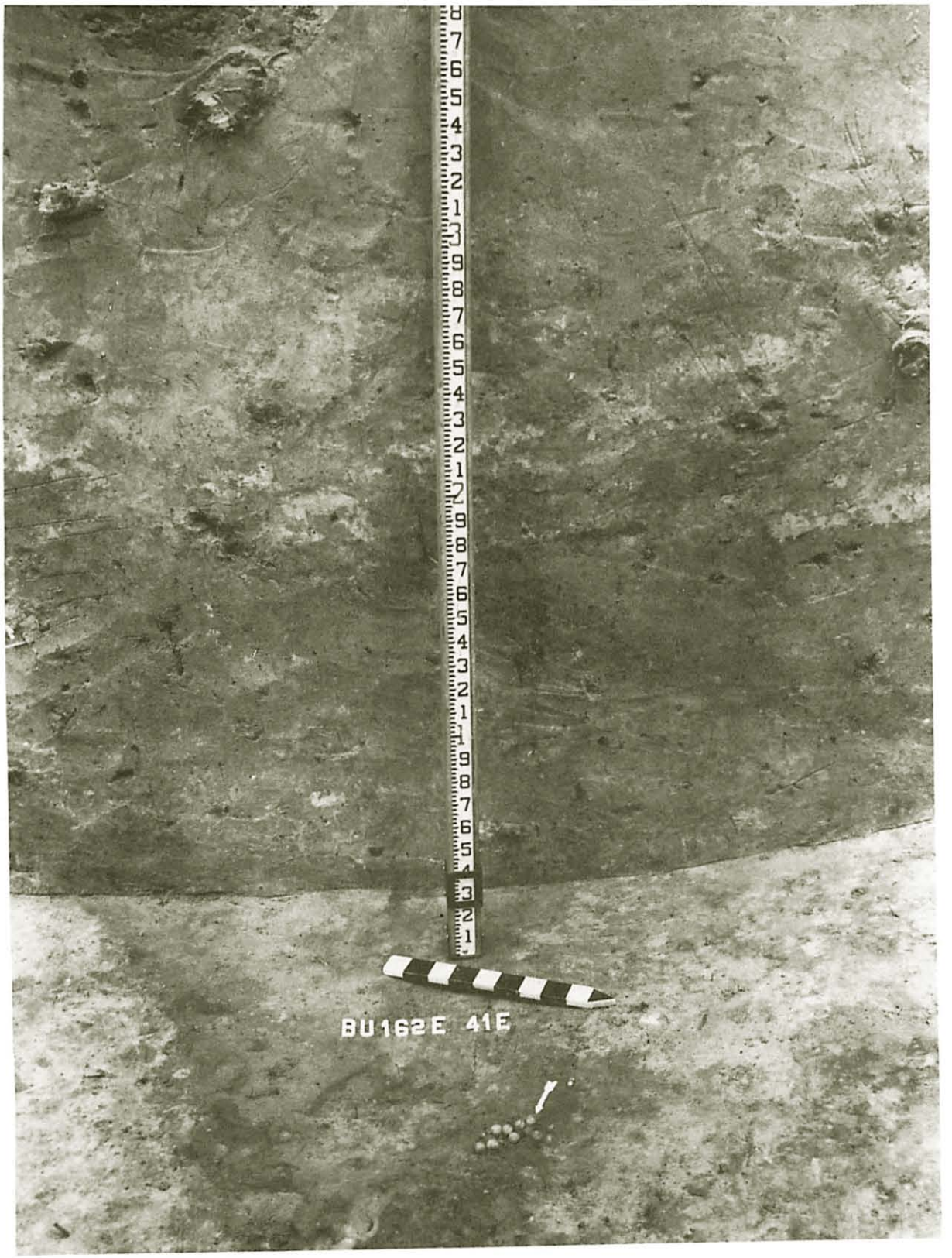


Figure 36. A cluster of lead balls lying on the bottom of the E layer in Square 41, in the moat at the northwest bastion of Ft. San Felipe.

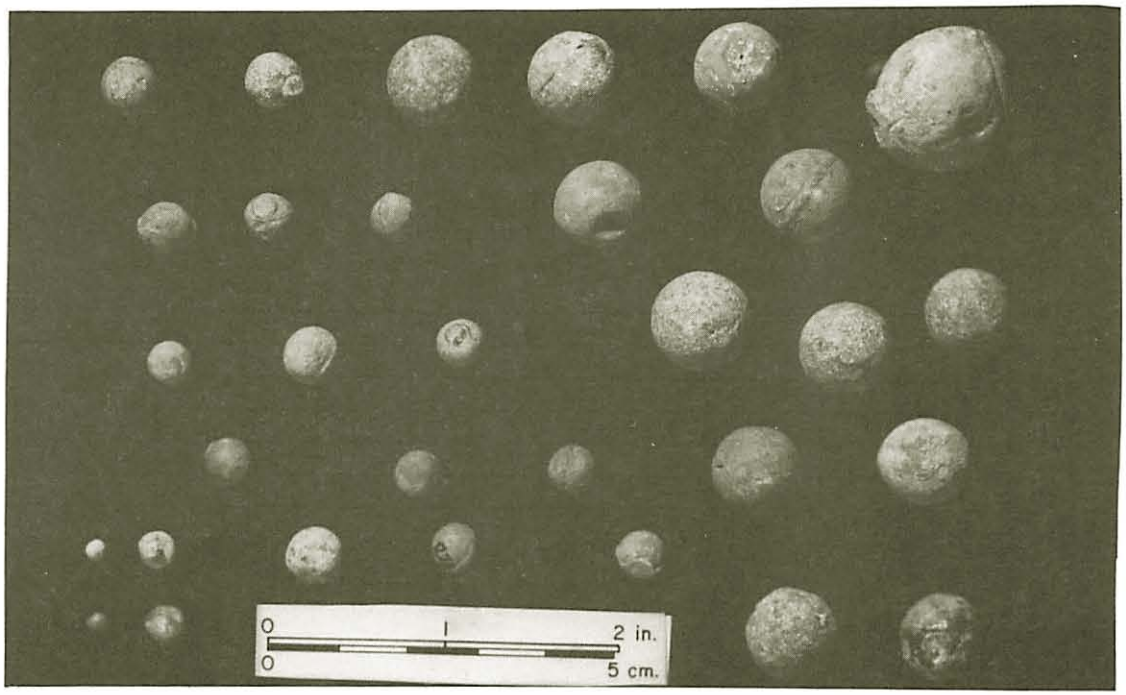


Figure 37. The range of lead shot sizes, from the smallest at the lower left to the largest at the top right. (All are from Ft. San Felipe, 38BU162H, except those in parentheses, from Santa Elena BU162.) **Top row:** 79B, 89A, 101B, 89A, 375A, (162-7B). **Row 2:** 91A, 91A, 79B, 120A, 375A. **Row 3:** (104B), 90A, 78B, 90A, 79B, 101B. **Row 4:** (106B), 92A, 92A, 92A, 120A. **Row 5:** (141B), (141B), 78B, 87A, 120A. **Row 6:** (141B), (141B), 90A, 86A.

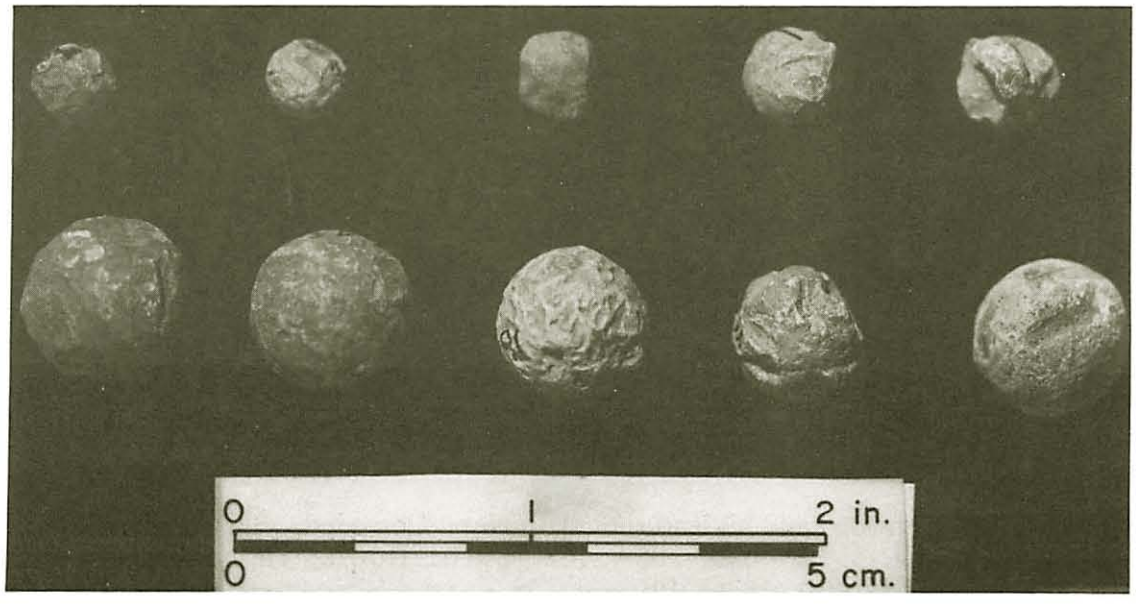


Figure 38. Bit lead shot showing teeth marks. **Top row:** 162J-88B, 162-141B, 162C-136A, 162E-42D, 162G-57A. **Row 2:** 162C-59A, 162C-138A, 162E-41D, 162G-46B, 162C-71A.

TABLE 11: ALTERED LEAD SHOT FROM TOWN AND FORT

TYPE OF ALTERATION OF BALL	SPANISH FEA. Count	%	SANTA ELENA (includes features) Count	%	FT. SAN FELIPE (includes features) Count	%
bit	3	4.50	15	10.30	11	5.60
hit	7	10.60	13	9.00	16	8.10
corroded	2	3.00	5	3.40	4	2.00
cut	5	7.60	9	6.20	12	6.10
melted	2	3.00	1	0.70	3	1.50
sprue attached	4	6.10	10	6.90	11	5.60
TOTAL OBSERVATIONS	66		145		198	

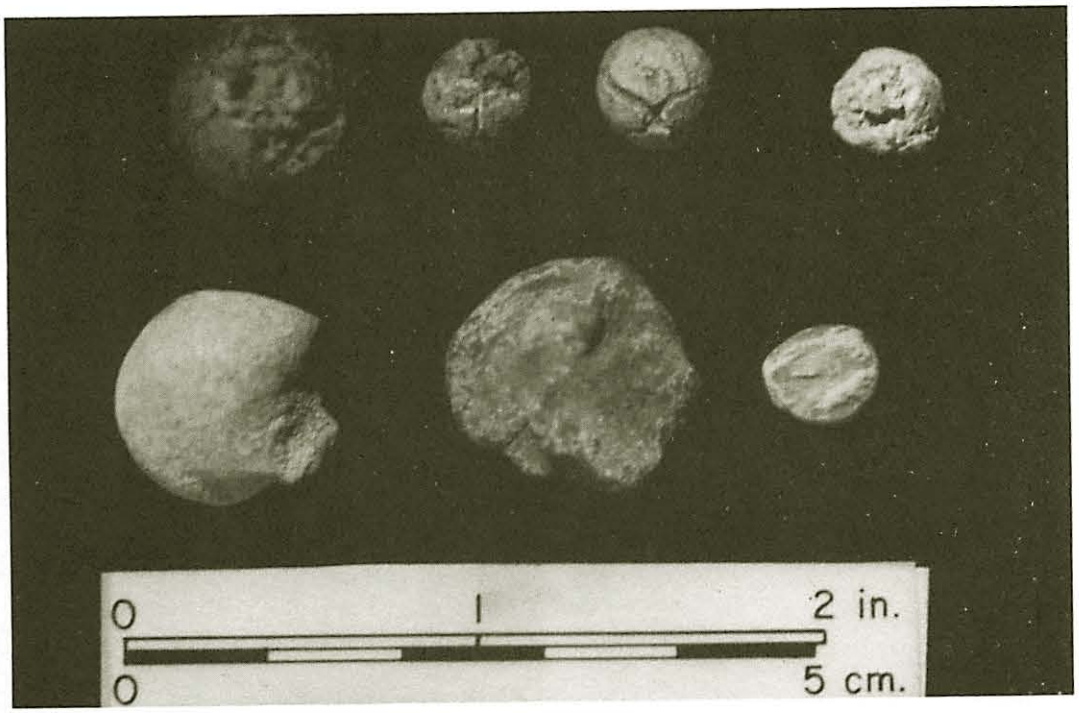


Figure 39. Corroded and hit lead shot. **Top row:** Corroded, 38BU162H-118A, 162C-137B, 162C-205A, 162C-331B. **Row 2:** Hit, 38BU162H-333E, 162H-100A, 162C-10B.

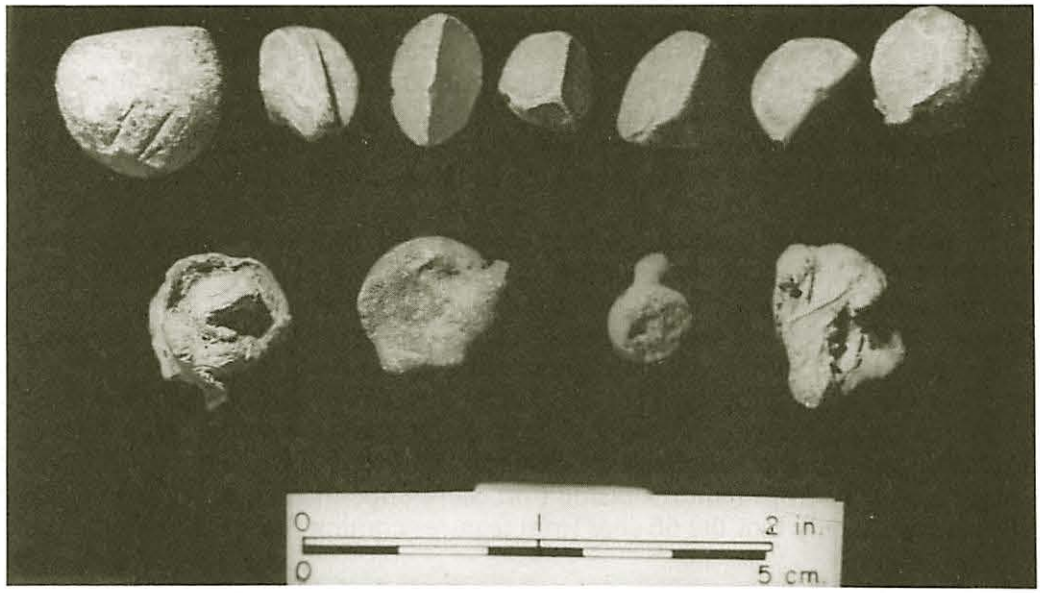


Figure 40. Cut and melted lead shot. **Top row:** Cut, 38BU162J-38A, 162H-102A, 162H-88A, 162A-13B, 162G-70A, 162C-141A, 162H-113B. **Row 2:** Melted, 162E-37C, 162H-82A, 162G-217, 162C-196B.

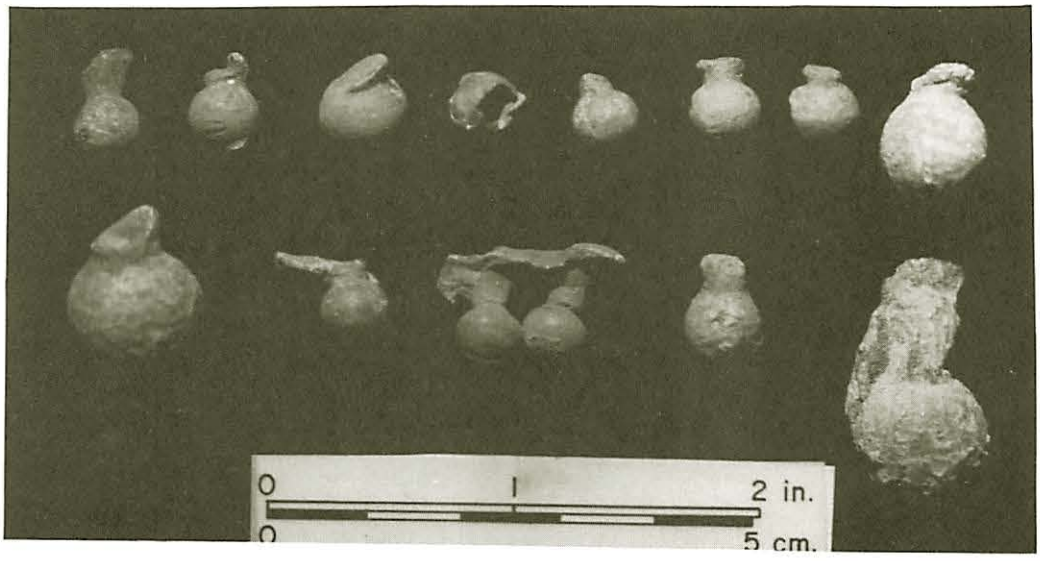


Figure 41. Lead shot with sprue. **Top row:** 38BU162G-57A, 162A-6A, 162C-22B, 162C-138B, 162-111B, 162C-144B, 162C-221A, 162E-38E. **Row 2:** 162C-207A, 162J-38A, 162G-56A, 162A-106A, 162-46A.

Other shot had been *hit* from being fired and striking some object that distorted the shot (Fig. 39), while some were cracked and *corroded* much as pewter often does after years of exposure to the elements. Some were *cut* in half or quartered (Fig. 40), while others showed signs of having been partially *melted,* perhaps in the process of re-melting to cast new shot. The final group were those having long *sprue* attached from poor cutting of the shot away from the sprue after casting (Fig. 41). The tabulation of these altered shot is seen in Table 11.

The importance of Spanish context features for use as a control against lead shot recovered from the A and B zones has been mentioned above. To establish this control a group of Spanish features with tight context (no disturbance by subsequent occupation) were selected and the 66 shot found in them were treated as a separate analysis (Appendix X). These Spanish period features include refuse pits, daub processing pits subsequently used as refuse deposits, the moat fill of Fort San Felipe, wells in Fort San Felipe, *casa fuerte* postholes, the *casa fuerte* ditch, and refuse deposits lying on the surface of the ground at the time of Spanish occupation. These are listed and the shot tabulated in Appendix X. From these data it is apparent that there are far more lead shot from features inside Fort San Felipe than from features in the domestic area of Santa Elena, only 8 of the 66 shot from features coming from Santa Elena.

Once these data were tabulated they were turned over to Carl Steen, an archaeologist who was then a student at the University of South Carolina. Carl then proceeded to carry out an analysis which is presented in the section to follow. Carl is now an archaeologist with the South Carolina Institute of Archaeology and Anthropology at the University of South Carolina.

It should be noted that in the list of documented material goods from Spanish Florida seen in Figure 10, "lead musketballs," "lead arcabuz balls," "lead," and "bullet molds" were mentioned, as well as crossbows.

Lead Shot from Santa Elena and Fort San Felipe

Carl Steen

Problem

Lead shot of various sizes have been recovered from the Santa Elena/San Felipe site. Assuming no knowledge of standard sizes, weights, etc. for sixteenth century Spanish projectiles we would like to see if the data will tell us what the standard or "normal" size or sizes are, and what, if any, distributional differences there may be. Other nominal variables will be considered in a similar light. The documentary record will then be consulted to inform the interpretation of the archaeological data.

Documentary Record

It was found that the weapons likely to have been present at the site would have been matchlock or wheel-lock arquebuses. There are three general types of these smooth bore muzzle loading weapons. The caliver, a lighter sporting gun about .60 - .70 caliber (15 - 17.5mm roughly); arquebusses (actually a generic term for a range of weapons used in sport and war) about .70 - .80 caliber (20.5 - 23mm); and the musket , a heavy weapon (not like the rifled musket of the eighteenth century) .80 - .92 caliber (20.5 - 23mm). These weapons are capable of piercing the heaviest armor at 125 yards (Held 1957: 38), and thus represented a major step forward in the technology and tactics of warfare.

Pistols were introduced in Europe at some point in the 1520s (Peterson 1956: 38) and thus may also have been in use at the sites. No specific evidence of this has been brought to my attention, however, and the documentary record on pistol specifications is sketchy. One might think that pistol bores would be smaller, but the references consulted did not specifically say that they were.

In the sixteenth century there was no standardized measurement scale that held true for trade between nations. A foot, for instance, could be of different lengths in different countries. The English measured their shot in the number of balls it took to make a pound (Held 1957: 33). After about 1540 this was known as the bore (which is the diameter of the barrel). After 1850 bore is called gauge, a term which is still in use. In the sixteenth century, though, one might refer to his gun as a ten ball to the pound size, rather than as a 10 gauge or .79 caliber (Held 1957: 33). What we know of the calibers of arquebusses then is actually what has been reconstructed from the measurements taken by researchers. Since there was no standardized mesurement system there is no reason to believe that gun makers tried to, or even could if they wanted to, make all of their guns to precisely the same specifications. This discovery pointed out a fundamental error of assumption in my approach to this project: "standard" sizes related to caliber or bore do not necessarily exist. The best we might do is to arrive at a most frequently used size.

In addition one must also consider windage; the difference between barrel size and ball size (Hamilton 1980: 125). Since black powder leaves a considerable amount of residue on the barrel with each firing the shot must either be a bit smaller than the bore size, or the barrel would have to be cleaned after each shot. An ideal amount of windage was not indicated in the literature but common sense tells us that if the windage was too small the barrel would require too frequent cleaning, and that if it was too large the shot would not fit tightly,thus allowing gasses to escape around the shot, slowing it and decreasing its accuracy. An additional factor to consider is the effect of the use of cloth or paper wadding. This practice was introduced by the Spanish in the 1540s (Peterson 1956: 115). It is not known, specifically, how thick or thin this wadding was,

which adds more uncertainty. Thus we can see that shot are probably never of the same diameter as the bore of the gun - they can only approach that size. How closely they approach that size is the crux of the problem.

To further confuse the issue these guns were used in the same way that shotguns are used today - with different sized shot for different purposes (Trench 1972: 110). Birds and small game would require small shot, while deer or large animals might require larger shot. Thus, while a caliver might have a bore diameter of .60 caliber, the only time that a shot even approaching .60 cal. would be used would be when accuracy and stopping power would be of the utmost importance.

On the other hand it may well be that single shot approaching the bore sizes were used infrequently. Indeed if the following quote from one of Hernando De Soto's men is any indication then the use of shotgun type loads may have been an adaptive strategy. He said:

> They [Indians] never stand still, but are alwaies running and traversing from one place to another, by reason whereof neither crossbowman nor arcubuse can aime at them; and before one crossbowman can make one shot, an Indian will discharge three or four arrowes; and he seldom misseth what he shooteth at (Peterson 1956: 11).

From the foregoing discussion it is clear that the documentary evidence can give us the perimeters within which to work. The archaeological record can give us more specific information. Overcoming the problem of accurately interpreting those data is another matter.

Variables

The following section will give operational definitions of the variables and a discussion of each.

Size (Diameter in millimeters and weight in grams.)

Shot size is generally thought of in terms of the concept of caliber-diameter in hundredths of inches. It is more likely that the size of the arquebus balls was measured in terms of weight, and approximate diameter, in the sixteenth century. Thus for us to think in terms of the precision measurements of the twentieth century is of little use.

This study indicates an occasionally wide variation in the diameter for each weight of shot recorded. For example, shot weighing 3 gr range from 6-11mm in diameter. A strong correlation exists between diameter and weight (as one might expect) but in individual cases this can be a misleading statistic. It was originally thought that aberrant diameter to weight ratios would be a strong indicator of impure metals in the body fabric of the shot, but, as will be discussed below, it appears that this ratio may indicate other forms of damage to shot more sensitively than it does the presence of impurities. Further analysis of the variation in weight per individual diameter can be used to determine means and standard deviations of weight per diameter, and thus can be used to approximate the original size of damaged shot. It is not believed that this will be a very sensitive tool, but it may have utility in specific cases.

The shot in the Santa Elena/San Felipe assemblages varies in diameter from 3.15 - 20 mm, and in weight from .5 - 48.5 gms. A tabular representation of the data (Appendices VIII, IX, X and Table 12), plotted graphically (Fig. 42), indicated *two strong modes* - one below 10 mm, between 6 - 8mm, and one above, between 12 - 14mm. At about 15mm the frequencies drop off drastically, indicating a third, less discernible tail mode.

TABLE 12: SUMMARY OF LEAD SHOT FROM THE TOWN AND FORT

	SHOT FROM SPANISH FEATURES (1566 - 1587)	SHOT FROM ALL CONTEXTS AT SANTA ELENA (includes features)	SHOT FROM ALL CONTEXTS AT FT.S.FELIPE (includes features)
range (mm)	5.1 - 14.5	5.25 to 18.5	3.15 to 20.0
mean (mm)	9.79	9.66	9.77
SD (mm)	2.81	3.34	3.07
less than 10 mm (%)	56.1 (37)	64.8 (94)	61.6 (122)
10- to 15 mm (%)	43.9 (29)	29.7 (43)	36.9 (73)
15+ mm (%)	0	5.5 (8)	1.5 (3)
TOTAL SHOT	66	145	198

COMPARISON OF SHOT BY SIZE FROM SANTA ELENA AND FT. SAN FELIPE

	SPANISH FEA. less than 10mm	SANTA ELENA less than 10mm	FT. SAN FELIPE leass than 10mm
range (mm)	5.1 to 9.35	5.25 to 9.8	3.15 to 9.4
mean (mm)	7.43	7.38	7.38
SD (mm)	0.98	0.93	1.01
TOTAL SHOT	37	94	122
	10 to 15mm	10 to 15mm	10 to 15mm
range (mm)	10 to 14.5	10 to 15	10 to 15
mean (mm)	12.72	13.57	12.99
SD (mm)	0.89	1.1	1.13
TOTAL SHOT	29	43	73
	greater than 15mm	greater than 15mm	greater than 15mm
range (mm)	-	15.2 to 18.5	15.3 to 20.0
mean(mm)	-	16.3	17.23
SD (mm)	-	1.17	2.45
TOTAL SHOT	0	8	3

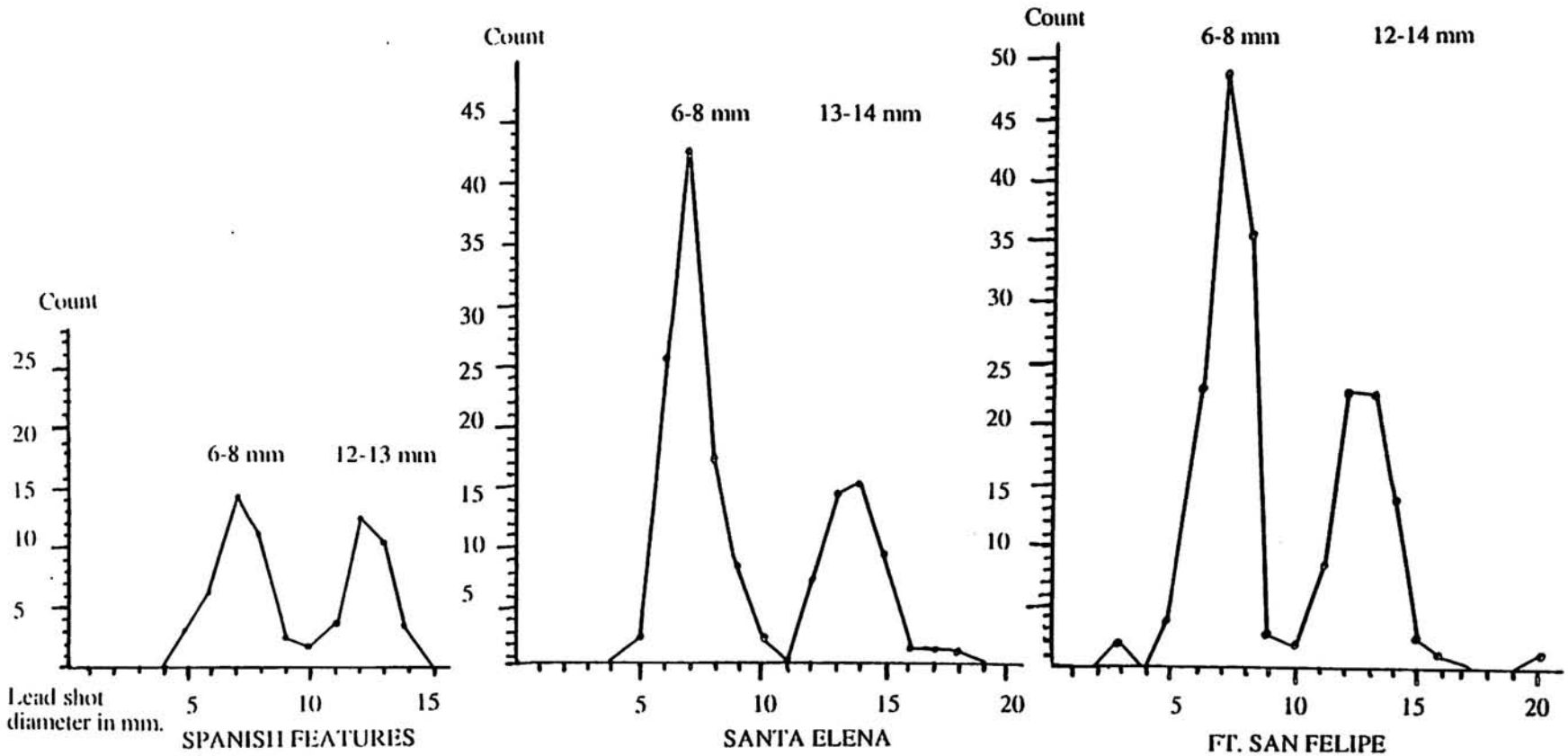


Figure 42. Comparison of lead shot size from Spanish features, Santa Elena and Ft. San Felipe.

Analysis of the means and standard deviations for the three size ranges (less than 10mm, 10 - 15mm, greater than 15mm) indicates an upper limit for the greater than 15mm range that is well outside of the 95% range of the 10 - 15mm group. There are considerable overlaps between the lower part of the final range and the upper part of the middle range in both the fort and town contexts. What this indicates is that the sample above 15mm in diameter is too small and widely dispersed to give us an accurate mean and standard deviation. A larger sample may increase the sensitivity of the analysis.

Shot from Spanish features exhibited a bimodal distribution of diameters (Appendices VIII, IX, X) that was quite similar to the shot recovered from contexts that may have been contaminated by the later plantation period occupation at the site, a time when cast musketballs were still being made. Peak frequencies occured at about 7mm (mean = 7.43mm for less than 10mm group) and at about 13mm (mean = 12.72mm). Considering the features, Santa Elena and San Felipe contexts separately, less than a millimeter of difference separates the means in both the less than 10mm and 10 - 15mm ranges.

The most significant difference between the feature contexts and the general contexts is that no shot larger than 14.5mm were recovered from the features. The cause for this could be that the material recovered from features (19.2% of all observations) simply does not include all of the possible sizes. Shot larger than 15mm overall only account for 2.9% of the total, thus making them a somewhat rare commodity. If this is the case then the excavation of more features should unearth a few larger shot. Conversely, an argument can be made that the shot from feature contexts accurately represent the shot sizes that were used by the Spanish, and that larger (and smaller) shot are of eighteenth or nineteenth century origin. However, since only 66 shot from features are involved a larger sample may likely produce the larger and smaller shot in question here.

Bit Shot

Bit shot show tooth marks, presumably human. Bit shot showing teeth marks are seen in Figure 38. The duties of a sentinel in Virginia in 1611 state:

> ...he shall shoulder his piece, both ends of his match alight,
> and his piece primed and charged, and bullets in his mouth,
> there to stand with a careful and waking eye (Peterson 1956: 17).

Overall twenty-six shot showed tooth marks. Of these 42.3 percent were in the fort and 57.6 percent were in the town, which is far out of proportion to the number of shot found in the respective areas. Some of the tooth marks, however, could have come from accidentally biting into shot embedded in the flesh of wild game, and some tooth marks could be from animals (pigs and squirrels, for instance, are known to chew lead shot) so the significance of this distribution is unclear. Again, the small number involved does not make for a powerful statistic.

Hit Shot

Hit shot show signs of impact. This variable is skewed, however, in that the shot that are considered in this category still had measurable attributes and were not simply misshapen lumps of lead as is sometimes the case (Legg 1985: Personal Communication). Thus this category contains only those shot still identifiable as distorted or hit shot. Hit shot are illustrated in Figure 39.

Corroded Shot

These shot show aberrant corrosion that manifests itself in cracking, powdery, or eroded surfaces. This aberrant corrosion is thought to be the sign of impure metals (such as pewter, tin, silver, etc. appropriated in times of stress on the lead supply) in the body fabric of the shot (South 1985: personal communication). Only 9 of the 343 (2.6%) shot showed this aberrant corrosion, which indicates that this occurrence is not a random event. The presence of impure metals may not be the only explanation, however, since lead is particularly susceptible to corrosion caused by even the mildest acids. Clearly an empirical test of the metal content needs to be run before any conclusions as to the cause of corroded shot can be made. Corroded shot are illustrated in Figure 39.

Cut Shot

Shot that are carved, trimmed, or in any way altered by cutting are included here. Shot alteration at other sites in other times ranges from elaborate carving for esthetic purposes to simply trimming the sprue off so that the shot is more symmetrical. Shot can be flattened, drilled and used for buttons, split for use as fishing line weights, grooved for more deadly effect or simply nicked, trimmed, or cut into quarters or halves for unknown reasons. Twenty one shot were cut. Of those, 12 (57.1%) were recovered from the fort context, and 9 (42.1%) from the town, which approximates the relative frequencies of shot in the two areas. Typical cut shot are illustrated in Figure 40.

Melted Shot

Shot that have received thermal alteration that has resulted in complete or partial deformation, in some cases rendering their diameters immeasurable, are included in this category. Four melted shot were recovered - three in the fort and one in the town. In one case the shot had been subjected to heating on a flat surface, probably to melt lead for recasting. These are illustrated in Figure 40.

Shot with Sprue Attached

Sprue refers to the waste lead left over from the manufacturing process. This can take the form of mold marks around the circumference of the shot, nipples left at the mold opening, or as is the case in this study, it represents those shot from which the sprue was not cut flush with the surface. These are illustrated in Figure 41. Sprue also refers to waste lead not attached to shot - that is lead that spilled on the ground, etc., but this type sprue is dealt with by South in the section to follow.

Summary

Examination of the archaeological data set has revealed that three size ranges are indicated for lead shot. One less than 10mm in diameter, one between 10 and 15mm, and one greater than 15mm. Documentary evidence indicates that shot of all three ranges can be considered arquebus balls. Shot from miscellaneous contexts at Fort San Felipe tended to be slightly larger, on the average, than those from Santa Elena. Shot from Spanish features showed a tendency to be larger, on average, than shot from miscellaneous contexts. The lack of shot larger than 14.5mm in feature contexts suggests that the shot in the greater than 15mm range may well represent plantation period shot. Shot exhibiting nominal variables were, for the most part, proportionately distributed. Exceptions are in Bit and Corroded shot, in which substantially more than the expected number were found in the Santa Elena context. A closer consideration of the intervening variables at work here may clarify this.

The major finding of our study is the demonstration of the two modes in size, between 6-8 mm, and between 12-14mm, being 28 caliber and 50 caliber in size. From the feature shot and the shot from the less controlled contexts from Santa Elena and Fort San Felipe, it is apparent that these modes represent the most frequently lost sizes in use by Spaniards at Santa Elena from 1566 to 1587.

Lead Sprue from Santa Elena and Fort San Felipe

In the previous section by Carl Steen we have seen that there were more lead shot from Fort San Felipe (198) than there were from the levels and features in Santa Elena (145), as seen in Table 12. We would also expect that Fort San Felipe, being the center for arms and soldiers, would also have a larger quantity of the by-products from casting lead shot than would the town of Santa Elena. This argument of relevance is based on general knowledge of activities that are known to have taken place in forts vs. those characteristics of domestic households.

Lead sprue can be in the form of irregular masses of lead blobs to cut sprue from lead shot cast in single shot molds (reported in a later section), to sow sprue with 6 nipples from a gang mold (Fig. 43).

By weighing the sprue in grams we can compare sprue from features with that from the A and B-zones lying above the features. We can also compare the sprue from Santa Elena with that from Fort San Felipe, where we would expect more to be present. The tabulation is seen in Appendix XI, and the totals are presented as follows:

	Count	Weight gm	%	TOTAL	%
SANTA ELENA SPRUE					
Features	22	73.0	11.3		
Levels	81	571.0	88.7		
Totals	103		100.0	644	24.3
FORT SAN FELIPE SPRUE					
Features	212	214.0	10.7		
Levels	47	1793.5	89.3		
Totals	259		100.0	2007.5	75.7
				2651.5	100.0

From the above comparison we can see that in both Santa Elena and Fort San Felipe 11% of the sprue is found in features, an interesting uniformity in the relationship between features and levels. However, when we look at the count of sprue fragments we see that there is 2 1/4 times the sprue count in the fort than in the domestic context of the town.

The most dramatic contrast, however, is seen when we compare the total weight of all sprue from Santa Elena with that from the fort. Here we see that over 75% of all sprue is from Fort San Felipe! This is entirely in keeping with our expectation that more lead shot casting activity would be carried out inside the fort than in the town, and this activity can be monitored by the weight of sprue from the two areas.

Figure 43. Lead sprue from Santa Elena and Ft. San Felipe. **Row 1:** 162C-31A, 162C-141B, 162C-346B. **Row 2:** 162A141B, 162G-53B. **Row 3:** 162C-218B, 162H-110, 162H-110B. **Row 4:** 162A-13A, 162H-110A, 162C-202B, 162G-77A. **Row 5:** 162H-272B, 162H-272B, 162C-202B, 162C-141B. **Row 6:** 162H-272B, 162H, 272B, 162H-272B, 162H-272B, 162H-99A. **Row 7:** 162H-101A, 162H-101A, 162H-99A, 162E-42C, 162H-217A, 162H-146C, 162H-272B.

A Bandolier Bag from Fort San Felipe for Holding Shot

A crescent shaped corroded iron object was recovered from the *casa fuerte* ditch inside Fort San Felipe (South 1985: 56-60), (Fig. 44). X-rays of the object were made (Fig. 45), and these were sent to Ivor Noël Hume at Colonial Williamsburg for identification. He identified the object as a man's purse or bandolier bag. The holes in the crescent, revealed by X-ray, are for attaching the fabric or leather of the bag. The pinned hinges at each end are to allow the two crescent-shaped parts to swing apart for the mouth of the bag to open. The lumps in the center of the crescent are the catches for closing the bag. The pin protruding from one side is probably for attaching the purse to a leather belt (South 1985: 55).

Noël Hume provided fifteenth-century English purse-frame examples illustrated from the London Museum Catalogue (1954: 170-71) and a Dutch example, as well as an illustration of a seventeenth-century bandolier bag for holding bullets, worm, patch, etc. from Gheyn (1607), (Fig. 46). Given the military context of the Fort San Felipe site and ditch where the bandolier bag frame was found, and the massive nature of the frame, it is thought that the frame is indeed from a military bandolier bag worn by some Spanish arquebusier while stationed at Fort San Felipe. An interpretive drawing by Guy Prentice of the type of bandolier bag recovered at Fort San Felipe is seen in Figure 47. A similar Spanish military bag is seen in Figure 48, at the waist of Charles V, in Titian's painting (Hamlyn 1970: 68-69), (South 1985: 55).

Bullet Molds for Molding Shot

In previous sections we have dealt with lead shot, the sprue by-products from the casting, the bandolier bag used to carry the shot, and now we report on the molds used for making the shot. Three such molds for molding a single shot have been found at Santa Elena and Fort San Felipe. The cups without the handles were found in the Spanish refuse B-zone in Santa Elena (38BU162C-144B), and one from a Spanish pit feature in the town (38BU162D-102). A third was recovered from the moat fill of the west curtain of Fort San Felipe (38BU162-74 [67E]). They are illustrated in Figures 49-50.

Agricola, in 1556, describes a two ball mold with foot long handles (Hoover and Hoover 1950: 239).

> The lead balls are made with a pair of iron tongs, about one foot long; its iron claws are so formed that when pressed together they are egg-shaped; each claw contains a hollow cup, and when the claws are closed there extends upward from the cup a passage, so there are two openings, one of which leads to each hollow cup. And so when the molten lead is poured in through the openings, it flows down into the hollow cup, and two balls are formed by one pouring.

We know that bullet molds for molding six shot were present at Santa Elena since we have found sprue sows with six nipples (Fig. 43), but no bullet mold of this type has yet been found at the site.

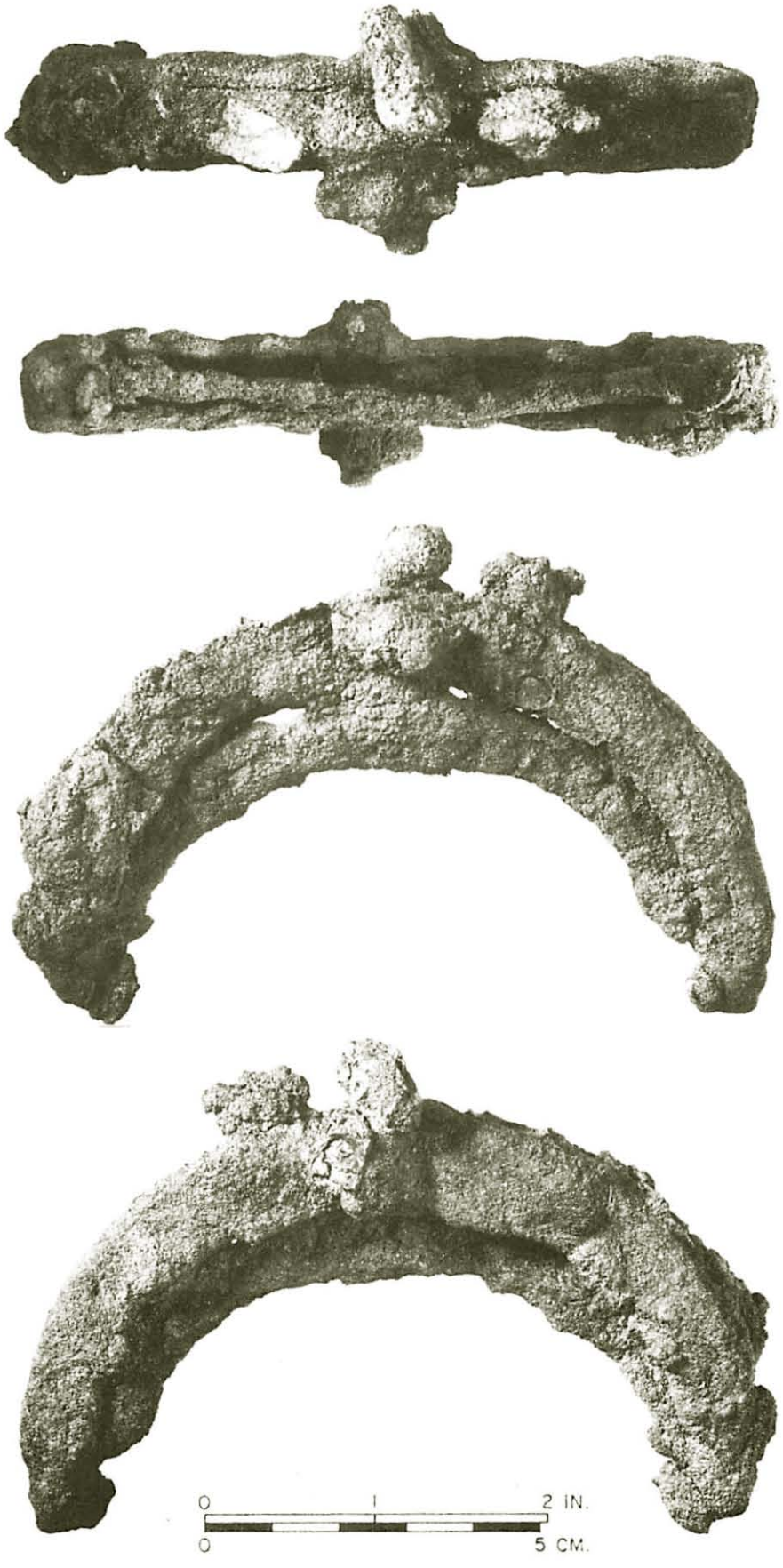


Figure 44. Views of the four sides of the iron parts of a bandolier bag used by soldiers for carrying bullets, worm, patch, etc. from the *casa fuerte* ditch (38BU162H-334).

Figure 45. X-rays of the iron part of a bandolier bag once carried by a Ft. San Felipe soldier. Note the holes in both parts for attaching the leather or cloth bag, and the hinge pins.

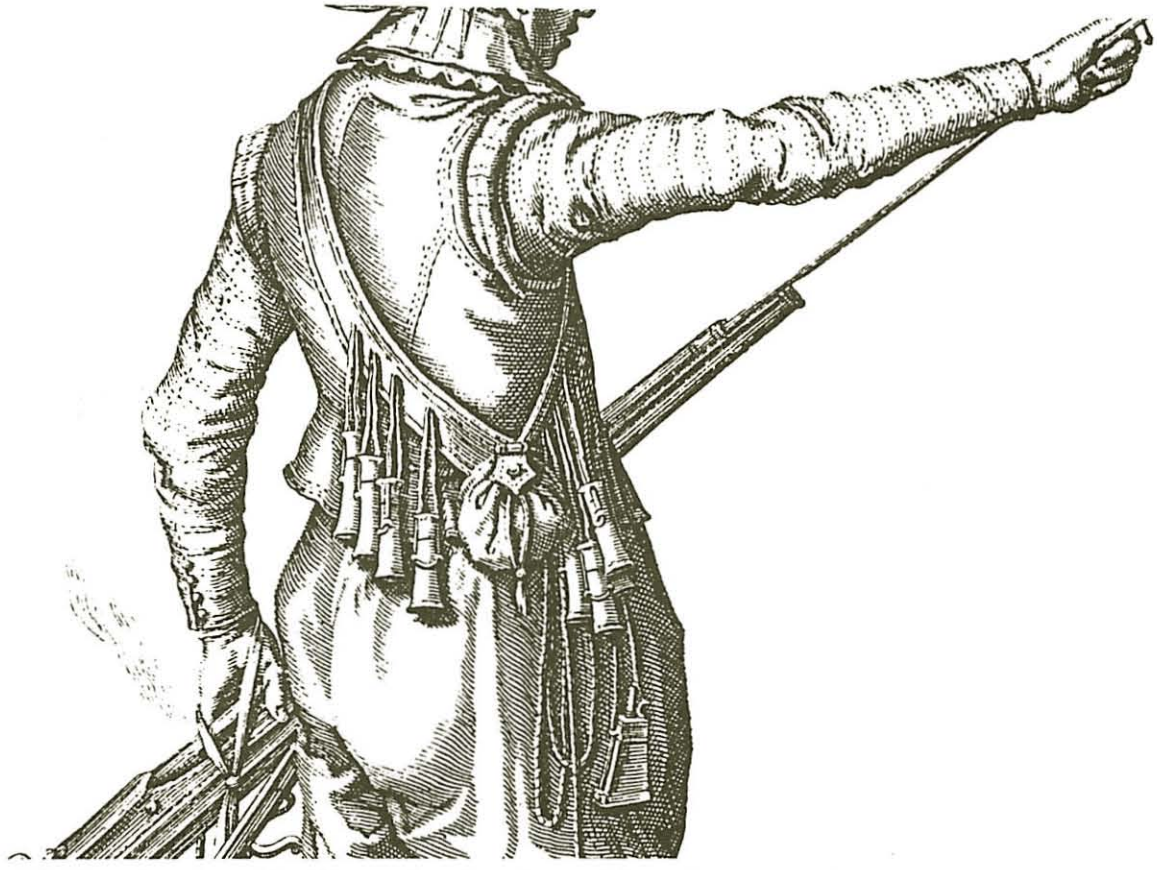


Figure 46. Drawing from De Gheyn showing the position of the bandolier bag in relation to the powder-filled cartridges used with the balls carried in the bag (Gheyn, Jacob de 1607).

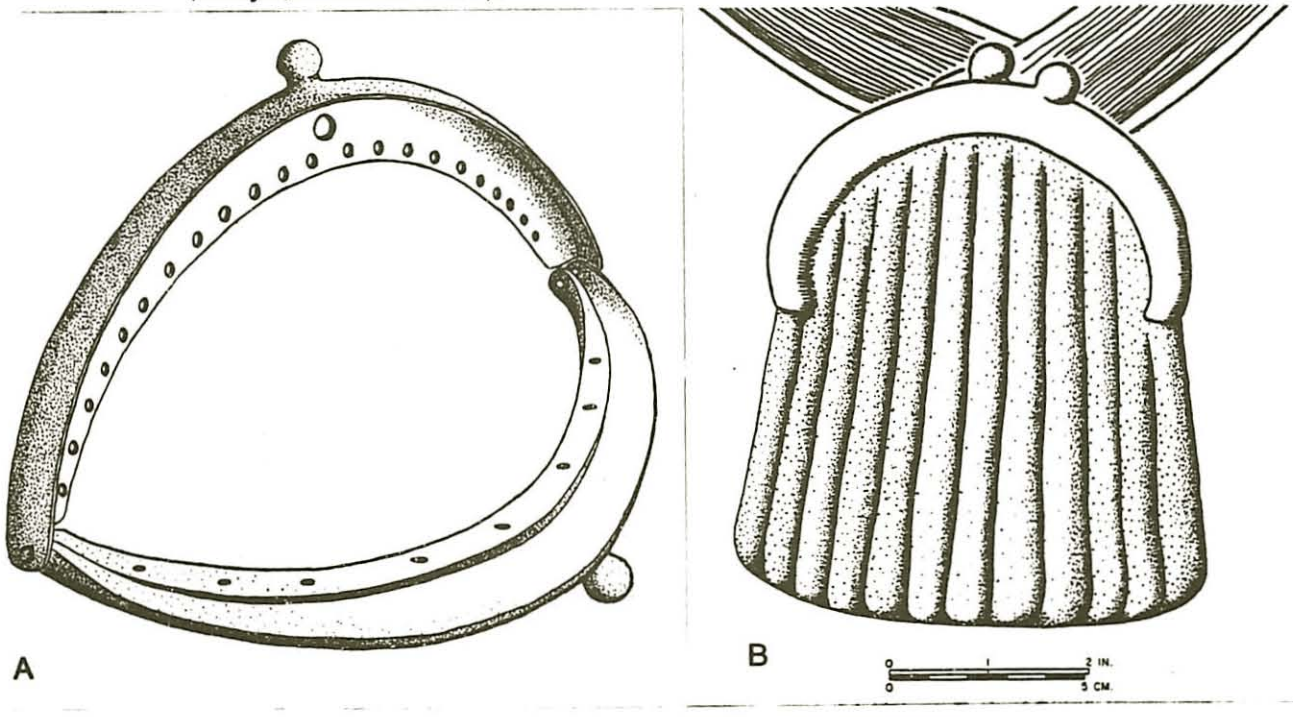


Figure 47A. Interpretive drawing by Guy Prentice of the iron parts of a bandolier bag.
47B. Interpretive drawing by Guy Prentice of the bandolier bag.

Figure 48. **Top:** Painting by Titian (1548) of Charles V of Spain (Hamlyn 1970). **Bottom:** Close-up view of the bandolier bag carried by Charles V.

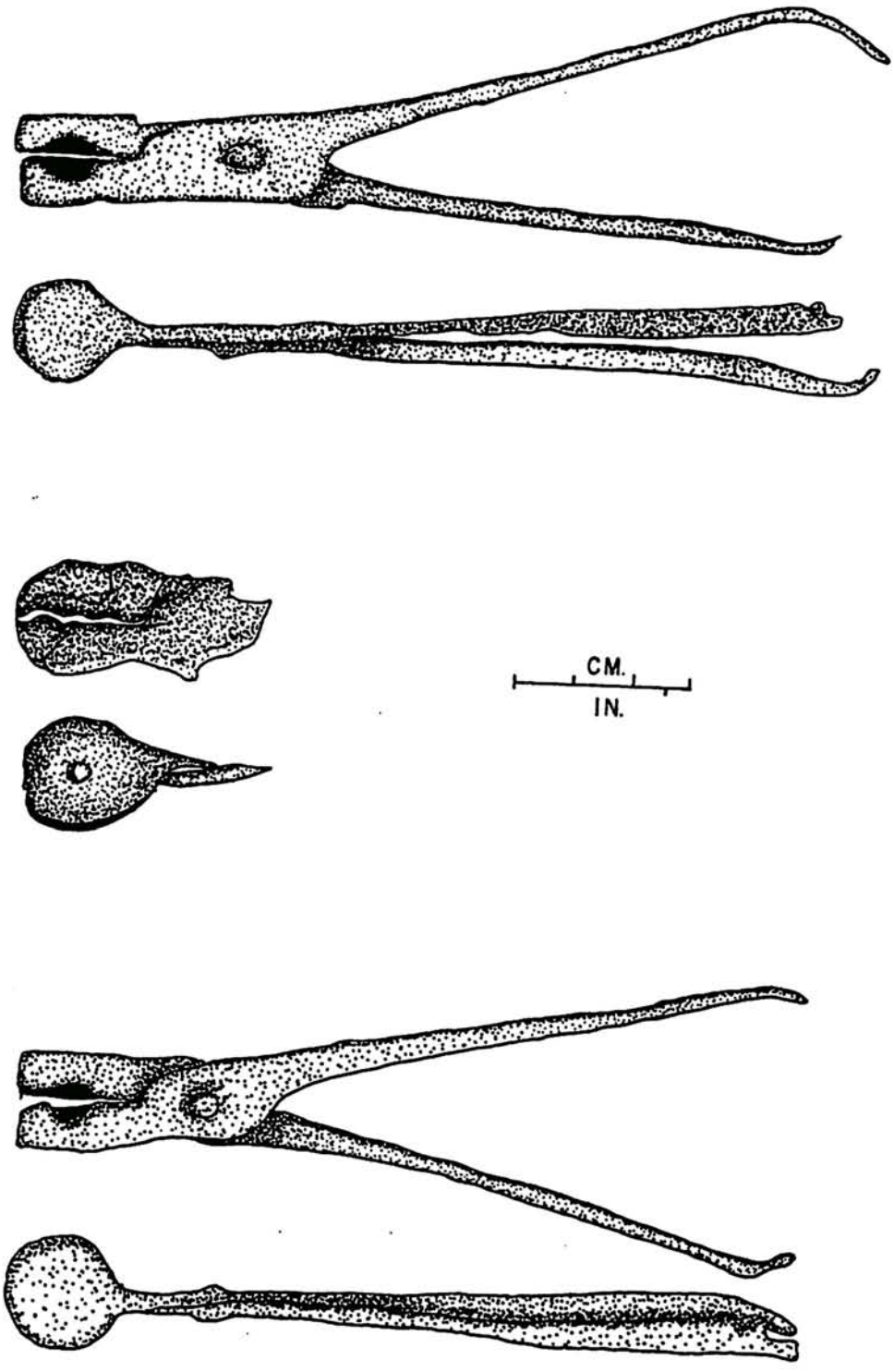


Figure 49. Scale drawings of bullet molds from Santa Elena and Ft. San Felipe. **Top:** Ft. San Felipe moat, 38BU162-74. **Center:** Santa Elena B-zone, 38BU162C-144B. **Bottom:** Santa Elena refuse pit, 38BU162D-102.

Figure 50. Bullet molds, pike point, and goat's foot lever fragments. **Top left:** Bullet mold, 162D-102. **Left center:** Bullet mold, 162D-74. **Bottom:** Pike point, 162D-4B. **Top right:** Goat's-foot lever parts, 162E-38D, 162E-38D, 162G-229. **Lower right:** Bullet mold cups, 162C-144B.

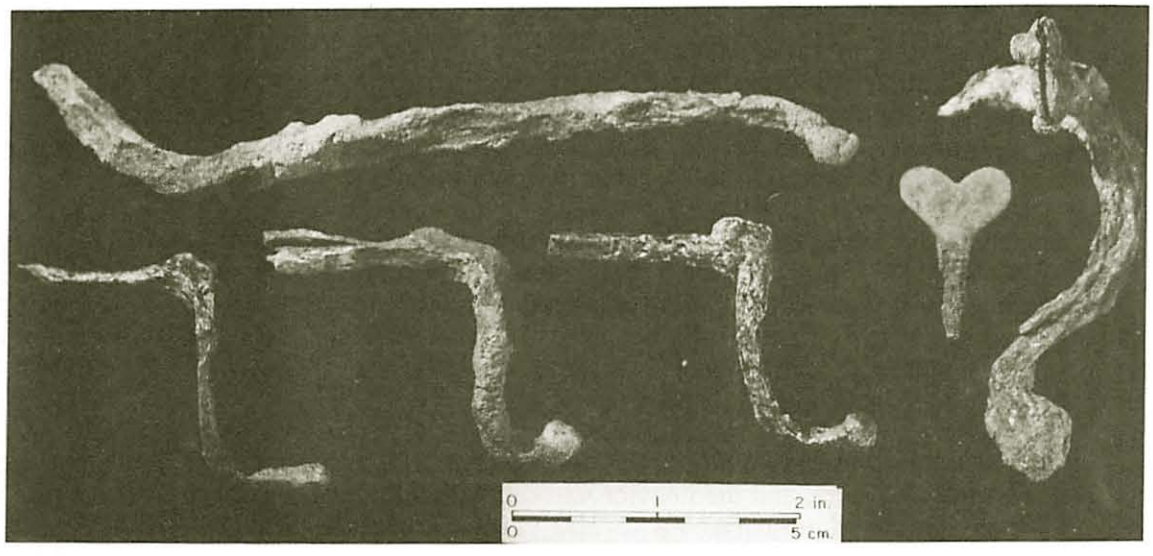


Figure 51. Arquebus triggers and other matchlock musket parts. **Top:** Arquebus trigger, 38BU162C-207B. **Left: to right:** Arquebus triggers, 162D-6B, 162C-362, 162D-20B. Wingnut screw for arquebus serpentine, 162E-40D. **Right:** Serpentine for arquebus, 162E-42D.

The Arquebus

Introduction

In the documented list of material culture in Spanish Florida (Fig. 10), arquebuses and "mosquetes," as well as crossbows are present. In this and the section to follow we will discuss these weapons in relation to the parts recovered at Santa Elena and Fort San Felipe.

The arquebus is a matchlock weapon developed by the Spanish in the late fifteenth century (Tunis 1954: 78). Trench (1972: 105) describes it:

> With a 5-foot barrel and a 3/4-inch bore, this was quite a formidable weapon. To fire it the barrel was laid on a forked rest stuck in the ground, and the butt, if crooked in the French style, placed 'just before the right pap'; and if straight, in the Spanish style, against the right shoulder. This 'arquebus' is a recognizable firearm. Its ball could pierce almost any armour, and would have some chance of hitting a man at 80 yards. The Spaniards were the acknowledged experts, replacing English bowmen as the most feared infantry in Europe. Armed with the arquebus, they were nearly always victorious in Italy, Mexico, and Peru.

We have seen from the lead shot analysis by Steen in a previous section that only one 3/4" lead ball of arquebus size has been recovered from Santa Elena and Fort San Felipe, revealing that arquebus loads of smaller shot were found to be more useful there. Without a number of expended or shot arquebus balls to observe we do not know if those at Santa Elena were rifled inside the barrels or not. Rifled barrels allowed for greater accuracy and caused the ball to spin in flight. The reason why this was the case was debated using the philosophical orientation prevelant at the time (Trench 1972: 107):

> Some held that tiny imps, who delighted in misdirecting a good Christian's bullet, could not keep their seats on a spinning ball: others that the agents of supernatural powers were, on the whole, more comfortable on a spinning ball, but their influence was beneficial, causing it to fly more truly.

Experiments were conducted to address this point of rifling, with church witnesses, in 1547. Appropriately blessed silver bullets, shot from rifled barrels, known to be effective against witches and werewolves, were matched against lead balls not having the benefit of blessing fired in non-rifled guns, with the target 200 meters away. Not one silver bullet hit the target, while 19 of the 20 lead balls did. This cast doubt on the efficacy of rifling (Trench 1972: 107), not on the efficacy of blessing bullets.

The arquebus was of two types: the light *caliver* shooting a ball of .75 inch diameter and having a 4-foot long barrel, and the heavier *musket* with a larger bore and a 5-foot barrel which was effective against plate-armor up to 200 yards (Trench 1972: 111-112). As we have indicated, no ball larger than .75 caliber has been recovered from Santa Elena and Fort San Felipe, suggesting that the lighter *caliver* may well have been the most popular weapon used there.

The lighter arquebuses could hit a playing card at 70 yards and kill a deer beyond 100, while the heavier muskets could pierce armor at much greater distances (Held 1957: 29, 39). The weapon was fired by dipping a glowing match or fuse into powder by depressing a trigger. A "Z" shaped match holder, called a serpentine, faced the shooter instead of away from him as was the case with flint-lock hammers (Trench 1972: 104).

Serpentines

Two serpentine fragments were recovered, a heavier one from Santa Elena (38BU162D-20B) from the Spanish B-zone, and the other, more delicate one from the moat fill of Fort San Felipe (38BU162E-42D). The wingnut from a third serpentine was also found in the moat fill of Fort San Felipe (38BU162E-40D). These serpentine fragments are illustrated in Figures 51 and 52. The manner in which serpentines fit onto the matchlock arquebus is illustrated in Figure 53.

Triggers

Four iron triggers, three short and one long , were recovered from excavations at Santa Elena (Figs. 51, 52, and 56). None were found in Fort San Felipe. From the references available it is difficult to determine if these are from arquebuses or crossbows since both types were used on both weapons. Triggers are shown as used on arquebuses in Figures 53 and 54.

Matchcord Guide Tubes

A matchcord guide tube was sometimes used on an arquebus to guide the match or fuse into the proper position in relation to the serpentine. The position of this hollow, tapered matchcord guide tube is seen in Figure 53. A tapered hollow tube from a Spanish midden deposit in Santa Elena (38BU162C-171) is possibly such a guide tube. This is illustrated in Figures 15 and 52. Several tube fragments, possibly from this function, have been recovered from Santa Elena and Fort San Felipe as follows:

38BU162C-35B	Spanish midden, B-level, Santa Elena
162C-143B	Spanish midden, B-level, Santa Elena
162C-198A	Topsoil zone, A-level, Santa Elena
162C-204B	Spanish midden, B-level, Santa Elena
162E-40D	Fort San Felipe moat fill

Since such tubes are thin to begin with, they are usually badly corroded after 400 years in the earth and, therefore, identification as to function is difficult. However, those such as the tapered example shown in Figure 15 certainly appear to fit the requirements for the matchcord guide tube illustrated in Figures 52 and 53.

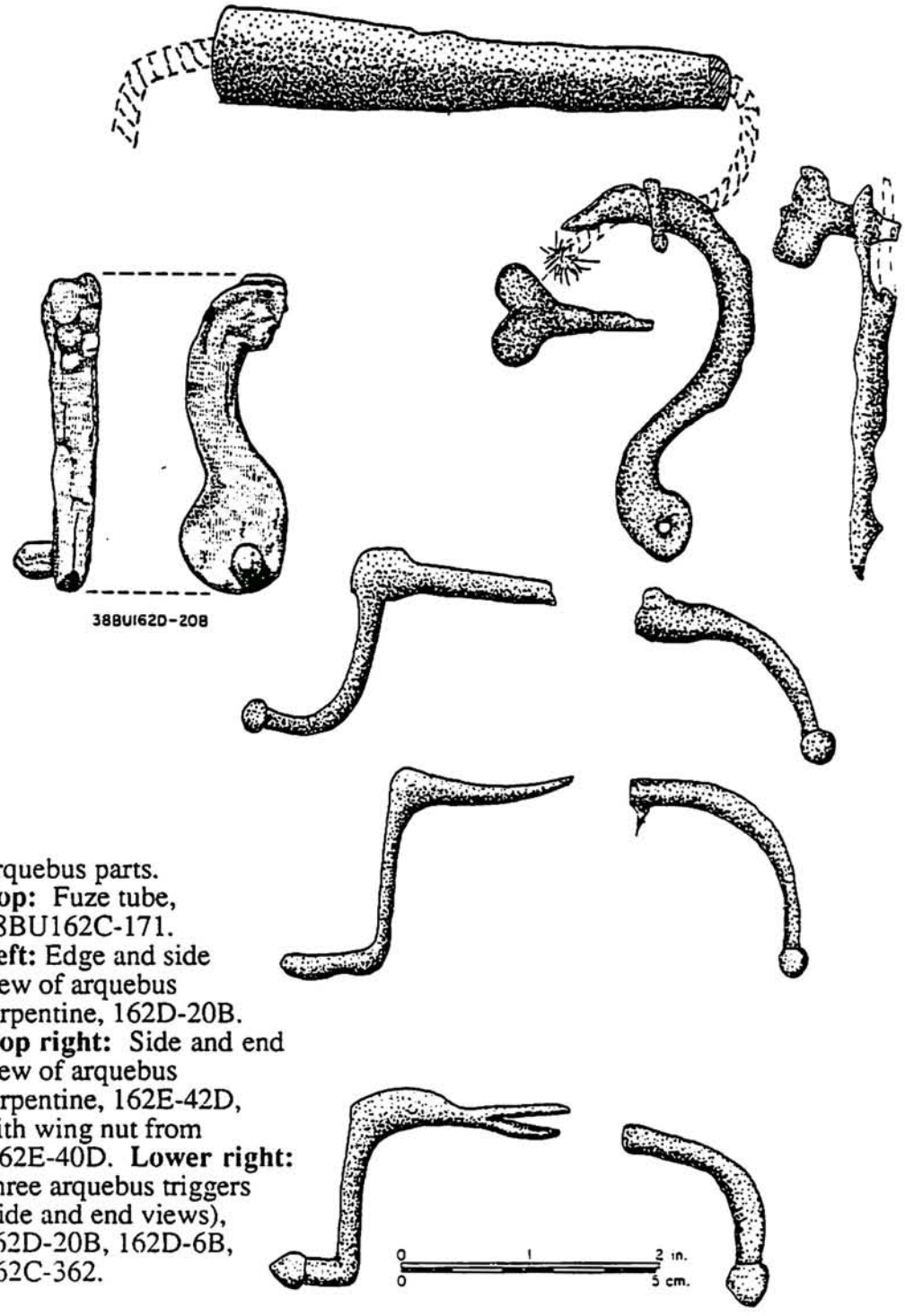


Figure 52. Arquebus parts. **Top:** Fuze tube, 38BU162C-171. **Left:** Edge and side view of arquebus serpentine, 162D-20B. **Top right:** Side and end view of arquebus serpentine, 162E-42D, with wing nut from 162E-40D. **Lower right:** Three arquebus triggers (side and end views), 162D-20B, 162D-6B, 162C-362.

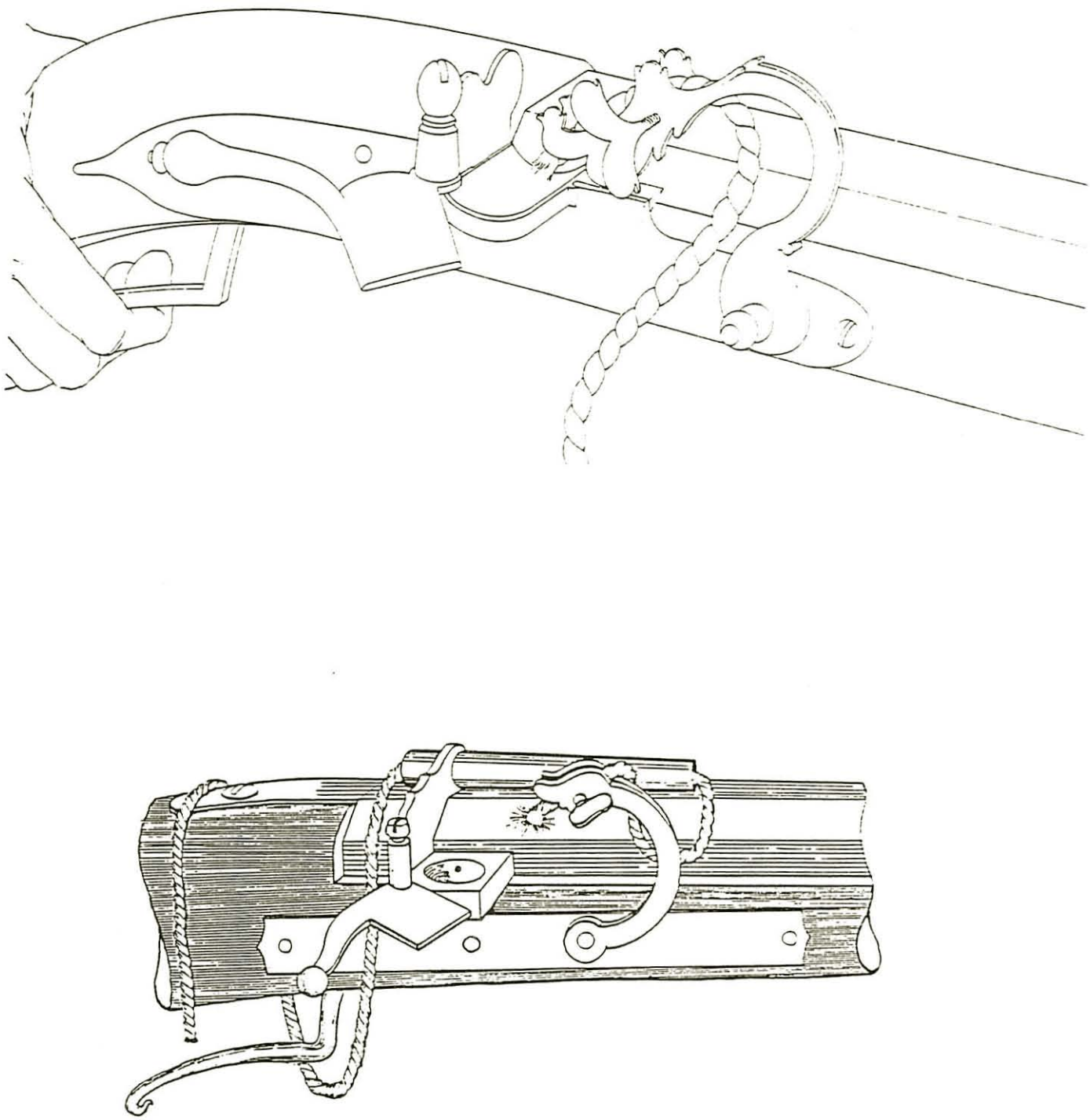


Figure 53. Illustrations of matchlock mechanisms. **Top:** View showing serpentine with wingnut and match. From Reid 1976:61. **Bottom:** View showing serpentine with match, fuze tube on top of the barrel, and trigger. From Held 1957:28.

Matchcord

A number of seeds, cockleburs, cane, and other normally perishable objects were recovered from the wells inside Fort San Felipe (South 1985a: 74-79). Among these items preserved below the water table for over 400 years was a rope fragment that may well have been a matchcord for an arquebus. Along with this was also found a linear strip of cloth. The woven cloth is of particular interest in that, when the Indians had the Spaniards at Fort San Felipe surrounded and under harrassment in the summer of 1576,the citizens of Santa Elena cut their bedsheets into arquebus fuses, until there were no longer any bedsheets in the town (Waddell 1980: 177). We might imagine this fragment (Fig. 55) may well be one of these sheet fragments torn or cut to make a fuse for an arquebus.

When Alvaro Flores inspected the forts in Florida in 1578, he found "twenty-five arquebuses, primed and loaded, laid on a long table...and in the sentry-box...two pikes and his arquebus...with its fuse lighted..." (Peterson 1956: 318, from Connor 1930: 117-203). The importance of fuses being lit was demonstrated by Ensign Moyano, who, in an Indian village with twenty-one soldiers trying to obtain food for Fort San Felipe, foolishly ordered that all the fuses be extinguished to prove his good intentions. The Indians seeing this fell upon Moyano and his men, killing all but one, Calderon, who lived to tell the tale (Connor 1925: 195). A short while later the heads of the dead men were carried by the Escamacu Indians to show them to the Guale Indians to the South of Santa Elena (Waddell 1980: 177).

The Crossbow

Introduction

In spite of the statement by the foremost author of information on the crossbow, Sir Ralph Payne-Gallwey, that forty years before 1572 the crossbow was practically extinct in warfare (1958:49), evidence for its presence at Santa Elena is found in the documents and artifacts. The material culture inventories (Fig. 10) reveal "crossbows" and "hooks for crossbows" in Spanish Florida, and Pedro Menéndez sent a supply of "cords for the crossbows" along with pikes and other goods to Santa Elena (Lyon 1984: 2). When Menéndez provisioned for his enterprise of Florida in 1565, his men were armed with arquebuses and crossbows, helmets and shields (Lyon 1976: 48). No evidence of helmets or shields has yet been found, but ample clues to the presence of arquebuses and crossbows are present.

As a hunting weapon, the crossbow survived far longer than it did as a military weapon and poison was used on the bolt or iron arrowhead to hasten the death of the game, as described here by Payne-Gallwey 1958: 145):

> With the Spanish crossbow, it was merely necessary that its bolt should be discharged with sufficient strength to perforate the skin of a deer, the deadly poison with which the head of the bolt was smeared quickly ensuring death by mingling with the blood. The Spanish crossbow which shot a light poisoned bolt, was, therefore, of no great power.

By the fourteenth century the siege crossbow had a range of about 450 yards (Trench 1972: 54). It was considered such a dreaded weapon that various Papal edicts forbade its use against Christians, but it nevertheless was a popular military and hunting weapon for hundreds of years, until replaced by firearms (Trench 1972: 47) sometime after the period of Santa Elena.

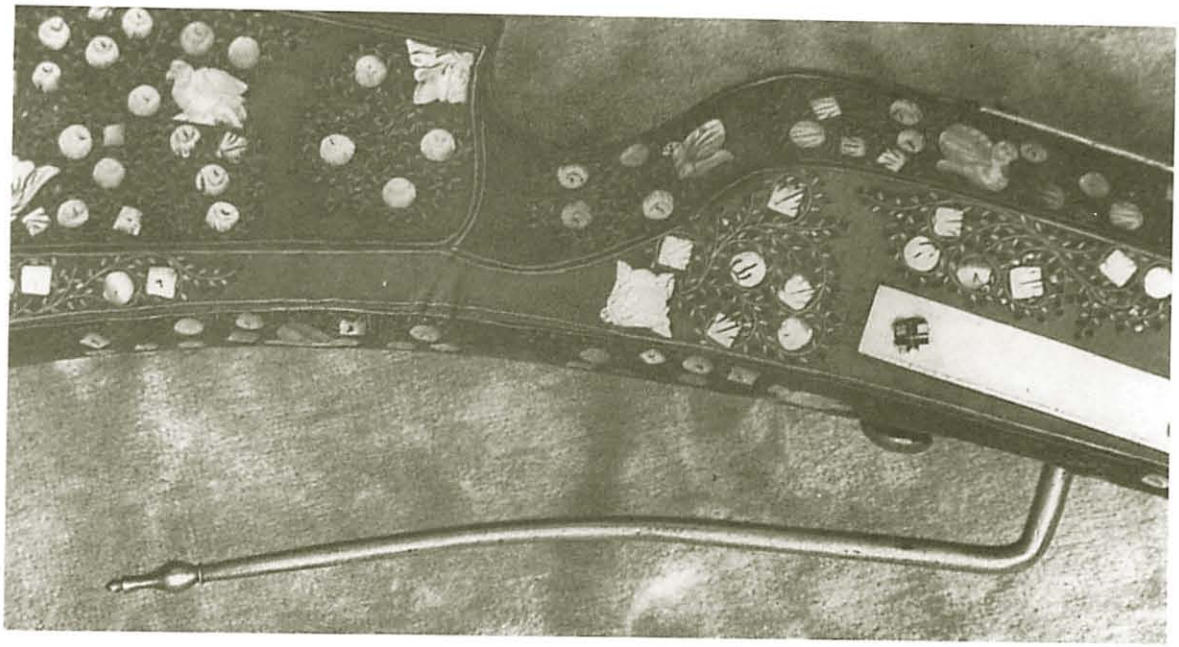


Figure 54. A German matchlock from ca. 1585, showing trigger. From Schöbel 1975:169, Fig. 106.

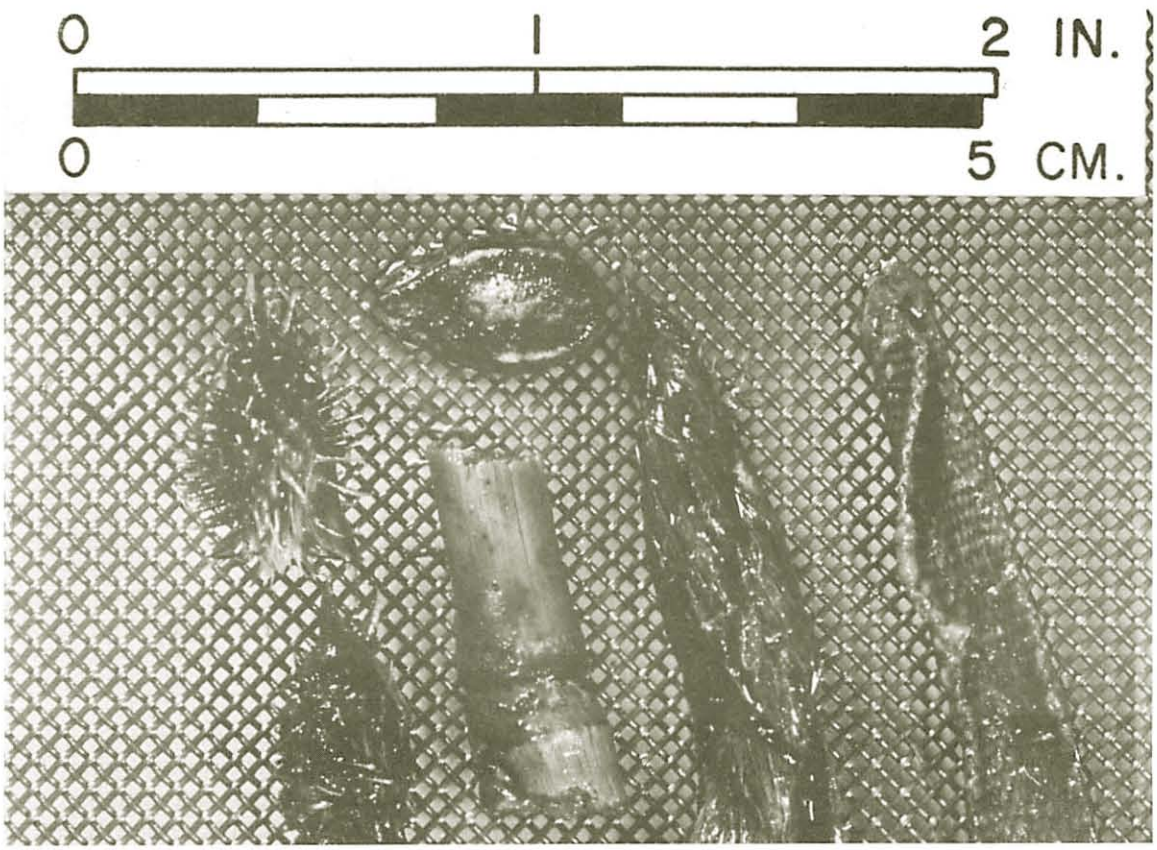


Figure 55. Cockleburs (*Xanthium strumarium)*, a squash/pumpkin seed (*Curcurbita moshata),* a piece of cane, a piece of braided rope, and a fragment of woven cloth cut into a strip, possibly for use as an arquebus fuze, from the north well in Ft. San Felipe, 162H-217H.

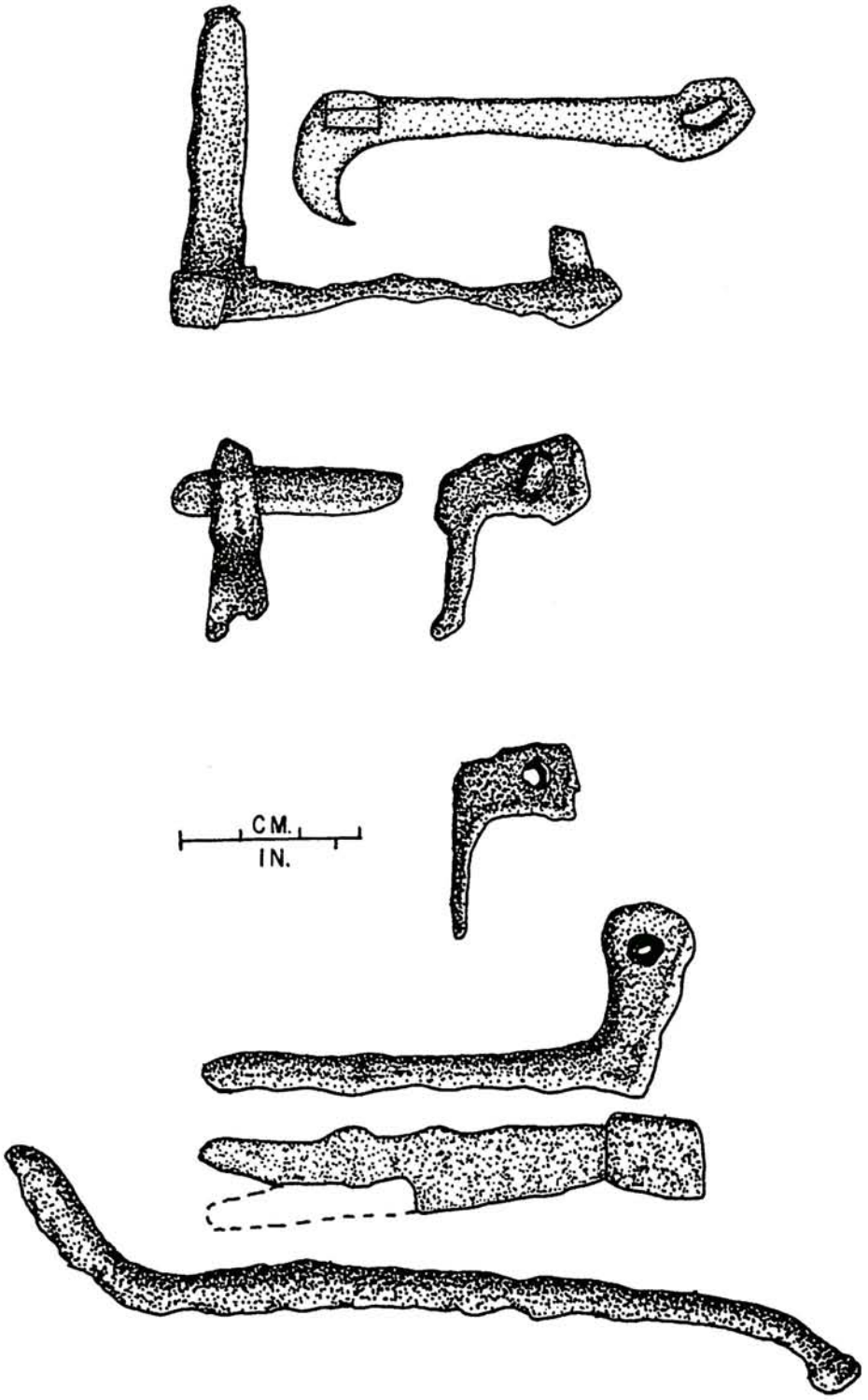


Figure 56. Goat's-foot lever parts and arquebus or crossbow trigger. **Top four parts:** Claw-frame parts from a goat's-foot lever used for cocking a crossbow, 38BU162E-38D (From the moat of the northwest bastion of Ft. San Felipe.) **Center:** Goat's-foot lever part from the *casa fuerte* ditch inside Ft. San Felipe, 162G-229. **Bottom:** Crossbow or arquebus trigger from Santa Elena pit, 162C-207B. **Above trigger:** Part from goat's-foot lever (side and top views) from the *casa fuerte* ditch inside Ft. San Felipe, 162H-409.

Crossbow Triggers

A long trigger (38BU162C-207B) was found in the Spanish B-zone level in Santa Elena, which could be either from a crossbow or an arquebus, since triggers of these weapons often are much alike (Figs. 50 and 56). This is the only possible crossbow fragment recovered. We know, however, that they were present from the documents and from the evidence from the goat's-foot lever or "hooks for crossbows" mentioned in the documents (Fig. 10) and found archaeologically.

Goat's-foot Lever

One of the necessities for the use of a crossbow was the need to cock or draw the powerful bow in order to cock it. One of the many devices used for this purpose was the goat's-foot lever, which enabled the crossbow to be cocked quickly. The crossbow and the use of the goat's-foot lever are illustrated in Figure 57. Various parts of the goat's-foot lever are illustrated in Figure 58, as taken from Payne-Gallwey's masterpiece work on *The Crossbow* (1958: 89).

Figure 58 is of particular interest beecause here we see the claw-frame used to draw back the bowstring for cocking the crossbow, and from Santa Elena and Fort San Felipe we have recovered fragments of the claw-frame from a goat's-foot lever (Figs. 50 and 56). The presence of the goat's-foot lever is clear evidence for the presence also of the crossbow as mentioned in the documentary records for Santa Elena. It is also of interest to note that a crossbow and goat's-foot lever were recovered from the shipwreck of 1554 on Padre Island (Arnold and Weddle 1978: 253).

Crossbow Bolt Points

Eight iron bolt points from crossbow arrowheads, or quarrels, were recovered from inside Fort San Felipe. None were found in the domestic occupation area of Santa Elena. Six of these are illustrated in Figures 59 and 60. Note the contrast between those conserved and those still retaining their coating of corrosion from four centuries of oxidation. These hollow iron points came in a variety of shapes for different functions (Fig. 61). Those from Santa Elena are all of Type 3 as illustrated by Payne-Gallwey (1958: 18) except for one, which is probably Type 1 (Fig. 61).

These armor-piercing arrowheads were very effective, far more so than arrows from bows. The sharply pointed ones, such as the one example from Fort San Felipe, were for use against men with light armor, such as foot-soldiers or perhaps Indians (Payne-Gallwey 1958: 18). Any would be effective against Indians, however, since they had no armor to pierce.

The Sword

A brass serpent head was found in the topsoil zone inside Ft. San Felipe (38BU162G-59A), (Fig. 60). Although covered with a green patina, it showed a high burnish indicating, perhaps, contact with clothing. Similar serpent heads are seen on sword hand guards and one is illustrated in Figure 60, from a Spanish or Flemish rapier dating from the mid-sixteenth century (Schöbel 1975: 120). Apparently, other cutting instruments than swords were so adorned, because similar serpent heads are illustrated on the handles of surgical tools illustrated by Held (1957: 35), from a woodcut dating from 1497 (Fig. 91). No other evidence for swords at Santa Elena or Fort San Felipe has been found, except perhaps a disc shaped object, possibly a foil or épeé handguard illustrated in Figure 114 and 117.

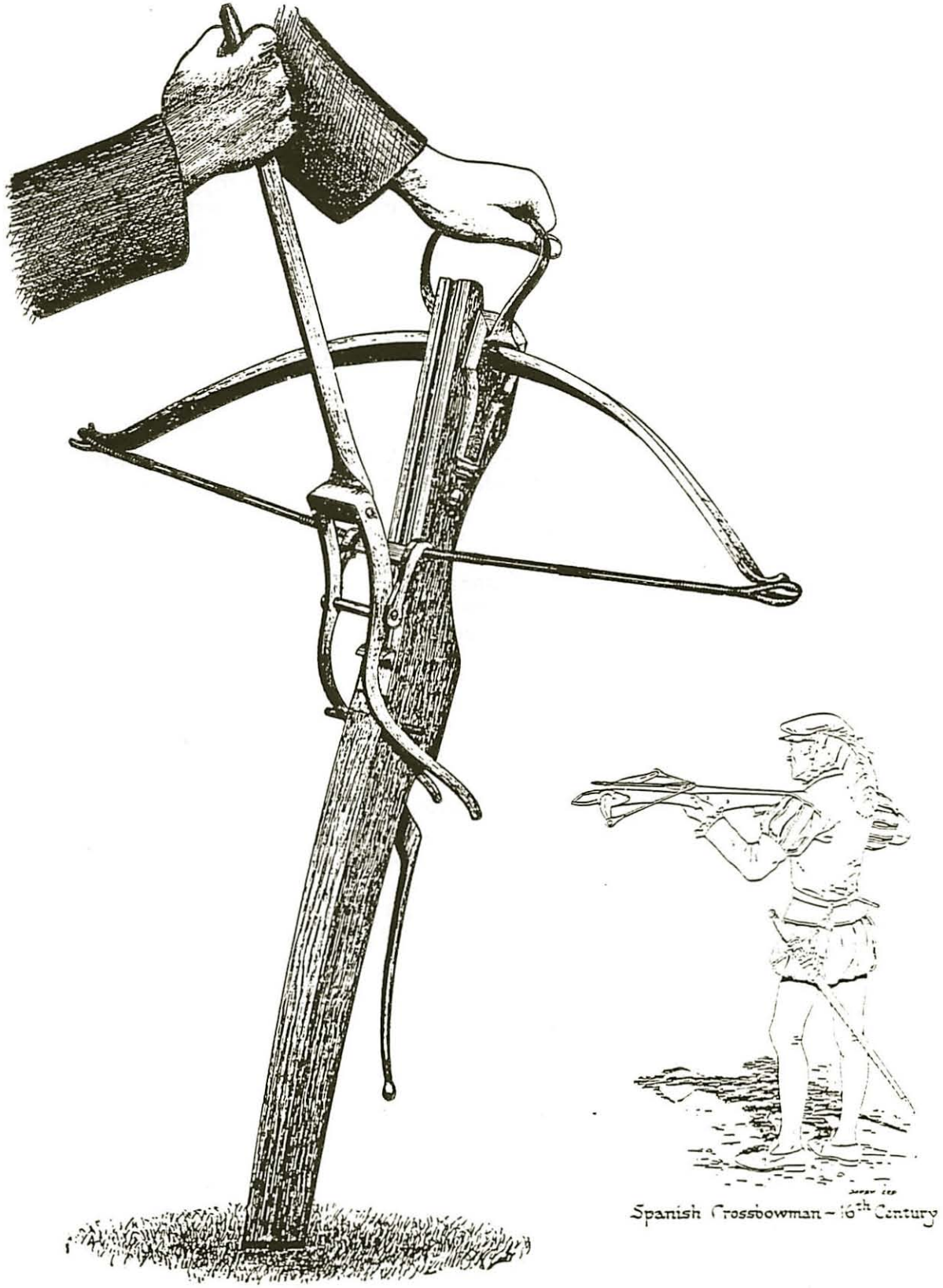


Figure 57. Illustration of the use of a goat's-foot lever to cock a military crossbow. From Payne-Gallwey 1958:89, Fig. 45. **Inset:** Illustration of a Spanish crossbowman of the sixteenth century by Darby Erd.

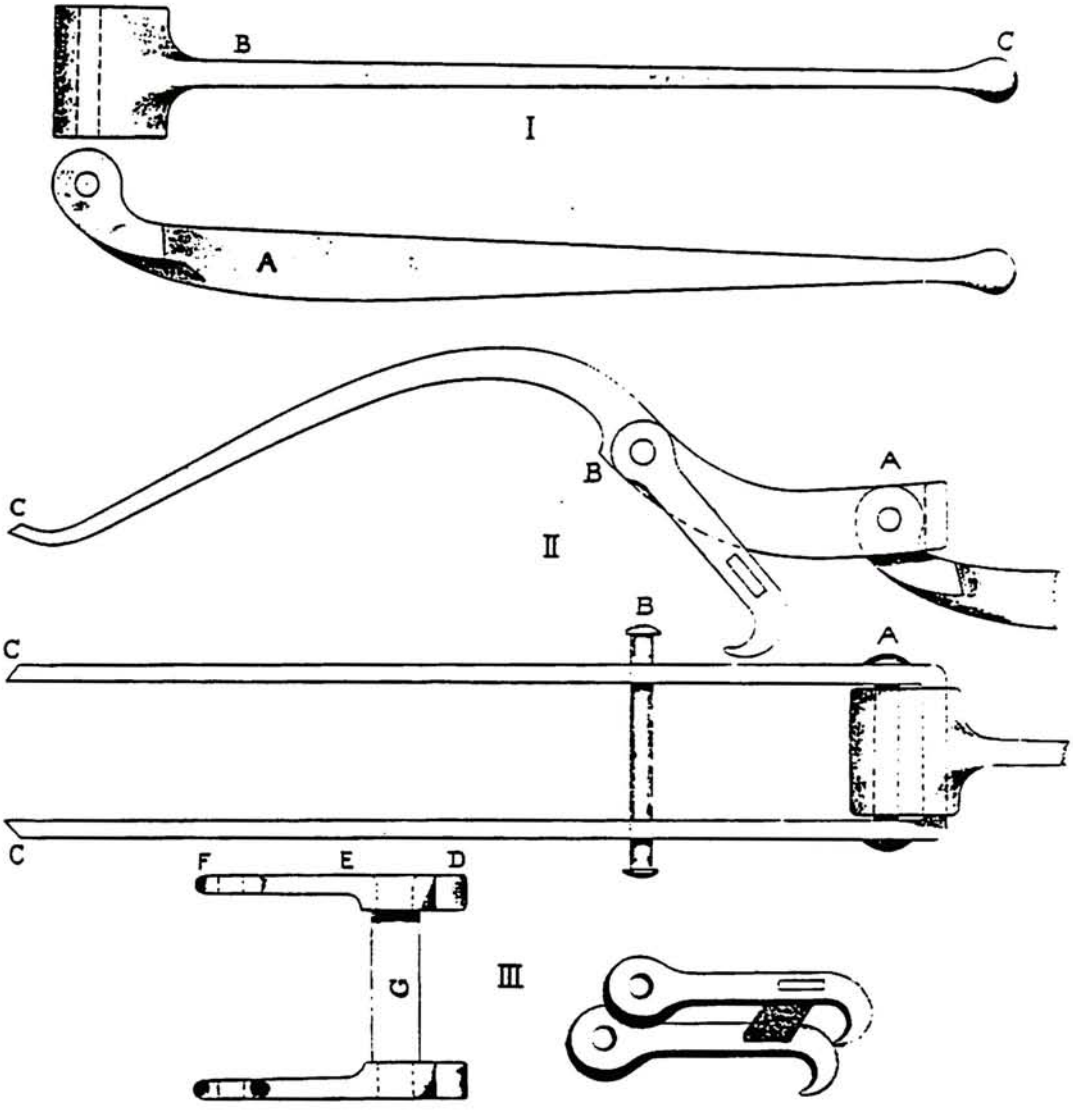


FIG. 44.—THE MECHANISM OF THE GOAT'S-FOOT LEVER.

Figure 58. The mechanism of the goat's-foot lever. From Payne-Gallwey 1958:87. Fig. 44.

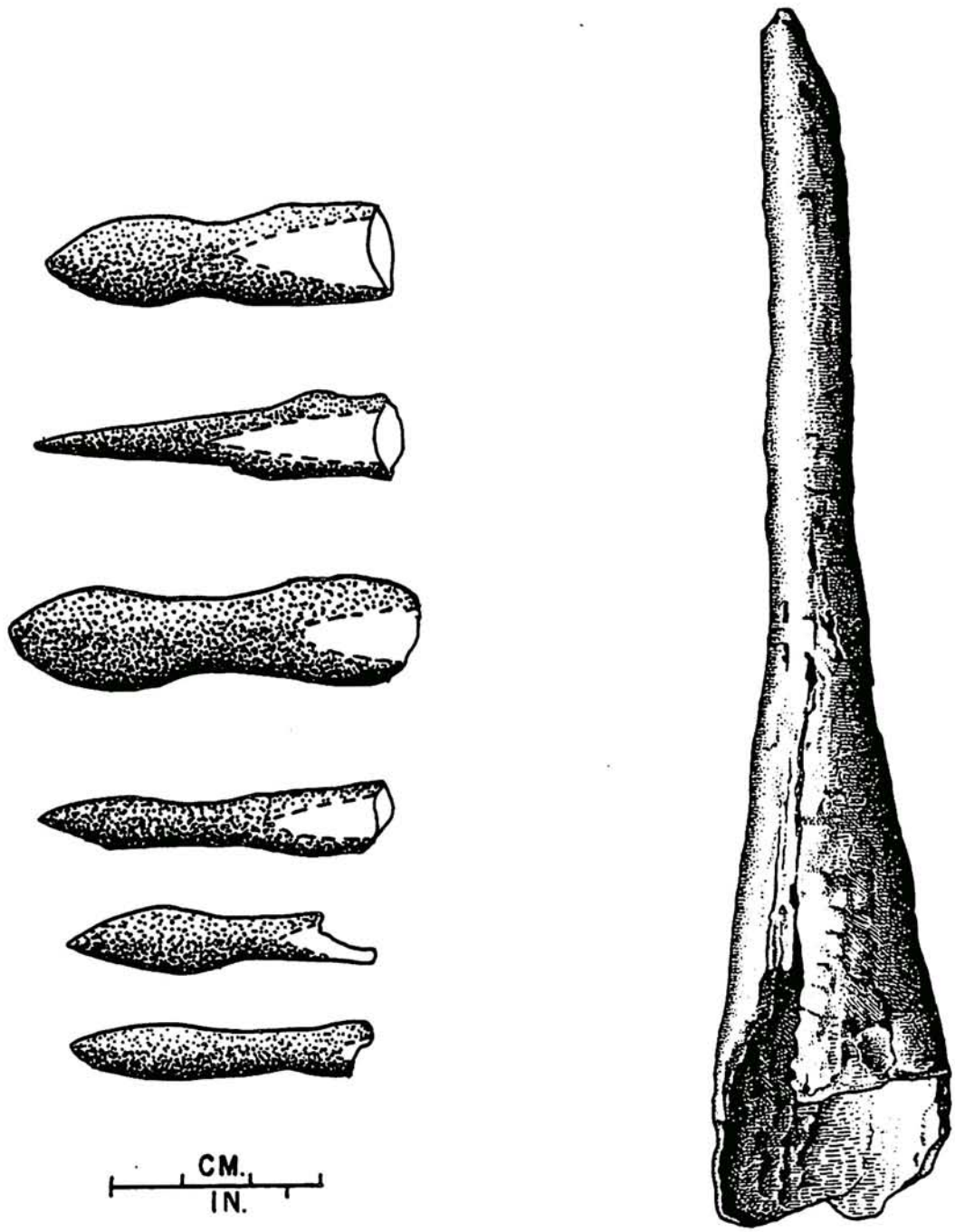


Figure 59. Crossbow bolt points from Ft. San Felipe and pike point from Santa Elena. **Top down:** Points, 38BU162G-18A, 162G-63A, 162G-67A, 162H-91A, (3 points). **Right:** Pike point, 162D-4B.

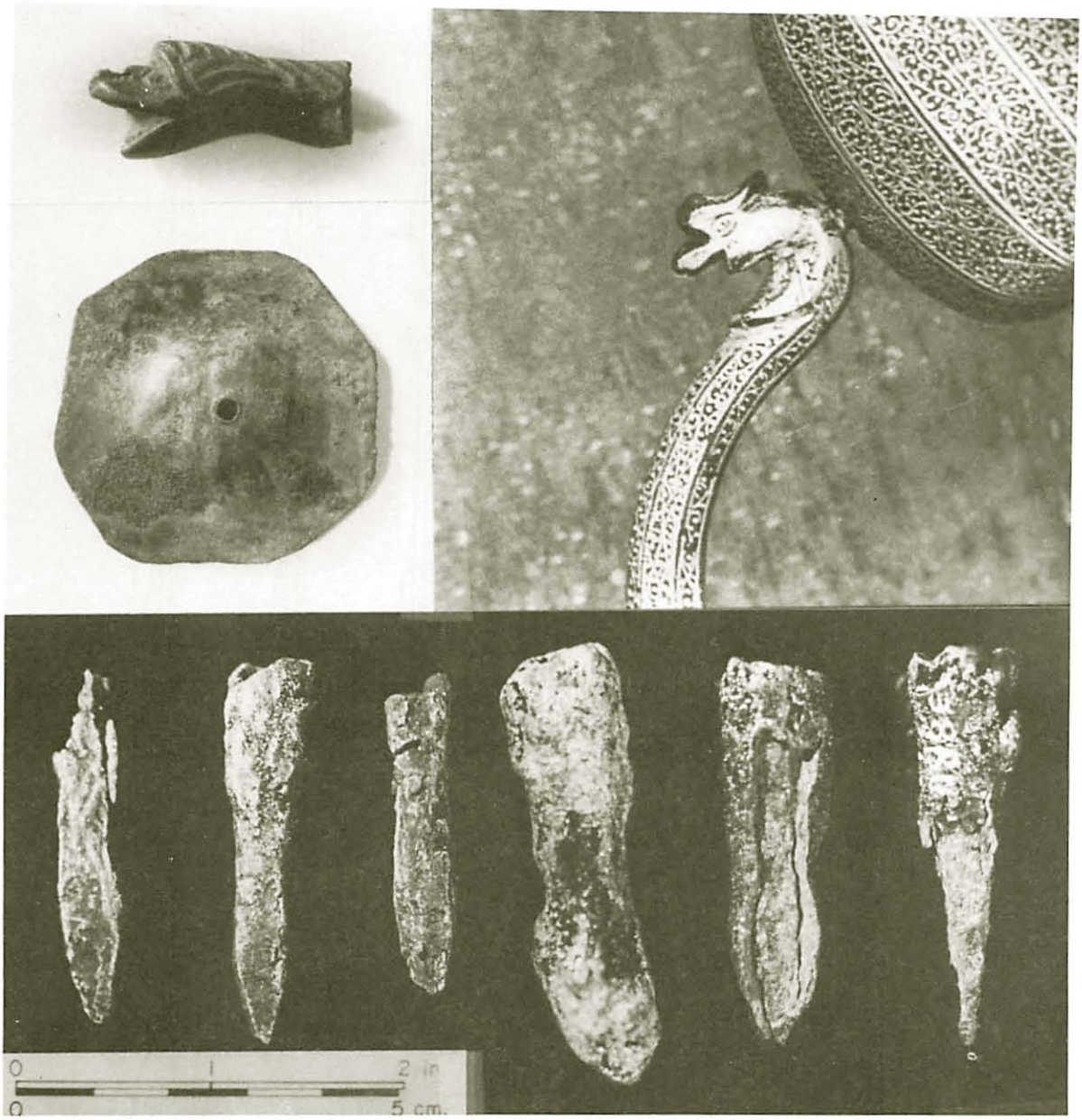


Figure 60. Brass serpent head, brass jack plate and crossbow points. **Top left:** Serpent head, probably from a sword handle similar to that at right, 38BU162G-59A. **Right:** A mid-seventeenth century sword handle with serpent similar to that from Ft. San Felipe. From Schöbel 1975:120, Fig. 68. **Left Center:** Brass jack plate from quilted Spanish armor *(escaupiles)*, 162G-146B, from a midden filled well inside Ft. San Felipe. **Bottom:** Crossbow bolt points from Ft. San Felipe. The three on the left (162H-91A) were conserved to bare metal. With those on the right an attempt was made to conserve the accumulated rust as well, but separation of the corrosion from the iron cores is taking place, 162G-67A, 18A, and 63A.

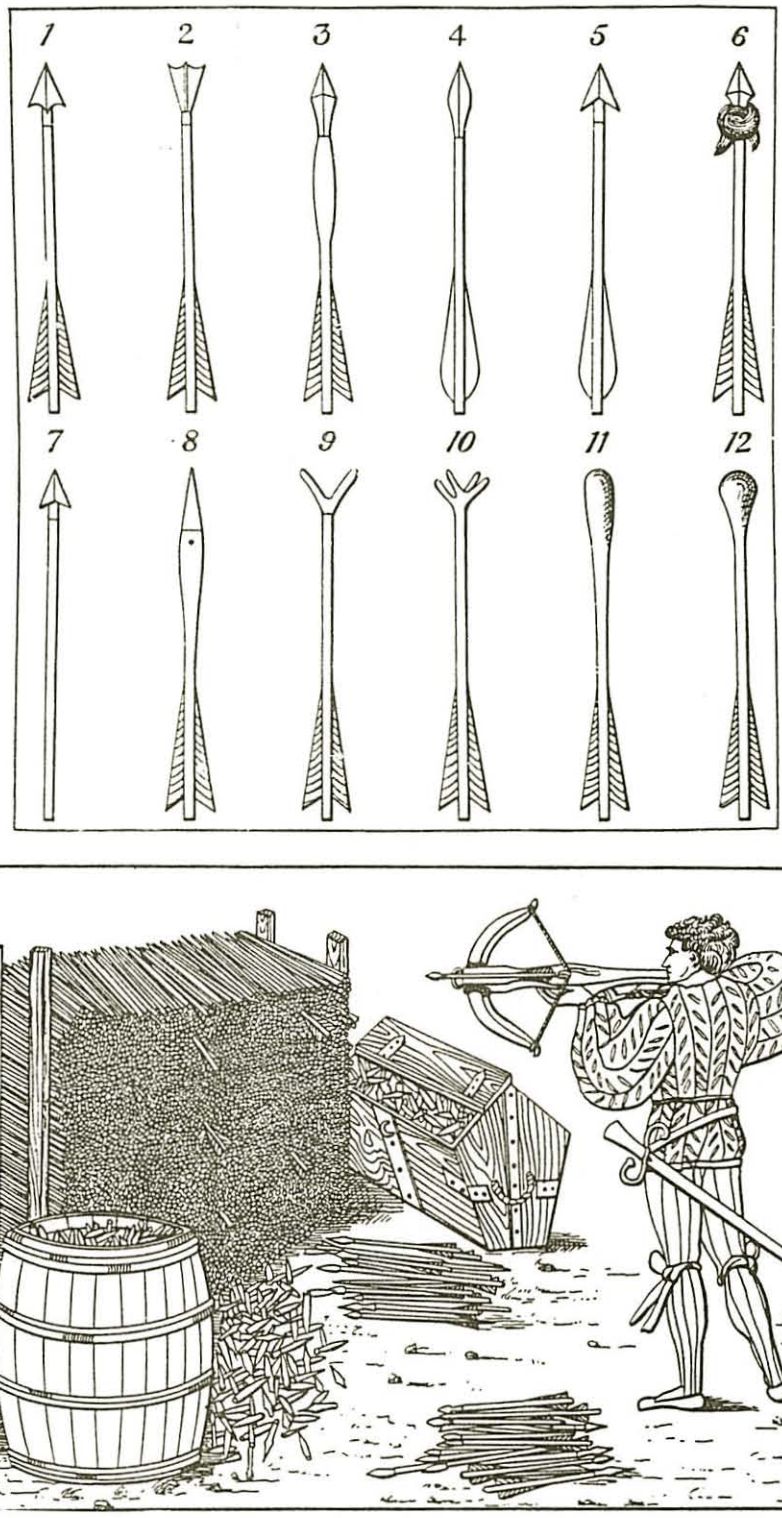


Figure 61. **Top:** Different forms of crossbow bolts, from military to game bird bolts. From Payne-Gallwey 1958:18, Fig. 10. **Bottom:** A store of crossbow bolts, shafts, and heads. From Payne-Gallwey 1958:16, Fig. 9, taken from a catalogue of the Arsenal of the Emperor Maximilian I. (b.1459, d. 1519).

Sword belts were mentioned in the inventories of material goods seen in Figure 10 and there are other references to swords, such as, for instance, Hernando de Segovia, the barber who had "sword, buckler, and case of instruments for making cures" (Peterson 1956: 318-319, from Connor 1930: 137-169). Hooks and eyes for sword belts have been found at Santa Elena and they are dealt with in a later section under Clothing.

The Pike

A pointed iron pike point was found in the Spanish midden B-zone in Santa Elena (38BU162D-4B), (Figs. 50 and 59). Pikes were listed in the inventories from Spanish Florida (Fig. 10) and Flores in his 1578 inspection of the forts in Florida, mentions three dozen pikes hanging on nails on the gun platform (Peterson 1956: 318, from Connor 1930: 117-203). The Santa Elena example is 7" long and 1 7/8" wide at the hollow socket end. Such pikes were used in moving timbers in building construction, but they were also used in a military context. Ivor Noël Hume (Personal Communication, April 11, 1983) says this iron pike point may well be one end of a palisado, or archer's stake. He says, (South 1983: 25):

> According to Holinshed, at the Battle of Agincourt in 1415, Henry V's instructions to his troops "caused stakes bound with iron sharpe at both ends of the length of five or six foot to be pitched before the archers on each side of the footmen like an hedge." These things continued to be used in England throughout the sixteenth and seventeenth centuries as well as in Europe. They were described as Le Sieur de Gaya in *Traité des Armes* (1678) as being a staff 6 1/2 feet long with an iron point at each end. Charles Ffoulkes, Master of the Tower Armouries, 1913-1938, in his book *Arms and Armament* (1945: 133) notes that Gaya "considers that this was a weapon, but it is more probable that it was a palisado." The only illustration that I have seen of these defenses is a German one from the fifteenth century and as one end of each stake is in the ground, and the other none too clearly depicted, I cannot tell you from which end your object is likely to have come. On the other hand, it seems reasonable to deduce that the spikes were the same on both ends. In England in the sixteenth century, the things were called "fyldstakes" rather than palisadoes.

The Armor

Plate (tasset lame)

During the excavation of the northwest bastion of Fort San Felipe, a fragment of armor plate was found to which a brass buckle was attached (South 1983:57), (Figs. 62 and 63). Ivor Noël Hume discusses this type armor as being made up of a series of iron plates called lames, "each overlapping and anchored to one another by leather straps" (Hume 1982:268), to form a tasset which protected the thigh (Fig. 65). Another fragment of armor was found in one of the *casa fuerte* postholes and this, too, had a brass buckle attached (Figs. 63 and 64).

Buckles

Other brass buckles, probably from armor straps, are also shown in Figures 63 and 64, though these may also have been on straps or belts not associated with armor. We include the brass buckles here because we have no iron buckles associated with plate armor. The functional use of such buckles is illustrated in paintings of armor from the fifteenth to the seventeenth century, in Figures 65 and 66.

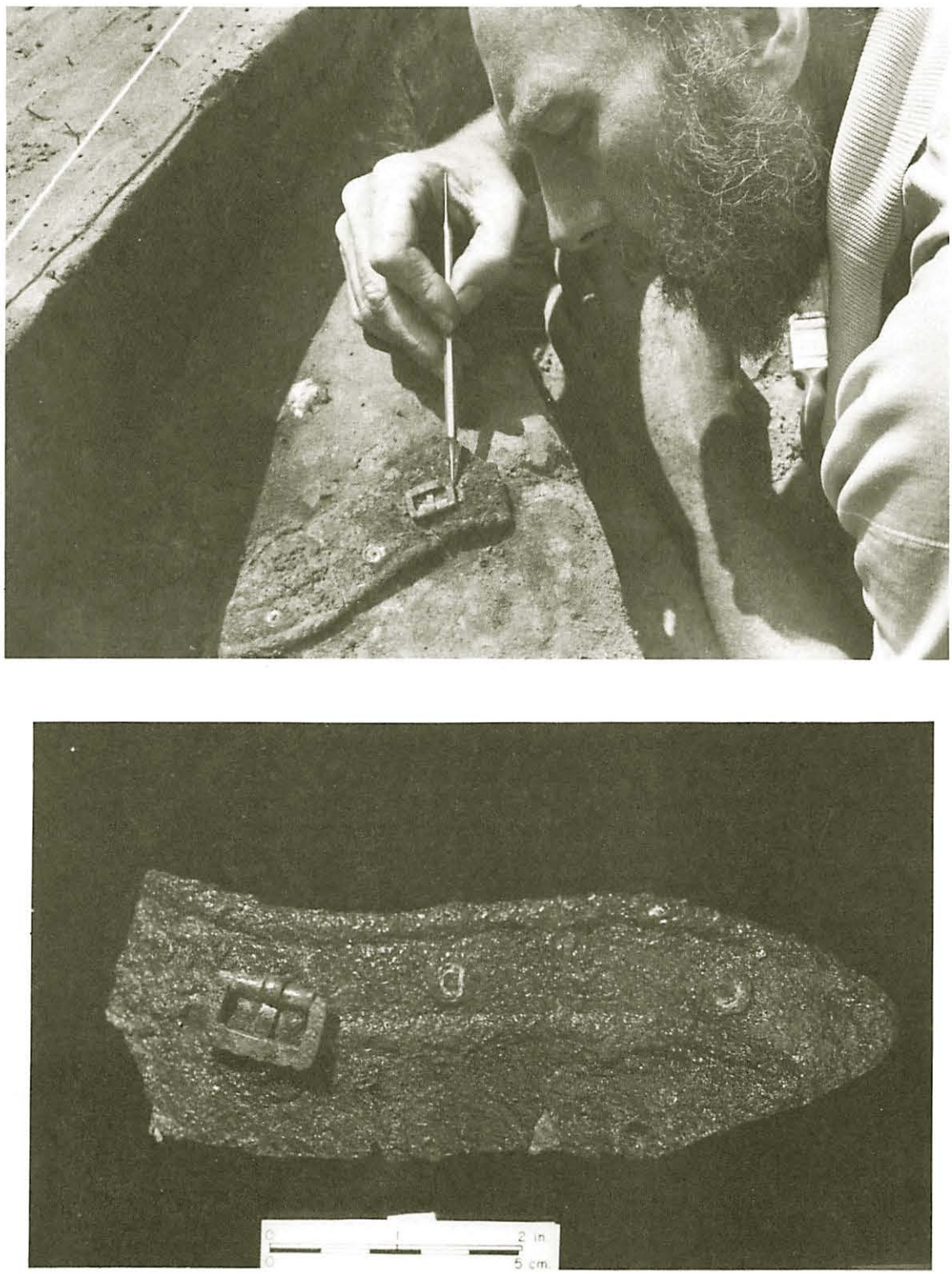


Figure 62. **Top:** A tasset lame from Spanish armor being revealed in the moat of Ft. San Felipe. **Bottom:** The fragment of Spanish armor after conservation, 38BU162E-97.

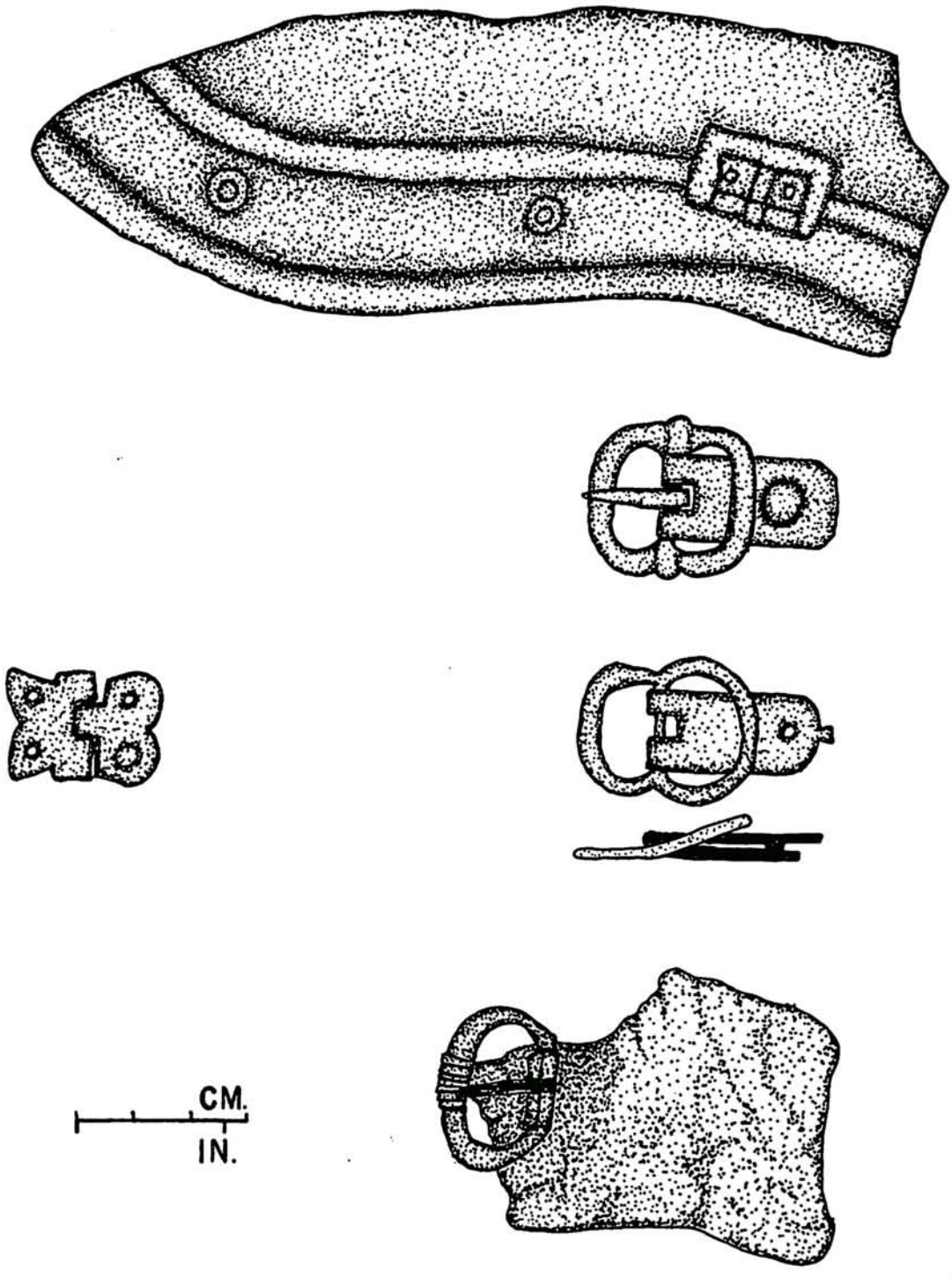


Figure 63. Drawings of Spanish armor, buckles and hinges. **Top:** Tasset lame, 162E-97. **Left:** Brass hinge, 162D-4B. **Center right top:** Brass buckle for strap or armor, 162D-48. **Center right lower:** Brass buckle (plan and side view) from the bottom of the moat of Ft. San Felipe, 162E-39E. **Bottom:** Spanish armor fragment with brass buckle from a *casa fuerte* posthole inside Fort San Felipe, 162G-170.

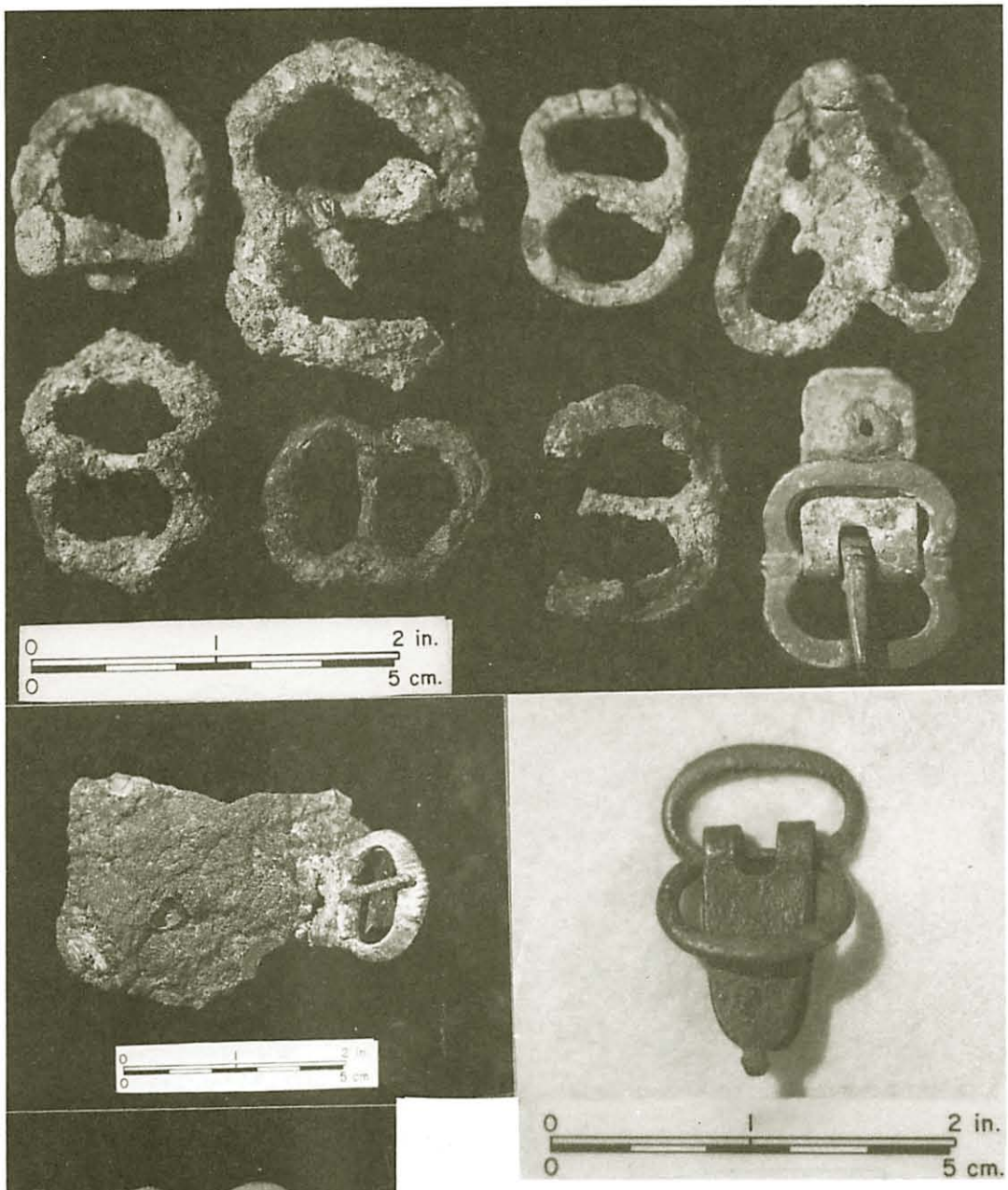


Figure 64. Iron and brass buckles and a hinge from Santa Elena and Ft. San Felipe. **Top row:** Iron buckles, 38BU162A-15B, 162C-293, 162C- 143B, 162C-177B. **Row 2:** Iron and brass buckles, 162C-293, 162C-346B, 162C-140B, 162D-4B (brass). **Center left:** Brass buckle on iron armor fragment, 162G-170. **Right:** Brass buckle,162E-39E. **Bottom left:** Brass hinge, probably from armor, 162D-4B.

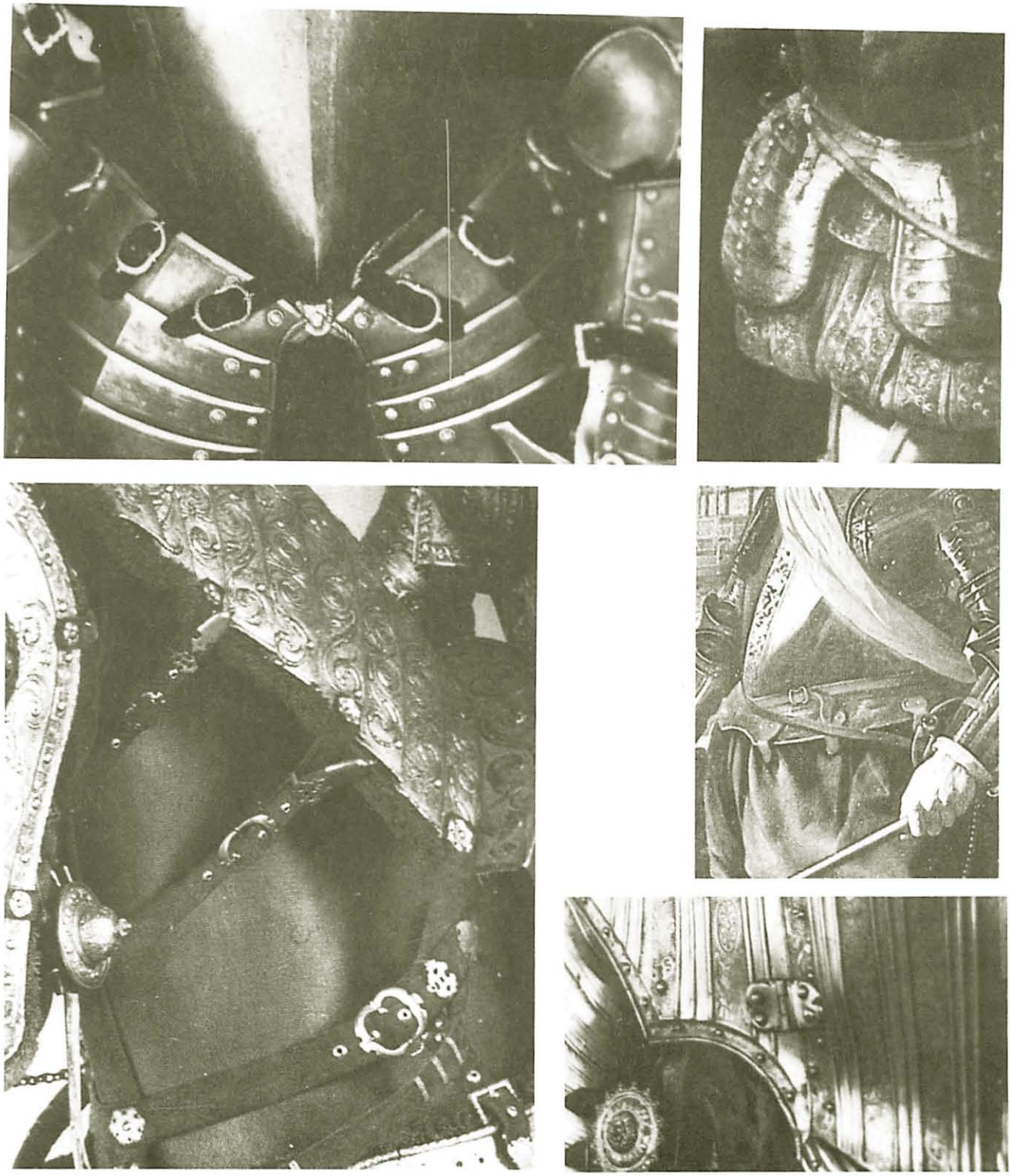


Figure 65. Brass buckles and hinges on armor. **Top left:** Buckles on armor, ca. 1592. From Schöbel 1975:41, Fig. 5. **Top right:** Armor, ca. 1630, showing overlapping lames. From "The Legend of the Bell" by Zurbaran (The Cincinnati Art Museum), from Gállego 1977:143, Fig. 22. **Center right:** Buckles on armor, ca. 1634. From "Defense of Cadiz Against the English" by Zurbaran (Madrid: Prado Museum), from Gállego 1977:187, Fig. 102. **Bottom left:** Buckles and other fastenings on horse armor, ca. 1562-1564. From Schöbel 1975:48, Fig. 13. **Bottom right:** Brass hinge on horse armor, ca. 1515. From Schöbel 1975:38, Fig. 2.

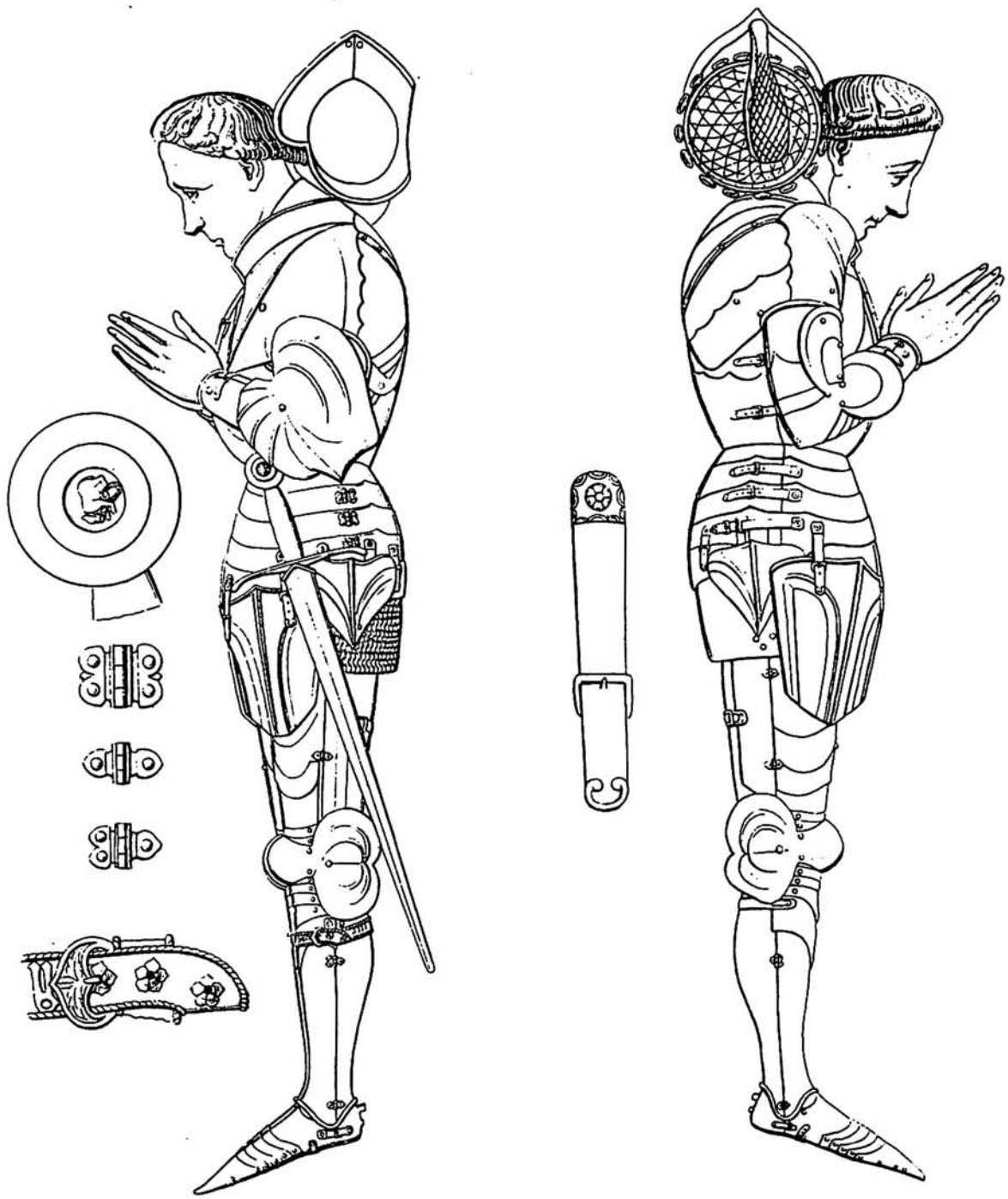


Figure 66. Illustrations of fifteenth century English armor showing hinges and buckles. From the effigy of Richard Beauchamp, Earl of Warwick (d. 1439), in the church of St. Mary, Warwick. From Stibbert 1968: Fig. 124.

Hinges

A brass hinge with asymmetrical wings was found in the Spanish B-level in Santa Elena (Figs. 63 and 64). Similar hinges are seen on horse armor (Fig. 65) of the period, as well as on plate armor (Fig. 66).

With the presence of hinges, buckles, and fragments of plate armor with brass buckles from Santa Elena and Fort San Felipe, it is clear that armor was in use at Santa Elena. This evidence was also recorded in the material culture lists seen in Figure 10. Here we see "armarde poufano," which is untranslatable, but which may have been meant to be "armadura profano," which means lay armor, or common armor. Another interesting type of armor, made of padded cotton, is discussed in the following section.

Escaupiles (quilted armor)

Jack Plates

Three brass discs with a central hole, and another of iron, were found in Santa Elena and Fort San Felipe (Figs. 60, 67, and 68). The iron disc fragment was badly corroded, but the brass discs were hammered into shape, with a dome in the center (Fig. 67). One had been hammered and flattened after the dome was formed. The shape of the dome was made by hammering on a small anvil, such as the one illustrated in a later section of this report (Figs. 106 and 129). The irregularity of these discs and their hammered appearance suggested that they were probably made locally.

Such discs are seen on Indian sites of the contact period (Polhemus 1982), and are considered to be trade items making their way from Spanish sources to interior sites in Tennessee and Georgia. They are found in Dallas Period sites and in some cases Spanish beads are found with them, dating them from ca. 1570 to 1600. Richard Polhemus reports on 17 of these from East Tennessee in a recent study (Polhemus 1982).

The function of these discs in the Spanish colonial system has not been addressed by archaeologists dealing with the inland Indian cultures where the discs are found, to my knowledge. Their function in the parent culture has been addressed by Ivor Noël Hume through a number of iron plates such as the iron and brass ones found at Santa Elena and Fort San Felipe (1982: 269). Such plates, according to Noël Hume, were sewn between layers of canvas, creating a quilted appearance. Such armored garments are called "plate coats," or "jacks of male," or jackcoats, and were listed in inventories from the early seventeenth century, with over one thousand metal plates being required to make one jackcoat (Noël Hume 1982: 270-271).

The Spanish name for such armored jackcoats was *escaupiles,* and they were much in evidence at Santa Elena and her forts. Writing from Fort San Marcos to the King of Spain in 1578, Pedro Menéndez Márques requested 150 suits of Mexican armor [escaupiles], "similar to those which were made for these provinces in Sevilla the other time. . . And if any greater number of men should come, let your Majesty order that one suit of armor be brought for each of them" (Connor 1930: 91). Later in the same year Alvaro Florez de Quiñones inspected Fort San Marcos and found "eighty *escaupiles,* all hanging on their nails" (Connor 1930: 191). From this information it is apparent that many jackcoats or *escaupiles* were to be found in Santa Elena and her forts.

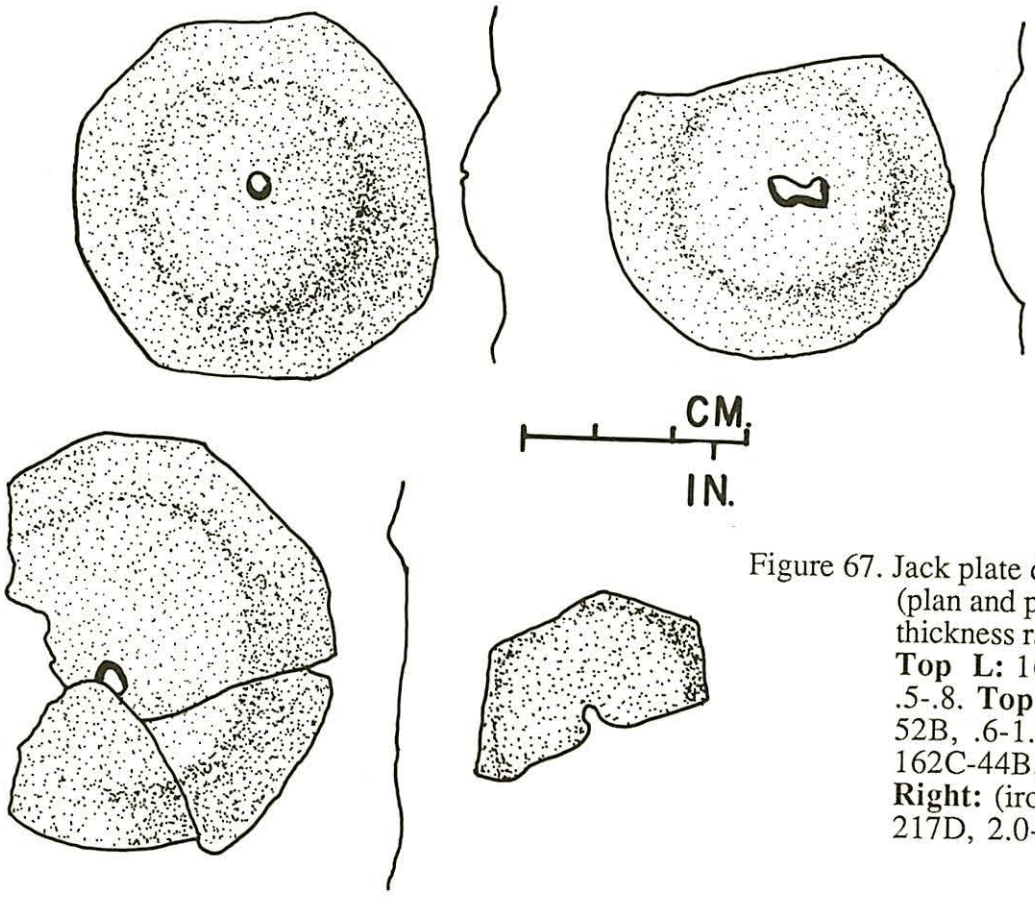


Figure 67. Jack plate drawings. (plan and profile & thickness range mm) **Top L:** 162G-146B, .5-.8. **Top R:** 162C-52B, .6-1.0. **Left:** 162C-44B, .5-1.0. **Right:** (iron) 162H-217D, 2.0-4.8.

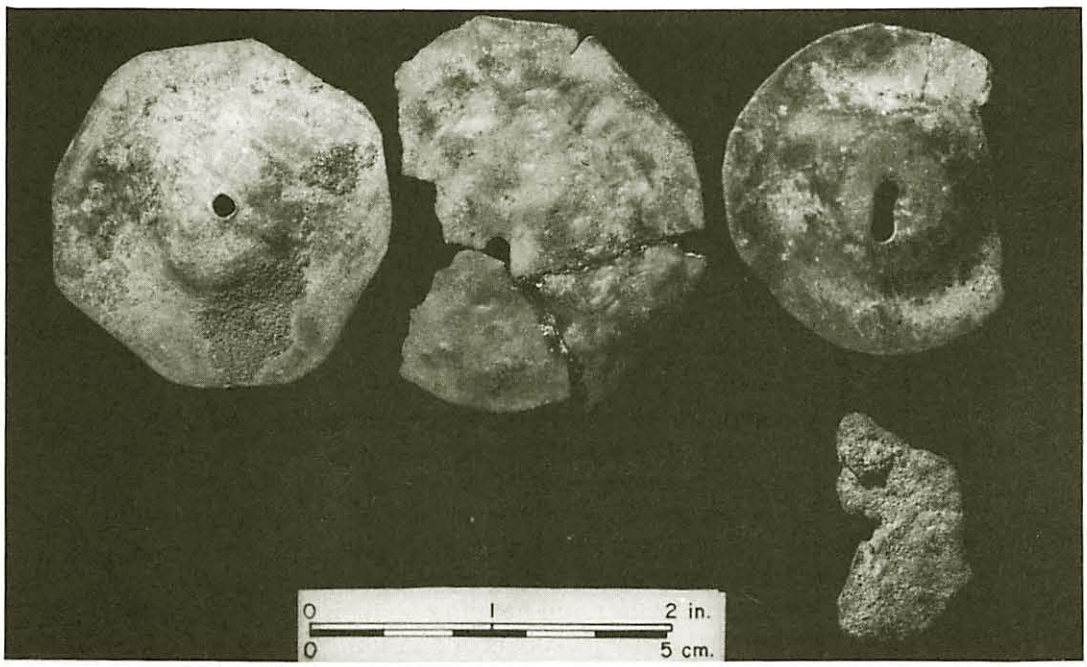


Figure 68. Brass and iron jack plates for quilted armor *(escaupiles)*. **Left: to right:** 162G-146B, 162C-44B, 162C-52B. **Bottom:** (iron) 162H-217D.

Another reference to *escaupiles* reveals that some were made in Santa Elena by the tailor, Alonso de Olmos, who had six children, one of whom helped him make the quilted cotton armored jackcoats (Lyon 1984: 4,7). This local manufacture is consistent with the locally produced character of the brass discs. Noël Hume points out that old plate armor was recycled by being cut to make octagonal shaped iron jack plates (like those of brass from Santa Elena) (1982:269).

A witness said in 1570 that the soldiers at St. Augustine had taken their *escaupiles* to pieces so they could be used as shirts. It may well be that they then traded the jack plates to the Indians. At Santa Elena it was said that of the fifty soldiers there were not six shirts (Connor 1925: I, 807), which reveals the severity of the need for shirts and why they should be converting *escaupiles* to shirts.

Domed round discs of brass, silver and gold are also seen among the artifacts thought to be associated with the DeSoto expedition (South Florida Museum Conference on the artifacts of the Hernando De Soto Expedition (1539-1543, January 29-31, 1988).

The Artillery

Gun Carriage Ring and Pin

A badly corroded iron ring with attached pin was found in the bottom of well 172 inside Ft. San Felipe. It is thought to be the type of ring and pin used to fasten artillery gun carriages to the bulkhead or firing wall of gun platforms. This type ring and pin is illustrated in Figures 69 and 70.

Some of the artillery carriages and wheels for them were made by the carpenter Martín de Lezcano at Santa Elena (Lyon 1984: 7). In the next section we will discuss the cannonballs used with the artillery at Ft. San Felipe, some of which were found on the site.

Cannonballs

Four solid iron shot for artillery were found, one at Santa Elena and three at Fort San Felipe. They measure as follows:

Provenience	Dia. mm	Wt. gm	Wt. oz	Wt. lbs.
38BU162A-73	71.0	1150	40.25	2.50
38BU162E-38E	71.0	1297	45.40	2.84
38BU162G-53A	85.0	2404	84.86	5.30
38BU162G-58B	78.	1669	58.92	3.68

The artillery present at Fort San Felipe and Fort San Marcos are known to be demi-culverins, sakers, demi-sakers, falcons, and reinforced cannon for assault (Connor 1930:155-159). Those balls weighing from 2.5 to 3.68 pounds are for the 3-pounder falcon, with the 5.30 pound ball being for the 6-pounder demi-saker (Manucy 1949:34). The two basic sizes of solid shot balls are illustrated in Figure 70. An illustration of a solid iron ball is seen in a painting by Velázquez, dating from 1632-3, entitled "Don Juan de Austria" (Fig. 70) (López-Rey 1968: Plate 105).

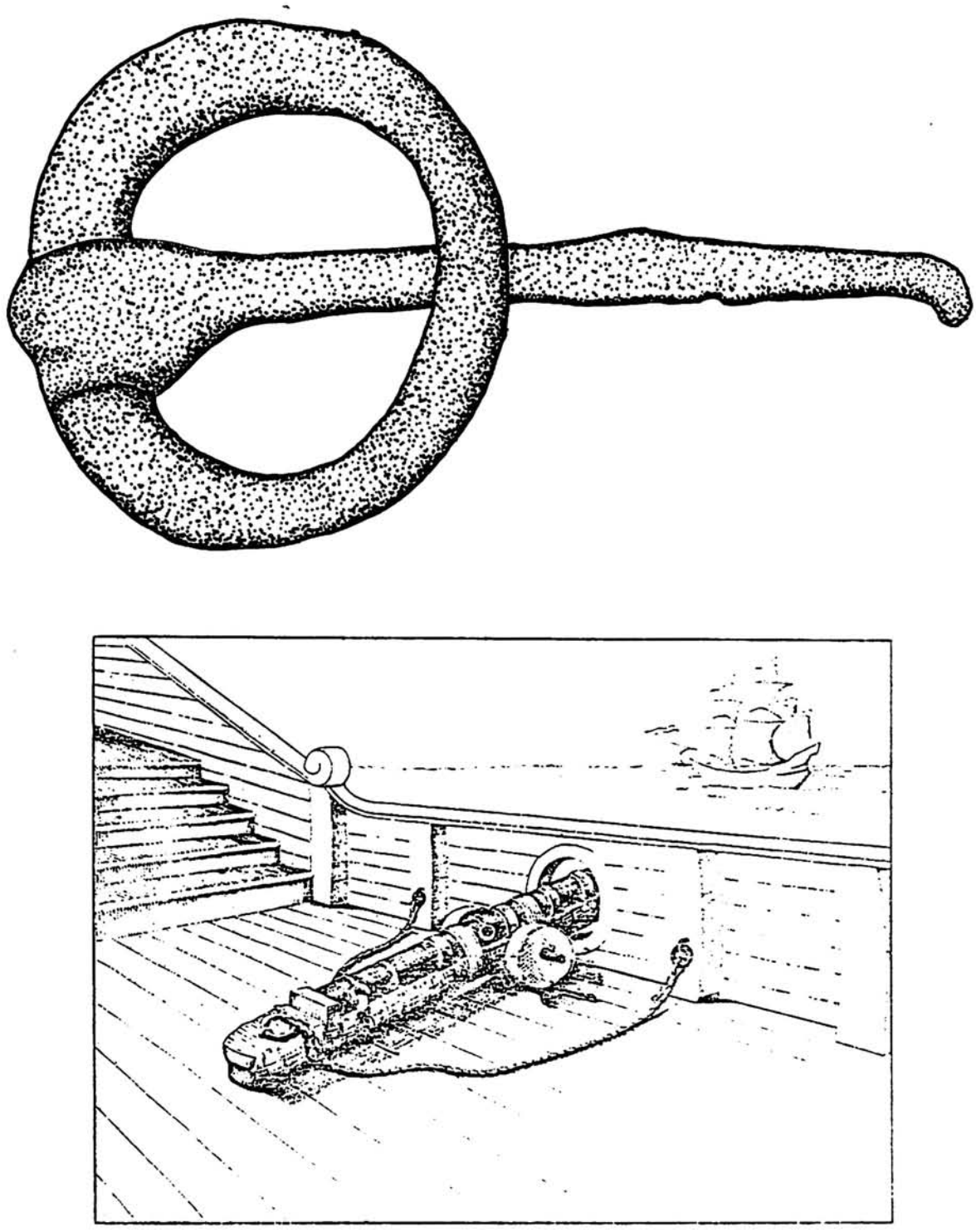


Figure 69. **Top:** Corrosion encrusted artillery carriage ring and pin from Ft. San Felipe, 38BU162H-172G, pin 300 mm long, ring 145 mm across. **Bottom:** Drawing of a ship mounted bombard showing the position of the artillery ring and pin. From Arnold and Weddle 1978:247, Fig. 33, ca. 1554.

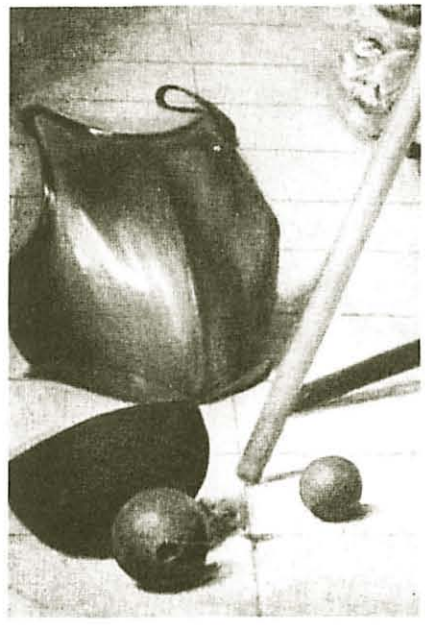


Figure 70. Cannonballs, stake, gouge, artillery carriage ring and pin, and flensing knife. **Top:** Gouge, 162D-37. **Left:** Iron stake, 162E-40D. **Center:** Large cannonball, 162G-53A, dia. 85 mm. Small cannonball, 162E-38E, dia. 71 mm. Artillery carriage ring and pin, 162H-172G, Flensing knife, 162G-173. **Right:** Cannonball and armor from "Don Juan de Austria" by Velázquez, ca. 1632-33, (Prado). From López-Rey 1968: Plate 105.

CHAPTER 6

THE CLOTHING GROUP OF ARTIFACT CLASSES

Introduction

Our primary interest in clothing is from the perspective of those items that have survived, such as buckles, hooks (frogs) and eyes, ball buttons, aglets (lacing tips or points), bordado (fancy embroidered decoration), decorative bells and star spangles, and those items involved in making and repairing clothing, scissors, thimbles, and pins.

There are, however, a number of excellent books on the history of costume, where the reader can enjoy many hours of reading on the fascinating subject of period clothing (Anderson 1979; Ashelford 1983; Kelly and Schwabe 1925; Laver 1950; Yarwood 1978). Yarwood provides a good generalized summary of Spanish clothing of the sixteenth century that is worth quoting here as a backdrop for the more specific clothing related topics to follow (1978: 386):

> In the sixteenth century the colonization of the New World had given great wealth and power to Spain and the designs of dress established in the Iberian Peninsula influenced all of Europe not under Turkish rule. Initially there was strong resistence to Spanish dominance in dress from the areas of northern Europe under the influence of the Reformation but, by mid-century, Spanish styles were paramount. Spanish dress was characterized by its elegance, austerity, rigidity and superb decoration. Black was the dominant color for normal wear; gayer colours were for special, festive occasions. Fabrics were rich and heavy, decoration was in gold and silver thread, with jewels and pearls. These qualities typified the Spanish way of life. Spanish rule was essentially that of the Roman Catholic Church which, in a restrictive, rigid manner, proscribed and opposed reform or change. The insistence upon traditional ceremonial at court, the limitations on the life of the people were epitomized in the elegant but profoundly uncomfortable constriction of the whaleboned and bombasted costume. These modes were beautiful works of art in themselves but artificial in form. The Moorish inheritance was still apparent especially in the textiles, the rich embroideries, the use of jewels and jewelled buttons, points and ornaments as well as heavy girdles and collars. The jewelled buttons fastened to the centre front of the ladies' gowns stemmed from the Moorish style of coat dresses. This was a characteristic Spanish fashion unlike the long girdle chains terminating in pomander or pendant usual in France and England. The leather styles of shoes and chopine were decorated with moorish motifs in silver or gold ornament and had slightly upturned pointed toes.
>
> The Spanish contributed a number of innovations to sixteenth century costume. These included the cape, in all its varied forms, the corset and farthingale, the high neckline supporting a ruff and the bombasted doublet and trunk hose. During the century other nations took these up and extended and adapted them but Spain's use of these features was always restrained and austere.

Clothing of the period was strongly status related. In fact, in Britain, sumptuary legislation dictated what nine categories of people should wear, with fines for those who did not conform (Ashelford 1983: 13). At Santa Elena there was a strong emphasis on the status level of the citizens, with lawsuits being brought when someone stepped beyond their place in the social group (Lyon 1984: 8).

As indicated in the quote above the grand manner of Spanish dress was very influential in Europe, with Spanish fashion (known in Britain as "Elizabethan" fashion) spread widely (Kelly and Schwabe 1925:54). The basic dress of shirt, doublet, jerkin, hose and gown for the male was accompanied by the use of bordado or embroidery in the shape of flowers and insects, accompanied by spangles, buckles and straps to hold swords, etc. (Ashelford 1983: 14-15). Aglets or lacing tips, also called points, were used to fasten sleeves to the body of the garment or legs to the doublet, with bows either showing or hidden from view (Ashelford 1983: 15). Strictly speaking, points were the ties with the metal tip, whereas aglets were the tips, which were also sometimes highly decorated and used only as decoration (Ashelford 1983: 142-144). The aglets from Santa Elena, however, were always plain and undecorated, probably reflecting the lower status level of the majority of its occupants compared with the elite ruling minority consisting of Pedro Menéndez and his family. In the sections to follow we will deal with those elements of Spanish clothing that have survived the four hundred years in the ground since Santa Elena was abandoned: buckles, buttons, aglets, hooks (frogs) and eyes, bordado, decorative copper stars, scissors, thimble, pins, etc.

Buckles

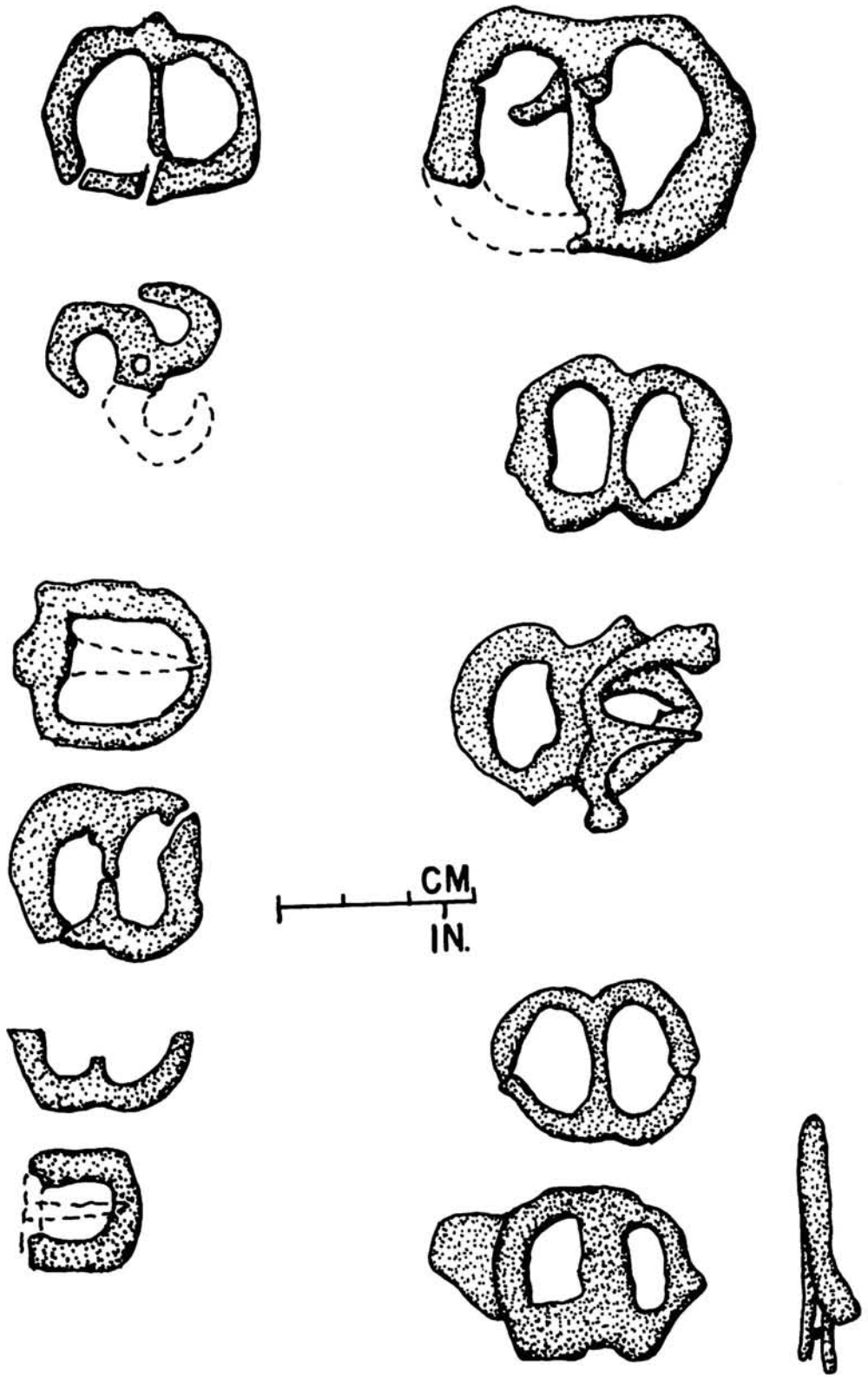
Brass Buckles

Brass buckles, some attached to plate armor fragments, have been found at Santa Elena and Fort San Felipe. Since these are known to be associated with armor, they have been dealt with in a previous section on armor (Figs. 62 - 66).

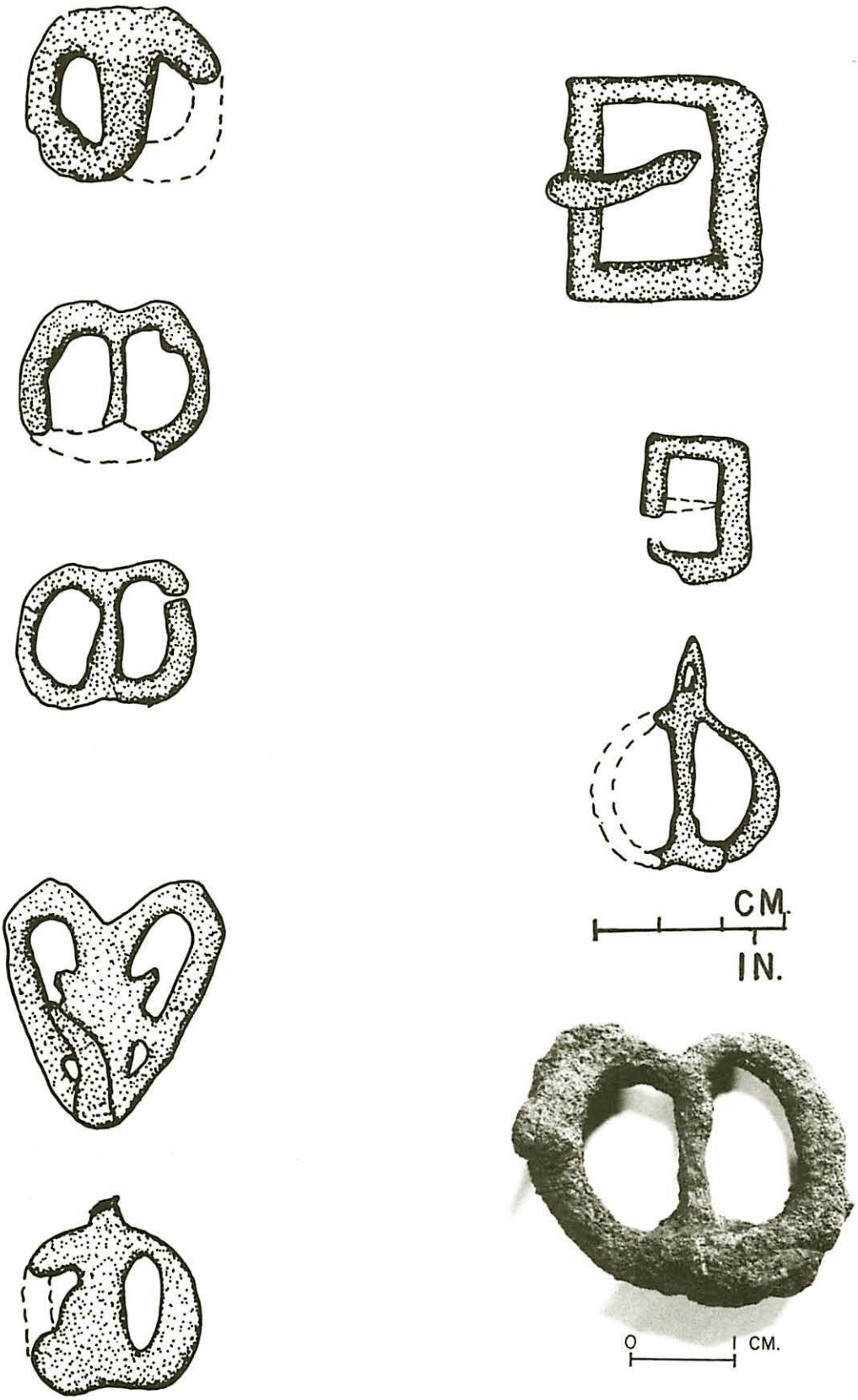
Iron Buckles

Seventeen of the twenty iron buckles came from the domestic contexts of Santa Elena rather than inside Fort San Felipe, so we suspect they were more frequently used on non-military clothing. A group of the iron buckles are illustrated in Figures 64 and 71 through 74.

The buckles are often in a bad state of preservation due to severe corrosion from the elements, with virtually all the iron having been replaced by rust in some cases. The typical shape is of a figure "8" (Fig. 74), with one example, however, being in the shape of a triskelion (Fig. 71). Some are in the shape of a "D" with the tang fastened on the straight side of the "D" (Fig. 71). One iron buckle had a copper tang, but only the tang with fragment of iron attached was recovered (Figs. 31 and 35). One double buckle was in the shape of a heart (Figs. 64 and 73), apparently to fasten straps at a "Y" shaped junction.



Figures 71 (left) and 72. Scale drawings of iron buckles. **Fig. 71:** (top down) 38BU162-134, 162-135B, 162A-15B, 162C-26B, 162C-51B, 162C-70A. **Fig 72:** (top down) 162C-293 (2 buckles), 162C-293 (two buckles rusted together), 162C-346B, 162C-163B (plan and side view).



Figures 73 (left) and 74.. Scale drawings of iron buckles. **Fig. 73:** (top down) 38BU162C-117, 162C-40B, 162C-143B, 162C-177B, 162C-257. **Fig. 74:** (top down) 162H-100A, 162G-54A, 162E-55, 162C-346B (drawing in Fig. 72).

The manner in which such "8" shaped buckles were used is seen in the illustrations from the 1570s, in Figure 75. The sword belt is seen to fasten by means of a hook, into an eye on the side of a buckle such as those we have been describing. An iron buckle with an eye attached was found in Fort San Felipe (Fig. 74). It is interesting to note that the only two square buckles (Fig. 74) recovered were from Fort San Felipe, not the domestic context of Santa Elena. The hooks and eyes of the type illustrated in Figure 75 are present in Santa Elena and are described in the following section.

Large Iron Hooks and Eyes

Twelve iron hooks and eyes were recovered from Santa Elena domestic contexts, with none from Fort San Felipe (Figs. 76-80). These were very corroded and fragile. X-ray photographs were made (Fig.80), revealing details of attachment pins, etc. not seen on the objects themselves. Two types are present, a double pin attachment and a single type. On one of the double pin (or rivet) attachment hooks the front separated from the back half, revealing a thin sheet of iron plate between. This suggested that these hooks and eyes were used in some manner to support sections of armor plate. However, no illustrations of armor frogs and eyes such as these could be found. They are seen, however, on the sword carriers seen in Figures 75 and 79, so it is apparent that they were, at least sometimes, connected with military accouterments, though we have included them here with clothing since none were found in a military context at Fort San Felipe.

If all of these hooks and eyes were sword carrier related it is odd that none were found inside the fort. Apparently, when one of these came loose from their attachment there was no means for repairing them and so they were discarded.

Sword belts were mentioned as present in the inventories listed in Figure 10. Swords were also listed as an item of personal gear by many of the soldiers at Ft. San Marcos when they were inspected by Alvaro Florez de Quiñones in 1578 (Connor 1930: 137-169). We might expect, therefore, hooks and eyes from sword belts and other clothing straps to be present at Santa Elena. Their absence in Fort San Felipe, however, is unexpected.

Small Wire Hooks and Eyes

Six wire hooks and eyes, two of copper wire and four of iron wire were recovered from well 172 in Ft. San Felipe and from the northwest bastion (Fig. 76). In 1566 and 1568, six thousand hooks and eyes are mentioned in documents relating to Spanish Florida (AGI, Contaduria 298, No. 1, 97:1). These may have been the large iron strap hooks and eyes discussed above, or they may well have been much smaller copper or iron wire hooks and eyes. We suspect this reference may be for this latter type since it was mentioned in the same sentence with "atauxia" buttons. The size and shape of these hooks and eyes is similar to those still in use today to fasten ladies' undergarments.

In Anderson's outstanding book on Hispanic Costume (1979) she quotes a conversation of 1538 on hooks and eyes in relation to buttons (pp. 87, 89).

Figure 75. **Top:** Hooks with eyes on buckle, ball buttons and bordado. From a painting of Sir Philip Sidney, ca. 1577, by an unknown artist, (National Portrait Gallery, London). From Ashelford 1983: Plate 92. **Bottom:** Hooks and eyes, buckles and rivets or gromets. From a painting of Robert Dudley, Earl of Leicester, ca 1575-80, by an unknown artist, (National Portrait Gallery, London). In Ashelford 1983: Plate 91.

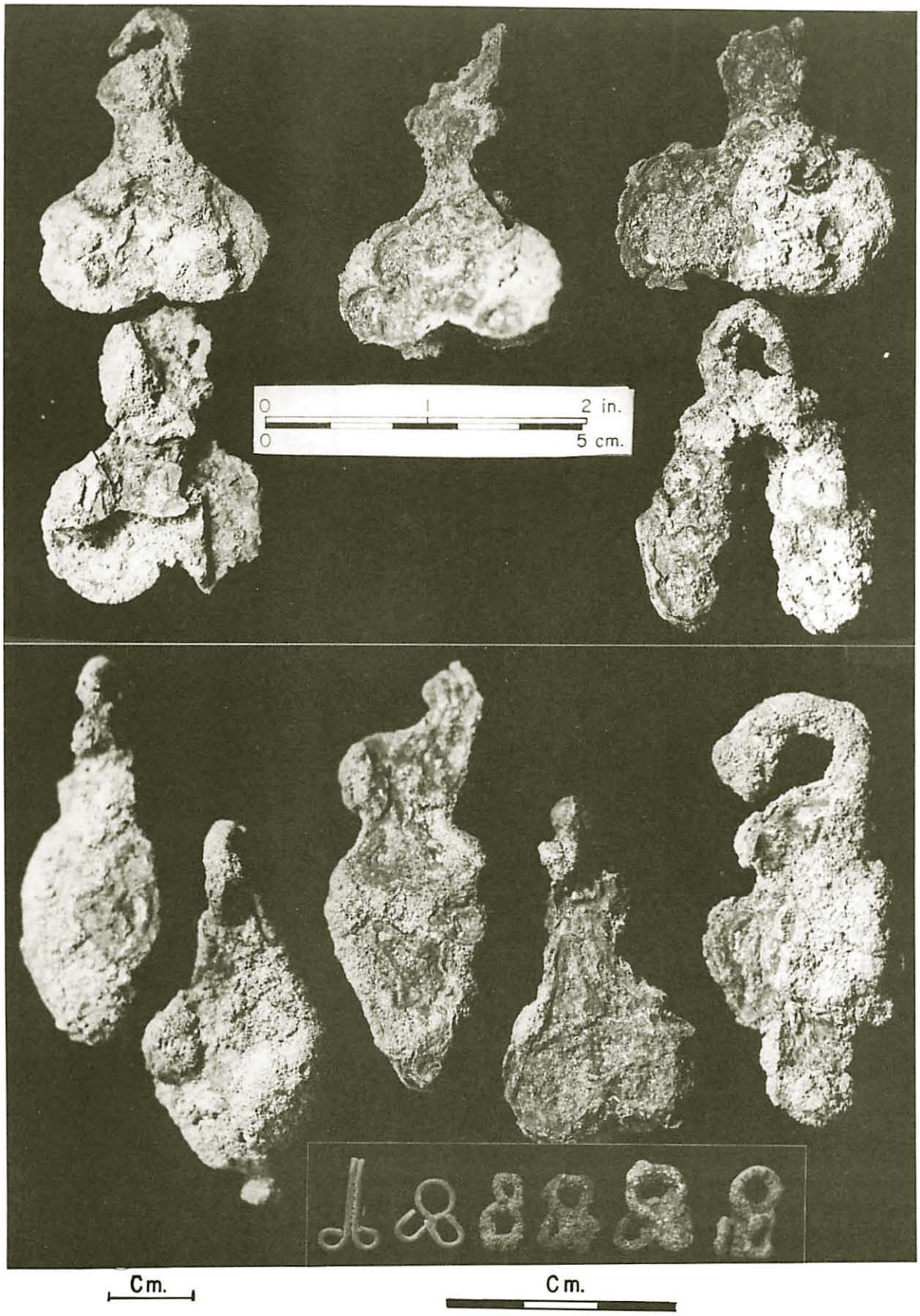
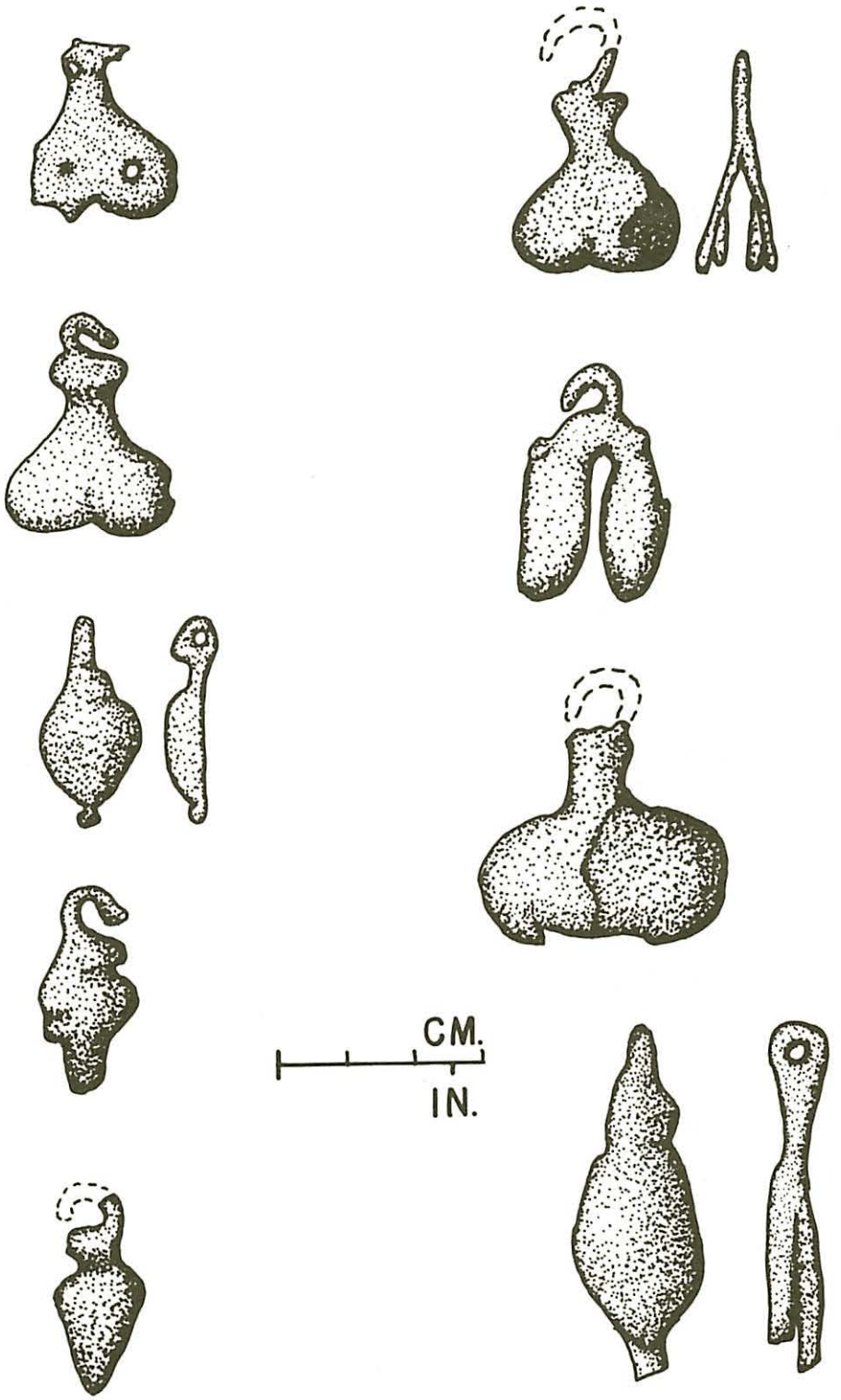
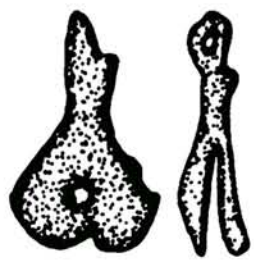


Figure 76. Hooks and eyes. **Top:** 38BU162C-38B, -171, -293. **Row 2:** 162A-109, 162C-204B. **Row 3:** 162D-4B, 162C-50B, 162C-169B, 162D-22B, 162C-117. **Inset:** Small hooks and eyes, 162G-172, -172, 172A, 172, 57A, 162E-38C.

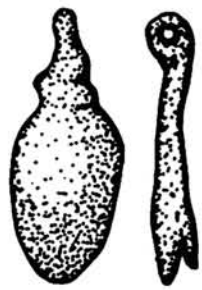


Figures 77 (left) and 78. Drawings of hooks and eyes for clothing straps. **Fig. 77:** (top down) hook 38BU162A-109, hook 162C-38B, eye 162C-50B, hook 162C-117, hook 162C-169B. **Fig. 78:** (top down) hook 38BU162C-171, hook 162C-204B, hook 162C-293, eye 162C-141B.

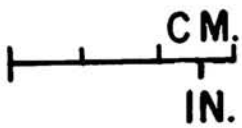
38GBU162D-22B 22.15 (W) 29.0 (L) eye
(with side view)



162D-4B 18.0 (W) 32.75 (L) eye
(with side view)



162D-4B 18.55 (W) 45.0 (L) eye



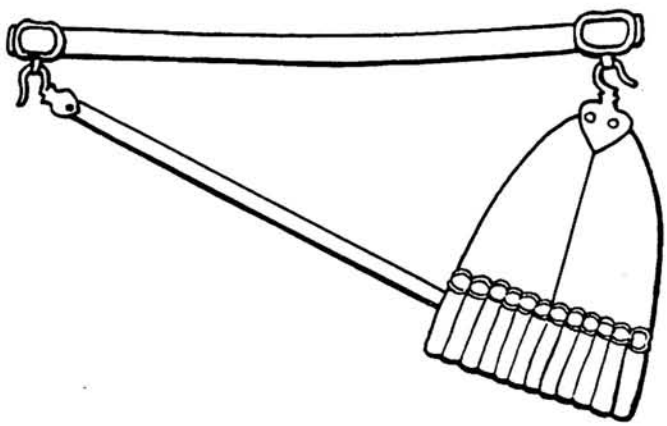


Figure 79. Hooks and eyes and sword carrier showing similar hooks with eyes on buckles. (Provenience and width and length mm.) **Below:** Sword carrier. From Peterson 1956: 88, Plate 95.

Figure 80. X-rays of hooks and eyes showing detail not seen beneath the corrosion. **Top row:** Hooks, 38BU162C-171, 162C-38B, 162C-204B. **Row 2:** Hooks, 162C-293, 162C-117, 162C-169B. **Row 3:** Eyes, 162D-4B, 162C-50B, 162D-22B.

Bellio. Well, for my part, I pay more attention to convenience in clothes than to how well they look. Those hooks (*corchetes)* and their eyes *(hembras)* are loose; you knave, you always unfasten them without watching what you do.

Maluenda.. I find it preferable to use buttons and buttonholes; they look better and are less troublesome in dressing and undressing.

Of hooks and eyes, Anderson says (1979:89):

> As described by Covarrubias, the hook is "a clasp of iron wire consisting of male and female [parts]. It was called *corchete* because of the small, curved *(corb hook)* of the male which catches in the female." Leloir says that hooks and eyes go back to remote antiquity, having from earliest times the form that is used today.

Ball Buttons

Atauxia and Acero Buttons

A total of 31 small metal ball buttons were recovered from Santa Elena and Fort San Felipe. They are sometimes gold plated and they have iron or brass wire eyes. They are about 3\8" in diameter. These were at first thought to originate with the plantation period of occupation of the site in the early years of the nineteenth century, since gilt buttons were used on ladies' shoes at that time (Swann 1982: 37, 45), and a similar ball shaped button was used as a military button from the same period, around 1810 to 1832 (Wyckoff 1984: 64). These latter were known as "bullet buttons." However, through the finding of six of the ball buttons in Spanish features including the moat of Fort San Felipe, it became apparent that this type ball button was from the Spanish period of occupation of the site. This was confirmed by information supplied by Richard Polhemus and Ivor Noël Hume (South 1985: 53).

The question arose as to whether these could be the *"atauxia," "autijia," or "ataugia de esmalte"* buttons mentioned in the Spanish documents dealing with Spanish Florida (Vandera 1569, Depratter and Smith 1980: 67-77; Figure 10, this report; AGI, Contaduria 298, No. 1, 97:1; AGI 298, No. 1, 99: 1-2; AGI 2932 Contratacion; AGI Contratacion 312, No. 2, 69:4, from Eugene Lyon, personal communication, June 3, 85). Some of these documents indicate that *"atauxia"* buttons were being supplied to the Indians. Richard Polhemus was helping excavate the pre-*casa fuerte* ditch (Fea. 397A) when he found one of the buttons in this Spanish feature, and he pointed out that they have been found in a Dallas period Indian grave in Tennessee, thought to date from the sixteenth century. It would appear that the ball buttons may well be a good candidate for those *"atauxia"* buttons being traded to the Indians.

Clearly, we needed to know more about Spanish buttons mentioned in the documents. Conversations with Paul Hoffman and Eugene Lyon revealed a wealth of information on the buttons from the research they have carried out in the Spanish documents. Three batches of buttons were sent to Spanish Florida along with other goods in 1566, 1568 and 1578. In these there are two types of buttons mentioned, the *"atauxia,"* spelled in various ways, and *"acero"* buttons. The word *"atauxia"* comes from the Arabic original, which was *"at-tauxia"* or "painted." Paul Hoffman says the buttons were likely an enamel ware based on the sixteenth

century use of the word (Personal communication, November 6, 1985). The "painted" or enamelled buttons may have been the gilt buttons found at Santa Elena and Fort San Felipe.

The buttons from the site were of two types, one a metallic gray color and the other a brass color. To determine their composition we sent one of each type and one with gilt adhering to the surface to the Winterthur Museum Analytical Laboratory, through the office of Curtiss Peterson, Conservationist at the South Carolina Institute of Archaeology and Anthropology. Through the courtesy of Charles Hummel, George Reilly, Janice Carlson, and Steve Pine the following results were reported (Winterthur Museum, A.L. Report #1781, 7/9/85, and #1830, 11/1/85).

	GILT BRASS BUTTON 38BU162C-196A	BRASS BUTTON 38BU162C-171	GRAY BUTTON 38BU162H-113B
Copper	72.8%	82.0%	23.0%
Zinc	9.9	9.2	0.5
Lead	12. 6	5.0	73.0
Silver	0.1	0.07	-
Tin	3.4	1.2	-
Antimony	0.4	0.3	-
Iron	0.8	-	-

Gold was present in only the gilt brass button. As can be seen from the analysis figures the gilt brass button and the brass button both contained high percentages of copper, whereas the gray button contained much less (23.0%), with a far higher percentage of lead being present (73.0). This analysis demonstrated that we had two types of button metal, brass and a gray alloy. Of the 31 buttons, only six were gilt and three of these were gray and three were brass. It appears, therefore, that the *"atauxia"* buttons were guilded, or "painted," or "enamelled," while the *"acero"* buttons were plain metal buttons of brass or a gray alloy.

We should mention here that there has been a mis-interpretation of the term enamel, confusing it with a later process of inlaying metals called Damascening, named for multi-colored Damascus steel, resulting in the use of the unfortunate term "damascene buttons," to refer to the ball buttons from Spanish contexts. The evidence from Santa Elena and Fort San Felipe strongly suggests that the terms *"atauxia"* (for gilt buttons of alloy or brass), and *"acero"* for the plain unguilded buttons, be used instead of the misleading "damascene."

The attributes of the buttons from the sites of Santa Elena and Fort San Felipe are seen in Table 13, with illustration of some of the buttons in Figure 81. Richard Polhemus has conducted an analysis of some of the buttons from Santa Elena and Fort San Felipe, and has defined four types: gray buttons with iron wire eye; gray with brass wire eye; gray without preserved iron eye, and brass with brass wire eye. His report is seen in Appendix XII.

In 1566 and 1568, six thousand hooks and eyes with *"atauxia"* buttons are mentioned (AGI Contaduria 298, No. 1, 97: 1), and Nicholas de Piedra ordered 20 gross of these buttons at 9 1/2 reales per gross. In the 1578 account (AGI Contratacion 312, No. 2, 69:4), 600 dozen (7,200) buttons are mentioned. If our interpretation of the *"atauxia"* buttons as gilt painted is correct, these should always cost much more than the *"acero"* buttons.

The *"acero"* buttons of gray alloy or brass (also alloy metal) were shipped into Spanish Florida in even larger quantities than were the *"atauxia"* buttons, with 2,250 dozen of these (27,000), being delivered by Sebastian Lopez on December 20, 1567, to be used on 900 jackets, with 22 buttons on each jacket and 8 on the breeches (AGI 298, No. 1, 99: 1-2; AGI 2932, Contratacion).

TABLE 13: BALL BUTTON ATTRIBUTES AT SANTA ELENA AND FT. SAN FELIPE

PROV. NO. 38BU-	DIA. (mm) (Thickness)	EYE PRESENT?	BALL METAL (Acero)	EYE METAL	GILT? ("enamelled") ("painted") (Atauxia)
			SANTA ELENA		
162A-55B	9.6	no	gray alloy	-	no
162B-56B	10.7	no	gray alloy	iron	no
162C-171 Fea.	9.5	yes	brass	brass	yes
162C-171 Fea.	9.5	yes	brass	brass	no
162C-170B	9.5	yes	brass	brass	no
162C-196A	9.5	yes	brass	brass	yes
162C-8B	-	no	gray alloy	iron	no
162C-144A	10.3	no	gray alloy	iron	no
162D-24B	9.5	yes	gray alloy	iron	yes
162J-21A	10.2	no	gray alloy	-	no
162J-58B	10.9	no	gray alloy	iron	no
162J-114A	10	no	gray alloy	-	no
162J-119B	10.7	no	gray alloy	iron	no
162K-9B	9.7	yes	brass	brass	yes
			FT. SAN FELIPE		
162-66A moat	10	no	gray alloy	-	no
162E-42E moat	10.2	no	gray alloy	iron	no
162E-38D moat	11.5	no	gray alloy	-	no
162G-11A	-	no	gray alloy	-	no
162G-47A	9.9	yes	brass	brass	no
162G-53B	-	no	gray alloy	-	no
162G-55A	10.7	no	gray alloy	iron	no
162H-84A	10.5	no	gray alloy	iron	no
162H-89B	10	yes	gray alloy	brass	yes
162H-90A	10.3	no	gray alloy	-	yes
162H-91A	10.3	no	gray alloy	iron	no
162H-91A	10.3	no	gray alloy	iron	no
162H-101A	-	no	gray alloy	-	no
162H-101B	11.4	no	gray alloy	-	no
162H-113B	10.3	no	gray alloy	iron	no
162H-113B	-	no	gray alloy	-	no
162H-397A Fea.	10.3	yes	gray alloy	brass	no

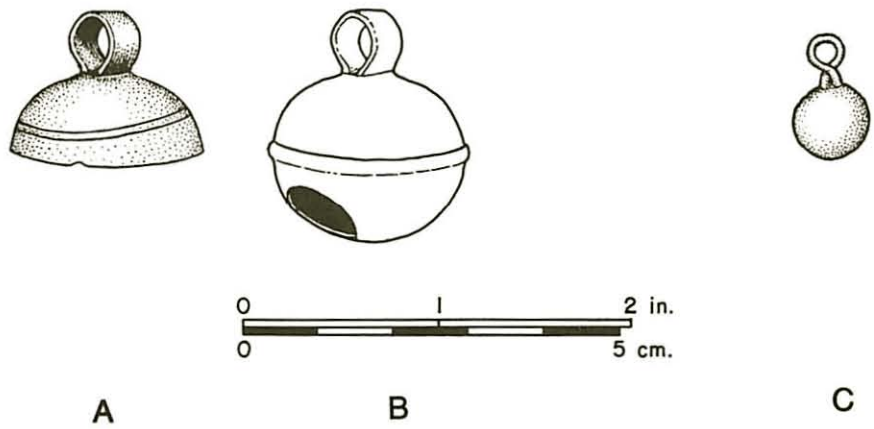


Figure 81. Clarksdale Bell fragment and ball buttons. **A.** Bell fragment, 38BU162H-101H, type drawing by Darby Erd of the appearance of a complete Clarksdale Bell. **C.** Drawing of one of the ball-shaped buttons from the Spanish component on the Santa Elena site. **D.** Gilt painted "atauxia" buttons. Top: From Santa Elena, 162C-196A. Bottom: From Ft. San Felipe 162H-189B. **E.** Brass "acero" buttons. Top: From Santa Elena 162C-170B. Bottom: From Ft. San Felipe, 162G-47A. **F.** Top: pewter "acero" button from Ft. San Felipe, 162H-397A. Bottom: Heart-shaped earring from Ft. San Felipe, 162H-81A.

Paul Hoffman notes (Eugene Lyon, personal communication, June 3, 1985) that each outfit had 2 1/2 dozen buttons. Each soldier was supplied with a ropilla, an official jacket, having 16 buttons on the chest and 6 on the sleeves. Jackets made of Spanish cloth had the *"atauxia"* buttons (gilt "painted"), whereas those buttons on cloth of English manufacture had alloy *"acero"* buttons (South 1985: 54).

Eugene Lyon suggests that these buttons were used by soldiers as well as the upper classes and Paul Hoffman points out they were likely imported in such large numbers for use in the Indian trade. In this regard we have the report by DePratter and Smith (1980: 67-77) on the goods taken by Juan Pardo from Santa Elena to the interior in 1567-1568 to trade with the Indians (Vandera 1569), which lists 23 sets of what they refer to as "damaskeen" [sic] buttons (p. 71). If each set was the set involved in the official jacket (*ropilla*), then the sets would consist of 22 buttons (16 for the chest and 6 on the sleeves). The number of buttons traded by Juan Pardo to the Indians would have been 506 buttons. Some of these buttons should have found their way into Indian burials or on Indian sites of the period. As previously mentioned, Richard Polhemus has indeed recorded two such gilt *(atauxia)* buttons in a Dallas period Indian burial in Tennessee (Appendix XII), not more than 15 to 20 miles from the site thought to have been visited by Juan Pardo in his visit to the west side of the Appalachian Mountains on his expedition from Santa Elena (Richard Polhemus, personal communication, July 2, 1985).

Richard Polhemus received from Ivor Noël Hume a comment on some of the buttons from Fort San Felipe (1572-1576), stating that the time period of the fort would be entirely reasonable for such buttons. He said that in the late sixteenth century large numbers of such buttons were being used on front closures and sleeves of male dress. Similar buttons of nickel alloy from the 16th and 17th centuries are illustrated in Baart *et al* . (1977). Richard Polhemus points out (Appendix XII) that a portrait of the founder of Santa Elena, Pedro Menéndez de Avilés, painted by Titian, shows such small metal ball buttons (Fig. 82). Other ball buttons are shown in illustrations of the period in the same figure (South 1985: 55).

From these data it is certain that the ball buttons found in Fort San Felipe and those from the domestic occupation of Santa Elena are indeed Spanish in origin. It is my interpretation that the gilt buttons are the *"atauxia"* buttons and the non-gilt alloy and brass buttons are the *"acero"* type.

Aglets

Copper tips, long referred to by archaeologists in Florida as lacing tips, have been found at Santa Elena and Fort San Felipe (Deagan 1978: 45,47; Willis 1984: 187). These small tubes are aglets or aiglet, or aiguillette (Yarwood 1978: 10-11), fastened on the end of a leather lace of kidskin or lambskin or ribbon, called points and used to tie together various parts of clothing or half armor *(medio armar)* , (Anderson 1979: 87-92, 223-225). They are not pin sheaths for holding straight pins as has been reported by some archaeologists.

The aglets from the town and fort sites are tabulated by length and width in Appendix XIII. Illustrated in Figures 83 and 84, they are about one inch long, with a seam from folding sheet copper into a slightly tapered tube. Sometimes the fragment of the lacing point is preserved inside by the copper salts. Forty-three were recovered

Figure 82. Illustrations of ball buttons on Spanish clothing. **Top left:** Bordado and ball buttons on pants, ca. 1625-50, from "Recuperación de la Isla de San Cristóbal" by Félix Castelo (Museo del Prado. Madrid). From Aznar 1977: Lamina V. **Top right:** Pedro Menéndez de Avilés, 1519-1574, Adelantado de la Florida, Comendador de Duro Santa Cruz de la Zarza, Orden de Santiago. (Reproduced from Cezaréo Fernández *Armada Española*. Photo enlargement by Homer N. Cato. From Lyon 1976:ii.).**Bottom:** Ball buttons on Spanish clothing. From "Sodomites Savaged by Mastiffs" by de Bry, ca. 1596, in Alexander 1976:132.

from Santa Elena features, four times the quantity of those recovered from features in Fort San Felipe (11). Those from Santa Elena average 28.2mm in length (1 1/8"), with those from Fort San Felipe being 25.4mm (1"). One larger aglet found in the plowed soil zone (Provenience 162B-33A) had a hole in the side. This suggests this may have functioned in a different manner than the others, and may well be from a later period of occupation.

Aglets were decorated with jewels, pearls, etc., and were often made of gold for the wealthier class of people, but none of this type have been recovered at the site of Santa Elena or Fort San Felipe. Queen Juana had a coat, for instance, that carried 118 larger and smaller gold aglets (Anderson 1979:223-224). Anderson, probably the world's authority on aglets and points, says (1979:89-91):

An essential use of points was to lace hose or breeches to the doublet. A later ordinance (1546) sets forth requirements that must always have been necessary. In order that the breeches waistband *(pretina)* should not rip under strain, it was to be interlined with two layers of canvas before eyelets *(ojetes)* were worked to receive points. Doublets (1541) were interlined for the same reason. A farmer reaping grain kept his laces taut, while a courtier living in a village might enjoy slacking his: "If a doublet opresses him, he loosens the points," says Guevara.

Both men and women used points tipped with aglets, though by the 1560s few men are thought to have been wearing them (Anderson 1979: 91). In 1527, silk or ferret points:

> were to be well tagged with aglets of solid brass *(latón gordo)*, beaten smooth and polished. Every aglet was to be so firmly attached to its ribbon that it would not fly off, on pain of 200 maravedis fine to the maker (1541). A craftsman standing for examination to enter the trade [of making aglets and points] had to tag, under observation, six dozen wide-ribbon points--two dozen with the aglets beaten and polished, two with them perforated and tagged, and two *grafiladas*, that is, with the aglet surface milled (Anderson 1979: 91).

The laces or points were between 13 and 21 inches in length, with the aglets (cabos, clavos), measuring about one inch in length, according to Anderson (1979: 223). It is interesting to note that those from Santa Elena and Fort San Felipe are from one to one and one-eighth inches long. Aglets had a way of coming off, apparently, judging by the 79 whole and fragmented ones recovered. Anderson quotes a conversation between Bellio and Gomecillo in 1538 illustrating this point (1979: 89):

> *Bellio*. These points have lost their aglets! This trimming band is ripped off and torn--see that they mend it! And take care also that no ugly stitching shows.
> *Gomecillo*. That would require a full hour and a half.
> *Bellio*. Then fasten it with a pin, so it doesn't dangle.

In another conversation of 1538 about points and aglets or tags, as they are sometimes called, the points or lacing strand itself is broken. In this conversation a youth speaks to a maidservant (Anderson 1979: 89):

> *Emanuel*. Give me the leather points.
> *Beatriz*. They are broken. Take the silk ones, as your tutor directed. Next, do you wish the breeches and hose? It is hot.

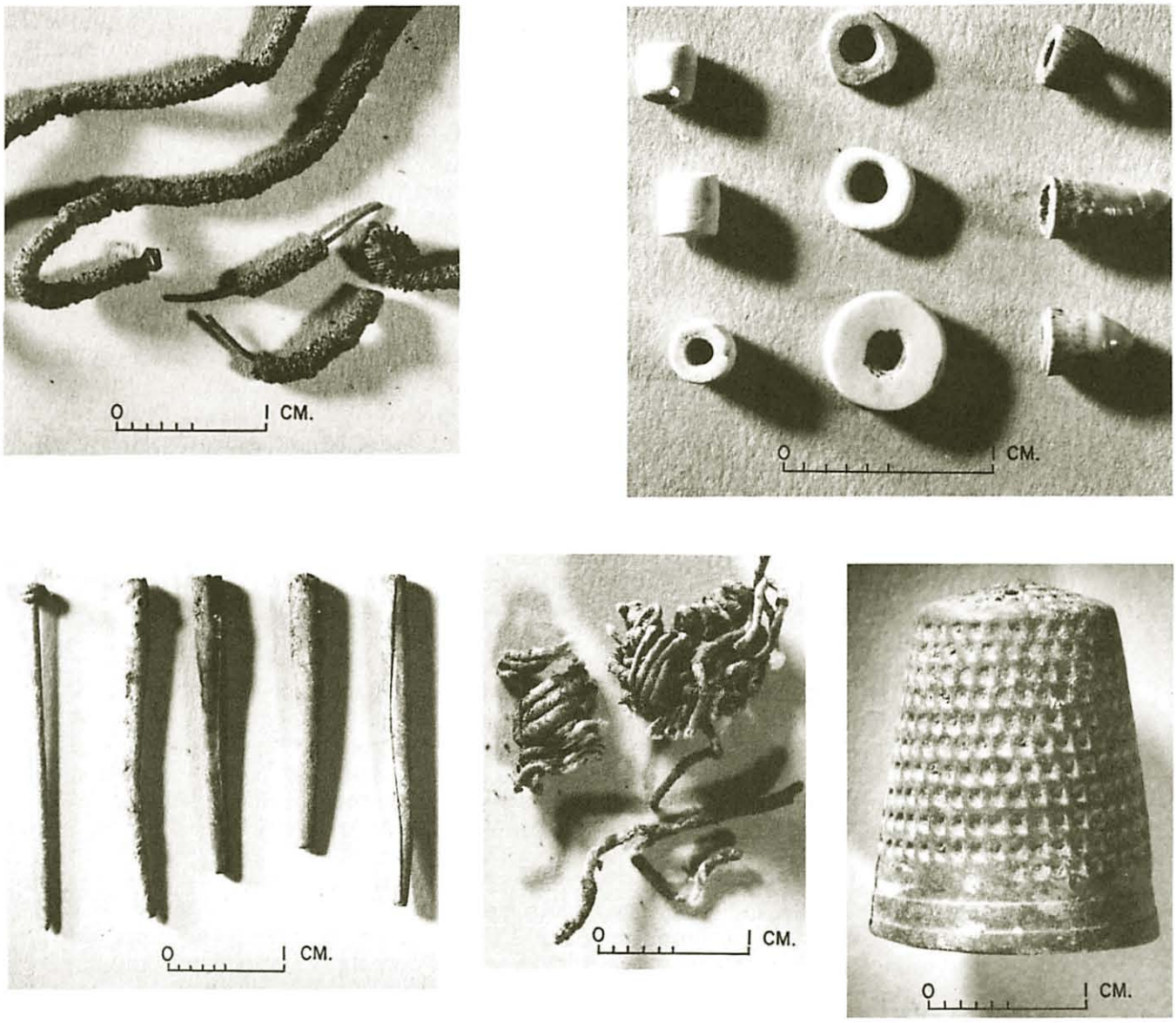
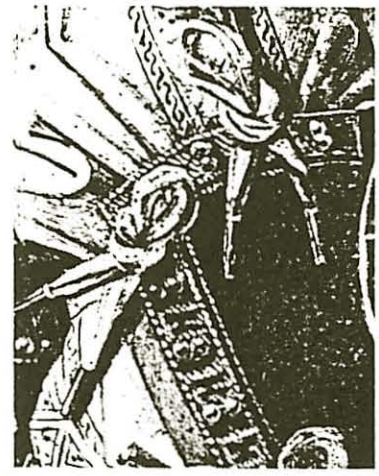


Figure 83. Bordado, shell beads, aglets and a thimble from Santa Elena. **Top left:** Bordado used as decoration on clothing, 38BU162C-76. **Top right:** Barrel and disc type shell beads,162C-293, with drum fish teeth, sometimes made into beads (top right), 162C-105. **Lower left:** Straight pin with wire-wound head and aglets (copper lacing tips), 162C-117. **Center:** Thread found inside thimble. **Right:** Brass thimble, 162C-117.



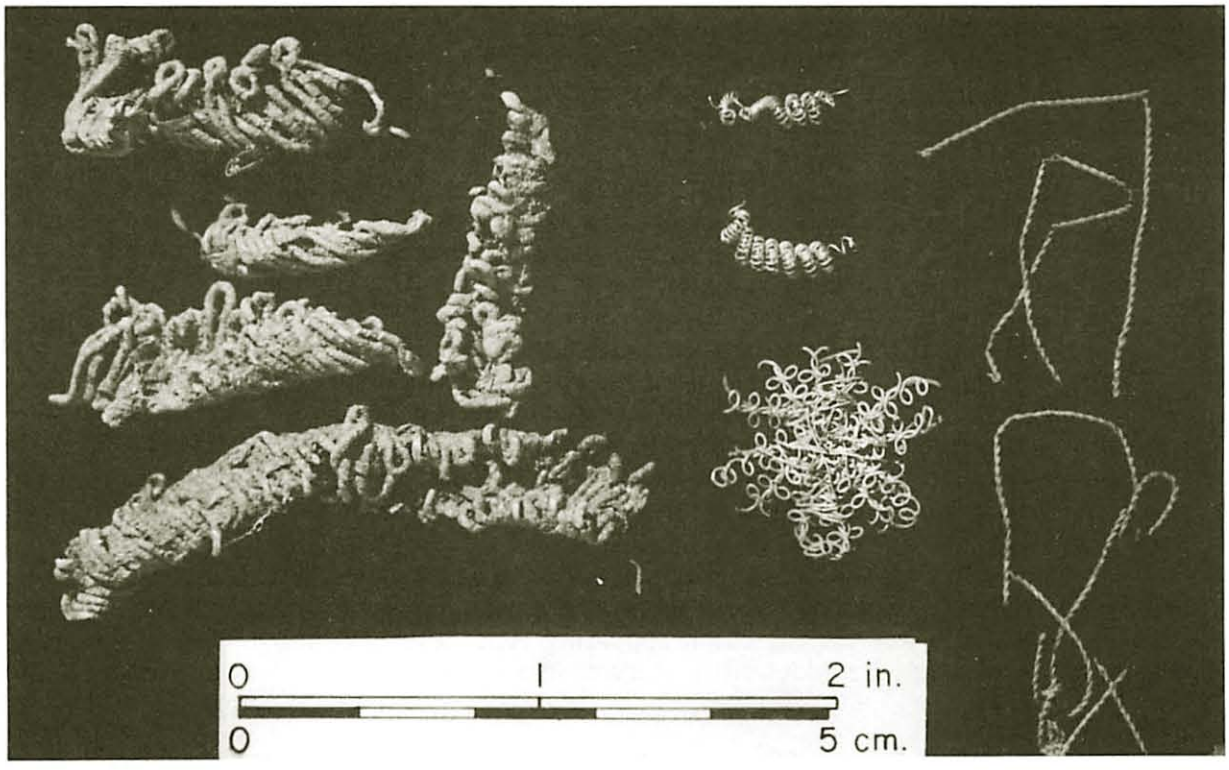


Figure 84. Illustrations of aglets on clothing, and bordado. **Left:** Aglets on a hat, from "Socorro de la plaza de Constanza," by Vicencio Carducho, ca. 1633, (Museo del Prado, Madrid). From Aznar 1977: Lámina IV. **Right:** Aglets on points at the waist, ca. 1500, from "The Beheading of St. John the Baptist," (Museo del Prado, Madrid). From Anderson 1979: 224, Fig. 518. **Bottom:** Bordado. Left: String type, 38BU162D-67. Center: Gold wire bordado, 162E-40C. Right: Bordado wire, 162-72.

Emanuel.. Not at all. Give me the drawers *(calzoncillos)*. Truss me up, for heaven's sake.

Beatriz. How now: Are your arms made of hay or butter?

Emanuel. No, but they are sewed on with fine thread. Ugh, what points you give me, tagless and broken.

Beatriz. Remember, gaming with dice yesterday, you lost the whole ones.

The appearance of points with aglets attached can be seen in the illustrations in Figure 84, as used on a bonnet, to fasten sleeves at the shoulder, and at the waist (Anderson 1979: 224; Aznar 1977: Lámina IV; López-Rey 1968: Plate 105).

Bordado

In Spanish features in Santa Elena and Fort San Felipe fragments of copper wire, gold wire and embroidered strands of string have been recovered. One type, from a pit east of Structure 5, filled with Spanish refuse, has a central straight wire core wrapped with a minutely fine, flattened and rippled copper wire with flattened links, giving the appearance of having been wrapped with a minute chain. It may have been guilded originally but none has survived. This type of copper wire is illustrated in Figure 83.

Another type is represented by strands of string that had originally been coated with some type of copper covering that, through oxidation, has preserved the looped and wrapped string. This was found in a Spanish refuse feature north of Structure 5 in Santa Elena. This type of embroidered string is illustrated in Figure 84.

A star or stylized flower shaped decoration made of gold wire was recovered from the top of the moat fill of Fort San Felipe at the northwest bastion. The gold wire is twisted and intertwined with a silver appearing wire into minute curls of gold wire. Someone has wrapped the silver wire around the star shaped arrangement in an apparent attempt to hold the gold wire shape together. This silver wire also had four beads strung onto the wire as though they, too, may have part of a decorative arrangement originally. This is illustrated in Figure 84.

Yet another type of copper wire is made of two strands twisted around each other. This type is illustrated in Figure 84. Small single strands of copper wire are also found and these may well be the core wires for the chain appearing type described above. This type, too, was recovered from Spanish midden filled features in Santa Elena, as well as from Well 172 inside Fort San Felipe.

From one of the *casa fuerte* postholes in Fort San Felipe (162G-198), a coil of copper wire was recovered with a garnet bead fastened on the wire. This wire mass is seen in Figure 85.

We turn now to the function of these various types of copper, gold, silver and string decorations. In the list of material goods shipped to Spanish Florida (Fig. 10), "ornamental braid for shirts" is listed. Eugene Lyon says this type decoration is called "bordado," and is an indicator of upper class status since others could not afford the expense of the twisted and variously shaped copper, gold and silver wire (Eugene Lyon, personal communication, 1984).

Embroidery involves the ornamenting of clothing or cloth using thread, string or metal wire. Yarwood (1978:143) points out that colors are important in embroidery but:

Figure 85. Bordado on clothing and from Ft. San Felipe. **Top left:** Bordado on a gentleman's clothing. From "Retrato de don Tiburcio de Redin" by Frey Juan Andrés Rizi de Guevara, ca. 1635-36, (Museo del Prado, Madrid). From Aznar 1977:429, Fig. 374. **Top Center:** Bordado on child's clothing. From "Prince Baltasar Carlos and his Dwarf," by Velázquez, ca. 1631, (Museum of Fine Arts, Boston, Mass.). From Troutman 1967: 39. Plate 18. **Top right:** Bordado on a youth. From "Prince Baltasar Carlos" by Velázquez and assistant, ca. 1639 (Vienna, Kunsthistorisches Museum). From López-Rey 1968: Plate 160. **Bottom left:** Bordado from Ft. San Felipe, with faceted garnet bead attached, 162G-198. **Bottom center:** Bordado on a lady's clothing. From "Queen Isabel" by Velázquez and assistant, ca. 1632, (Vienna, Kunsthistorisches Museum). From López Rey 1968: Plate 161. **Bottom right:** String bordado. From "Don Diego de Corral" by Velázquez,ca. 1631-32 (Prado). From López-Rey 1968: Plate 63.

> ...from earliest times, metal thread has also been used to give richness and brilliance to the work. In the use of gold and silver in embroidery, the metal threads were usually laid on the surface of the textile only, in order to conserve such valuable material, and were secured by small stitches in another thread. Later, fine metal wire was wrapped around the embroidery threads themselves.

The use of metal threads worked into bordado and sewn onto clothing as appliqué decoration is seen in the illustrations in Figure 85. At Santa Elena and Fort San Felipe we see the presence of bordado in a feature as relating to a member of the upper socio-economic level, probably one of the members of the controlling Menéndez family.

Bells

Seven bell fragments were recovered from Santa Elena and Fort San Felipe. Six of these were brass and one was iron. Two were from what Brain (1975: 129-138) has called "Clarksdale" bells. Four fragments were from "bell" shaped bells of brass, and one, from the B-level at Santa Elena, was an iron bell, of the type called "Saturn" for its central ring joining the two halves together (Brown 1977: 76-79). This latter bell was not recovered in a good Spanish context, though it was in what we call the Spanish zone, the B-level of the site, which is often disturbed by later occupation. The iron Saturn bell, therefore, may not be Spanish in origin.The bell fragments and illustrations are seen in Figures 86 and 87.

The Clarksdale bells are well known from sixteenth century contexts, particularly the De Soto expedition (Brain 1975: 129-138), and bells are mentioned as being items for the Indian trade in the Narvaez expedition of 1528 (Brain 1975: 130). Clarksdale bells are illustrated on playing cards and as part of horse harness in Figure 87. (Lacroix points out that card playing was an addiction of the Spaniards, with the companions of Christopher Columbus at Santo Domingo making playing cards out of the leaves of trees.) In the inventory of goods in Spanish Florida (Fig. 10), "cinch straps with bells" are listed, so such use is known to have been present. Bells are also mentioned elsewhere in the inventory and these may have been those "bell shaped" bells designed to be worn on clothing, particularly by priests, such as those illustrated on the bottom of the robe of a priest in the early seventeenth century painting in Figure 87. A summary of the distribution of Clarksdale bells on sixteenth century sites is seen in Brain (1979: 204), and that for Saturn bells from the late seventeenth and early eighteenth centuries in the same source (p. 202).

The four fragments of this "bell shaped" type are of particular interest because they have been hammered flat so that none of the original curve of the bell is seen. Apparently someone had reason to attack these bell fragments in an effort to flatten them for another function than the original one to tinkle and possibly keep away evil spirits. The Indians who burned and sacked what was left of Santa Elena and Fort San Felipe in 1576 come immediately to mind. However, there is evidence of considerable brass working in Santa Elena, and reworking bells may have been undertaken by this individual. Evidence for brassworking activity is reported in a later section.

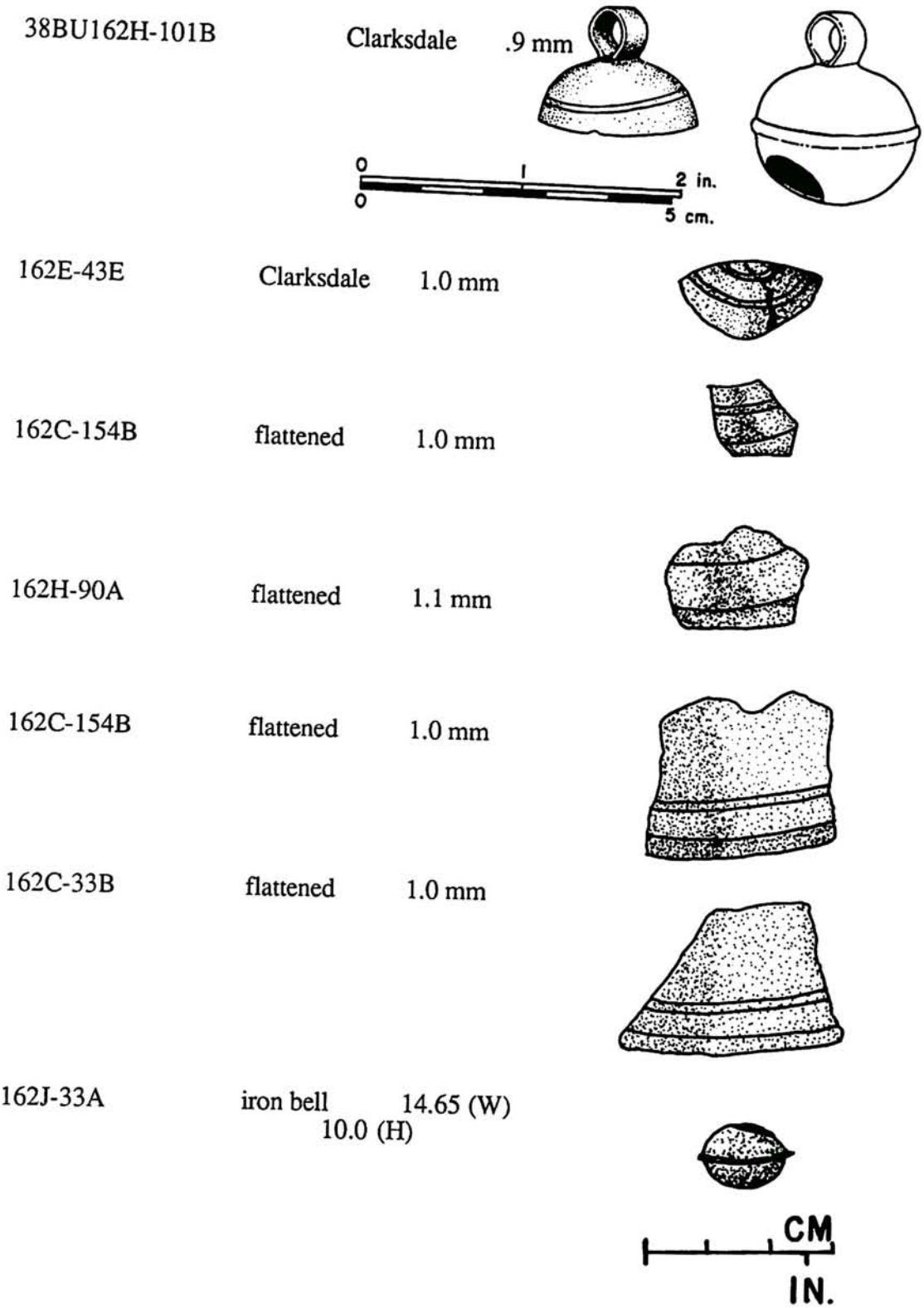


Figure 86. Bell drawings and measurements. (Provenience, metal thickness mm.)

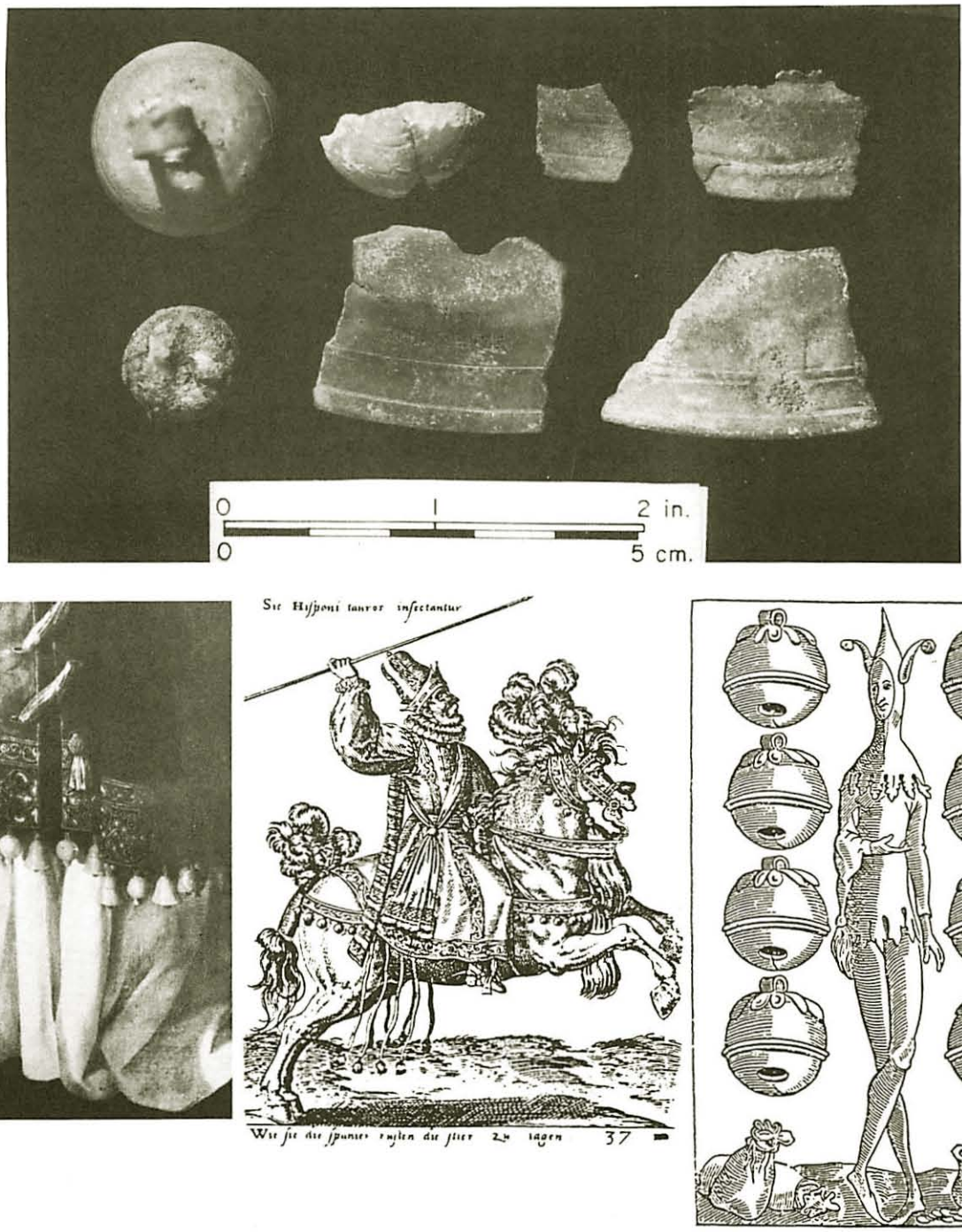


Figure 87. Bells. **Top row:** Clarksdale Bell fragments, 38BU162H-101B and 162E-43E. Small, flattened, bell-shaped bell fragments, 162C-154B and 162H-90A. **Row 2:** Iron bell, 162J-33A. Flattened bell-shaped bell fragments, 162C-154B, 162C-33B. **Left:** Bell-shaped bells on the bottom of a priest's robe. From "The Circumcision," by Zurbarán, 1639 (Grenoble: Musée des Beaux-Arts). From Gállego 1977: 201, Fig. 131. **Bottom center:** Bells on horse harness, ca. 1577,"*Rejoneador* ," from "How Spaniards Equip Themselves to Chase Bulls," (Victoria and Albert Museum; Crown Copyright). From Anderson 1979: 94, Fig. 239. **Bottom right:** Clarksdale type bells. The eight of "bells" from German cards of the sixteenth century (Bibl. Imp. of Paris. Print-room). From Lacroix 1870: 243, Fig. 217.

Copper Stars

Eight copper stars and an unfinished star have been recovered from Santa Elena and Fort San Felipe. Only one, however, was found inside the fort. This suggests that whatever these stars were used for it may have dealt primarily with a civilian rather than a military activity on the site.

As these objects began to appear through excavation on the site, most came from the plowed soil zone, so it was not known whether they were from the Spanish occupation, the plantation period occupation, or from the later, Marine Corps period. However, finally, in the 1982 season of excavation, stars were found in features 162D-67 and 162D-124, along with scraps of copper from their manufacture (South 1983: 23). This demonstrated their Spanish context on the site. Their function, however, was still unknown.

During the 1985 academic year, William Radisch, an anthropology graduate student at the University of South Carolina, acted as my assistant, carrying out research on which much of the documentation in this report is based. He undertook the challenge of the copper stars and his report is presented in the following section.

Classification and Interpretation of Metal Stars from Santa Elena

William H. Radisch

Introduction

Small metal stars were recovered from Spanish contexts at the Spanish colonial city of Santa Elena (South 1983: 23-26). These objects were investigated to determine what functional, social, and ideological uses and/or meanings they may have had to their former possessors. Initially, Stanley South (1983: 23) suggested that the stars may have been sewn onto clothing for use as decorative ornamentation. Sources were searched to obtain information to support or reject this hypothesis, as well as to see if there were alternative uses for the stars. Were they an indication of specialized activity? Might they relate to social conditions, such as differences in status, or ethnic identity? This study addresses potential solutions as these relate to the problems in the classification and interpretation of the stars.

Star Context and Attributes

To date, nine star forms, seven completed and two unfinished or abandoned, have been recovered, identified, and examined. Eight of the stars are copper, while the other is silver. One star was recovered from Spanish oystershell and ash midden Feature 162D-124, which also contained cut copper sheet fragments, indicating production activities of metal objects by the Spanish at Santa Elena (South 1983: 21, 23, 26). One of these is apparently from the manufacture of copper stars (Fig. 89). An oystershell filled refuse pit (Fea. 162D-67) also contained a star and three copper rivets (South 1983: 11, 15, 23). The other examples did not have such tight Spanish contextual associations, being distributed throughout the topsoil zone on the site. We know, however, from their presence in the Spanish features that the stars date from that occupation of the site.

	Hole dia.	Metal Thickness mm	Diameter mm	Points	
38BU162A-118A	1.5	.6	14.25	10	
162C-64B		.7	14.0	unfinished	
162C-331B		.6	15.0	unfinished	
162D-11A	2.5	.9	22.4	4	
162D-21A	1.5	.75	17.15	7	
162D-67	1.5	.9	12.2	8	
162D-124	no hole	.75	13.1	9	
162G-50A	2.5	.65	14.0	9	
					CM IN.
162J-44A	2.5	.45 (silver)	12.5	8	
162C-8B	1.5	.9	12.7	8	

Figure 88. Metal stars. (Provenience and attributes)

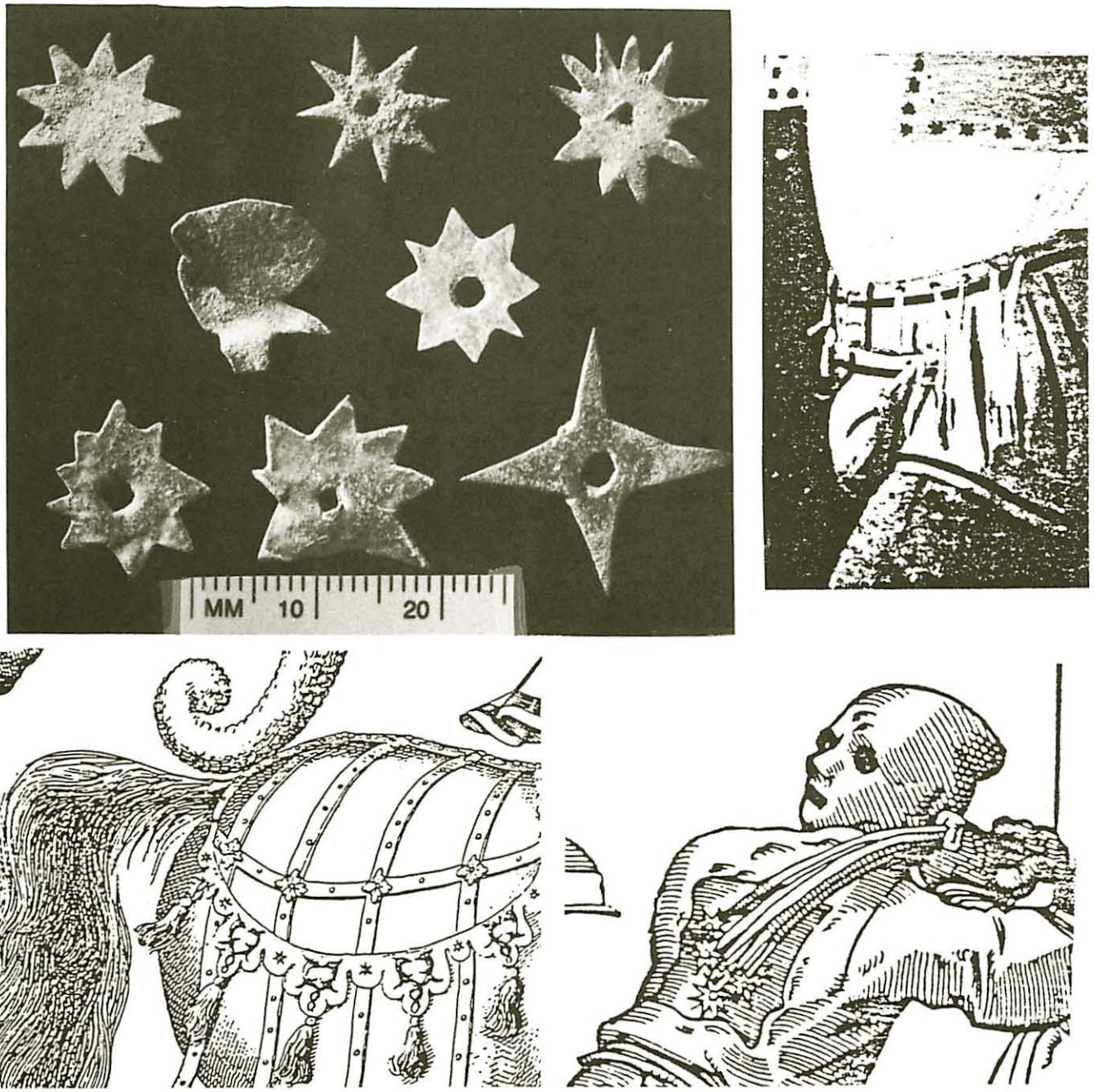


Figure 89. Metal stars and their use. **Top row left:** No hole star, 38BU162D-124, 8 point star, 162D-67, 10 point star, 162A-118A. **Row 2:** Unfinished star, 162C-331B, Silver star, 162J-44A. **Row 3:** 9 point star, 162G-50A, 7 point star, 162D-21A, 4 point star, 162D-11A. **Top right:** Stars on inside and outside of a jerkin, ca. 1520, "Executioner -- Doublet and Breech-hose," from "The Martyrdom of St.Hermengild," (Granada, Museo Provincial de Bellas Artes, Palacio de Carlos V, Alhambra). From Anderson 1979:224, Fig. 225. **Bottom left:** Stars on sixteenth century horse trappings. From a Brussels tapestry showing Charles V reviewing his militia (The Royal Palace, Madrid). From Stibbert 1968: Fig. 197. **Bottom right:** Stars on a flagellant's cat-o-nine tails from "The Ecclesiastical Hierarchy," by Tobias Stimmer, ca.1570 (Cut by L. Fry. [330 x 280] Vienna, 263-1957, B.23; A.59). From Strauss 1975, Vol. 3:1056, Fig. 75.

The stars and scraps from making them appear to have been cut with snips from sheet metal, since they visually exhibit cut marks and irregular outlines. However, the silver star and two completed copper stars had very regular outlines and no discernible cut marks, indicating more careful manufacture. The stars range in width from 12.2mm to 22.4mm, and have a mean width of 14.95mm. Thickness ranged from 0.45mm to 0.90mm, with a mean of 0.70mm.

Six of the completed stars have holes in or near their centers, four have round holes which were apparently drilled, and the other two have rectangular holes, made with an angular punch such as a nail, through the metal. Two non-completed and one completed form have no cavities formed by the impact of the hole punch, suggesting that a "hole production stage" was the final manufacturing activity.

The stars also have differing numbers of points. Of the seven completed forms: one has four, one has seven, two have eight, two have nine, and one has ten points. One unfinished form had three points while the other had only an initial cut. The example with only the initial cut was included in the star class since its width (14.0mm) and thickness (0.70mm) were nearly identical to the mean values mentioned earlier. The stars and their attributes can be seen by referring to Figures 88 and 89.

Interpretation

Research of terrestrial and underwater archaeological site reports to locate objects related to the sixteenth century and Santa Elena produced only one star-related source. Raymond Willis (1984: 193) mentioned a crude star cut from a brass sheet, which was recovered from the sixteenth century Spanish colonial site of Puerto Real, Haiti. Unfortunately, there was not an illustration of this star, nor any other descriptive attribute information in the report. However, it does sound similar to the stars recovered at Santa Elena. Other than Willis' report I have not found reference to, or heard of similar stars from, other sixteenth century Spanish sites.

Two sources provided illustrations of small stars attached to sixteenth century clothing. A book on Hispanic costume from 1480-1530 contained a detail from a painting "The Martyrdom of Saint Hermengild" by Juan Ramirez, circa 1520 (Anderson 1979: 89, Figure 225). An executioner is wearing a leather doublet (vest with short sleeves) which has small six- and seven-pointed (metal?) stars attached to its inside and outside borders (Fig. 89). Another book dealing with sixteenth century costume had a painting of "Sir Walter Raleigh" by an unknown artist, circa 1590 (Ashelford 1983: 116, Figure 124). Raleigh is pictured with a helmet having pearl-studded ostrich plumes. Attached to these are five- to seven-pointed small metal black stars. In both of these examples the stars show no uniform number of points and they appear to be of irregular shape. The method of attachment for the stars could not be discerned from the paintings, or the narratives, in either source. Both paintings have realistic proportions and the stars appear to be of size and shape compatible with the examples from Santa Elena.

It was tempting to classify the stars as clothing-related ornaments, as South had suggested. However, additional sources were consulted in order to determine what other uses these objects may have had, and other interpretations emerged.

A conversation with Miguel Morayta, an ethnoarchaeologist, informed me that small silver stars are used in present-day contexts in Mexico (Morayta, Personal Communication, 1986). There, the stars are used as grommets or washers on saddle tack and leather covered furniture. Small tacks were hammered through the stars with the stars functioning to keep the leather from pulling out over the heads of the tacks.

South Carolina Institute of Archaeology and Anthropology archaeologist Glen Hanson provided similar information from observations in Arizona (Hanson, personal communication, 1986). In this case silver stars helped to anchor layers of saddle leather together, although tacks were not used. Instead, a leather lace was fed through a hole in the leather, the hole in the star, then threaded through a bead, and passed back through the star and leather. The lace was then secured on the interior of the saddle by tying a knot, allowing for ease of maintenance. In both of these cases the stars appear to have a decorative purpose in addition to their functional utility.

A detail from a sixteenth century tapestry shows a Spanish rider on a horse which has trappings that have small stars attached (Stibbert 1968: 197), (Fig. 89). No other examples of stars in association with saddle tack/horse trappings were observed. Eugene Lyon's (1982: 6) archival research with contemporary records of Santa Elena revealed that seven saddles and their tack arrived at the settlement as the property of Pedro Menéndez, the founder of the city. Lacroix (1870: 113) relates that, during the sixteenth century, ownership of horses and their associated trappings were indicators of high status. The stars from Santa Elena might be representative of social standing. Lyon (1982: 6, 8) points out that the community had rigid class distinctions.

While researching sixteenth century Spanish furniture, several forms, including a chest, were observed which exhibited stars used as inlays (Boger 1959: Figure 80). These star inlays have central holes and variable numbers of points which make up star patterns. The chest is of Moorish design, a product of the Mudejar style, which is a blending of Islamic elements which agreed with Spanish Christian principles (Boger 1959: 48). The "star pattern" was a popular motif in Islamic art (Wade 1976: 63, 105) which was incorporated in Spanish clothing, furniture, and architecture (Boger 1959: 48).

Since there was such a blending of design elements resulting from Moorish influence it is possible that the stars from Santa Elena may represent the Mudejar style. The stars might have been inlays for furniture, and arquebus or crossbow stocks, being set into or tacked onto such objects. In this case the stars could be ornamental, and might indicate ownership or status. Their crude and varied shape, however, tends to negate this interpretation.

Lyon (1982: 4,6,7) mentions tailors, metalsmiths, and carpenters who produced goods for the civilian and military inhabitants of Santa Elena. Vivian Brooks, who is in charge of the costume department at the Longstreet Theatre at the University of South Carolina, Columbia, informed me that the stars were one variety of sequin or spangle, which were popular in Elizabethian times (Brooks, personal communication, 1986). This "Elizabethian" mode might more accurately be described as a "Spanish mode," so strong was the influence of Spanish fashion throughout the continent in the sixteenth century (Kelly and Schwabe 1925: 54). Brooks said that the sequins were attached with the aid of beads through a central hole as described above. She said that a metalsmith would produce stars for a tailor who would apply them to custom-made clothing for an upper class individual, as this person would have to cover the production costs of the stars and the garment. Stars may indicate class differences between producers and consumers.

Stars in Religious Symbolism

A concern with ideology developed during this research as stars were observed in a number of sixteenth century paintings which depicted events in a Catholic religious context. Scenes from the birth, life, death, and resurrection of Jesus, and events in the life of Mary, contained stars with varying numbers of points, like those from Santa Elena. Two examples

from sixteenth century Spanish paintings include a nimbus (halo) around Mary's head and a star in the sky during the birth of Jesus (Angulo 1954: Figures 232, 138).

Additional sources in Christian symbolism and iconography revealed that stars and their numbers of points have symbolic meanings in the Christian belief system. A four-pointed star signifies the cross; this form developed into the Maltese cross, representing the Knights of Malta (de Vries 1976: 439), an elite military-religious order in sixteenth century Spain (South 1982: 59). Seven points referred to the "seven gifts of the Spirit" (De Vries 1976: 440; Post 1974: 67). Eight points symbolized regeneration (De Vries 1976: 440; Post 1974: 67). Nine points related to the "nine fruits of the Spirit" (Post 1974: 67). No reference was located for a ten-pointed star, but Whittick (1971: 283) relates that the number ten represented the ten commandments.

Church art and architectural details provided further evidence that stars had symbolic meanings for sixteenth century Christians. A prominent symbol of Catholic ideology is St. Peter's Basilica, in Rome. Here, vaulted domes incorporate six and eight-pointed stars with mosaics and carvings depicting scenes in the lives of saints, Jesus, and Mary (DiFederico 1983: Figures 51, 67). These scenes were installed during the late sixteenth century after the Council of Trent, in 1563, decreed that religious imagery complimented Church teachings and was effective in the battle of the Catholic church against Protestantism (DiFederico 1983: 5). Related to this was the Council of Nicea which, in A.D.787, established principles that controlled the emphasis and composition of imagery to be used in Christian art (Sill 1975: xi). Paintings, sculpture, and other decorative objects were used as tools to instill Church ideology in masses of individuals, most of whom could not read (Hulme 1976: 1-2). The congregation could hear the lessons and see around them the examples to follow. Church art appears to have functioned as a medium for creating a symbolic past which was consistent with, and supportive of, the politico-religious ideology (Leone 1984; Wylie 1985) of the Catholic church during the sixteenth century.

Another interesting illustration of stars in a religious context is seen in an illustration of a flagellant by Tobias Stimmer, cerca 1570 (Strauss 1975: Vol. 3; 1056, Fig. 75). The cat-o-nine-tails being used by the flagellant has stars fastened to the ends of the whip strands to assist in drawing blood (Fig. 89). Could the Santa Elena stars have been made for this religious ritual?

Stars Related to Ideology, Ethnicity, and Class Differences

As stars were incorporated with other symbolic elements used as a socialization aid for the teaching and enforcing of Catholic ideology, might the stars from Santa Elena be evidence of the efforts of the Church to maintain its empire and social control in the New World in the sixteenth century? Lyon (1982: 7) mentions that the Church of Rome was continually felt in Santa Elena, the beliefs and rituals of Catholicism played a major role in the lives of the inhabitants. Santa Elena had a church which contained many religious objects (Lyon 1982: 7) and which was a major partner with the powerful family of Pedro Menéndez in controlling Santa Elena (South 1987). Might some of the stars have been attached to vestments or other religious materials?

Life for the men, women, and children at Santa Elena was often filled with stressful conditions such as disease, low supplies, crop failure, and the threat of attack from Indian and/or French groups (Lyon 1976, 1982). Santa Elena was also a stratified community; within its population were class differences ranging from slaves to noblemen (Lyon 1982: 6). Under such stressful conditions at this Spanish frontier settlement, would symbolic materials be used to maintain cultural boundaries, as Hodder (1982) has observed with African groups along their cultural borders, or as status enforcing ritual as South (1977: 40-42) has suggested? Wobst's (1977) study of rural Yugoslavian groups revealed that various garment forms and stylistic elements served as signals of ethnic identity and class differences. If the stars were worn at

Santa Elena, might they have symbolically signaled distinctions or similarities related to status, ethnic origin, and/or ideological identity? It is also possible that the stars were manufactured although their symbolic meanings had been lost. Hodder (1982) points out that some traditional forms continue even though individuals no longer recall any meanings for them. South's (1977: 183-190) flax hackle/tulip motif is another such example.

Conclusions

This study has suggested a number of potential uses and meanings for the small copper stars recovered from the sixteenth century Spanish colonial city of Santa Elena. The results of the present research indicate that the stars may have been used on clothing, saddle tack and horse trappings, furniture, arms, and/or church related activities and paraphernalia. In addition to their functional and decorative applications, the stars might have served to signal and maintain class and/or ethnic differences. As well, the stars may have been one medium used to instill, promote, and uphold church doctrine and political ideology.

The results I have presented are some of the possibilities that exist for interpreting these objects. Until other stars are discovered, researched, and reported from similar cultural and temporal contexts, our knowledge regarding the distribution of this artifact class will remain limited and tentative.

Tailoring

In the above sections we have dealt with clothing items directly related to clothing worn by Santa Elena's colonists, such as buttons, bordado, buckles and stars, reported above by Bill Radisch. In this section I will discuss the group of objects related to tailoring of clothing rather than to clothing itself. These items are scissors, thimbles, pins and bale seals.

The tailor at Santa Elena was Alonso de Olmos, who, with his wife, his mother-in-law and six children, had a busy household and also allowed his bachelor neighbor, Barolomé Martín, to take meals in his home until he married. Olmos' son helped him in the tailoring business, and other children helped him raise hogs and plant corn. He also loaned money to his neighbors in Santa Elena, sold dry goods from his tailor shop, and operated a tavern for the refreshment and entertainment of the community (Lyon 1984: 4, 7). The artifacts recovered in this section may well have been used by Olmos in his tailoring activity.

Scissors

Half of a scissors was found in one of the sample holes dug into the eighth fairway of the Parris Island Golf Course (38BUl62J-135). Since this object was not found in a good Spanish context it may well be from a later period of occupation on the site. However, its style suggests it may well date from the Spanish period of occupation (Noël Hume 1970: 268). This artifact is illustrated in Figures 15 and 90. Scissors, surgical instruments and cutting tools, such as swords, were crafted by skilled craftsmen and were sometimes adorned with serpent heads, as seen illustrated in a woodcut of 1497, by H. Brunschwig, of surgeon's instruments (Fig. 91). A pair of scissors is also shown in this woodcut (Held 1957: 35, Fig. 59), and as can be seen, the form has changed little in the past few hundred years.

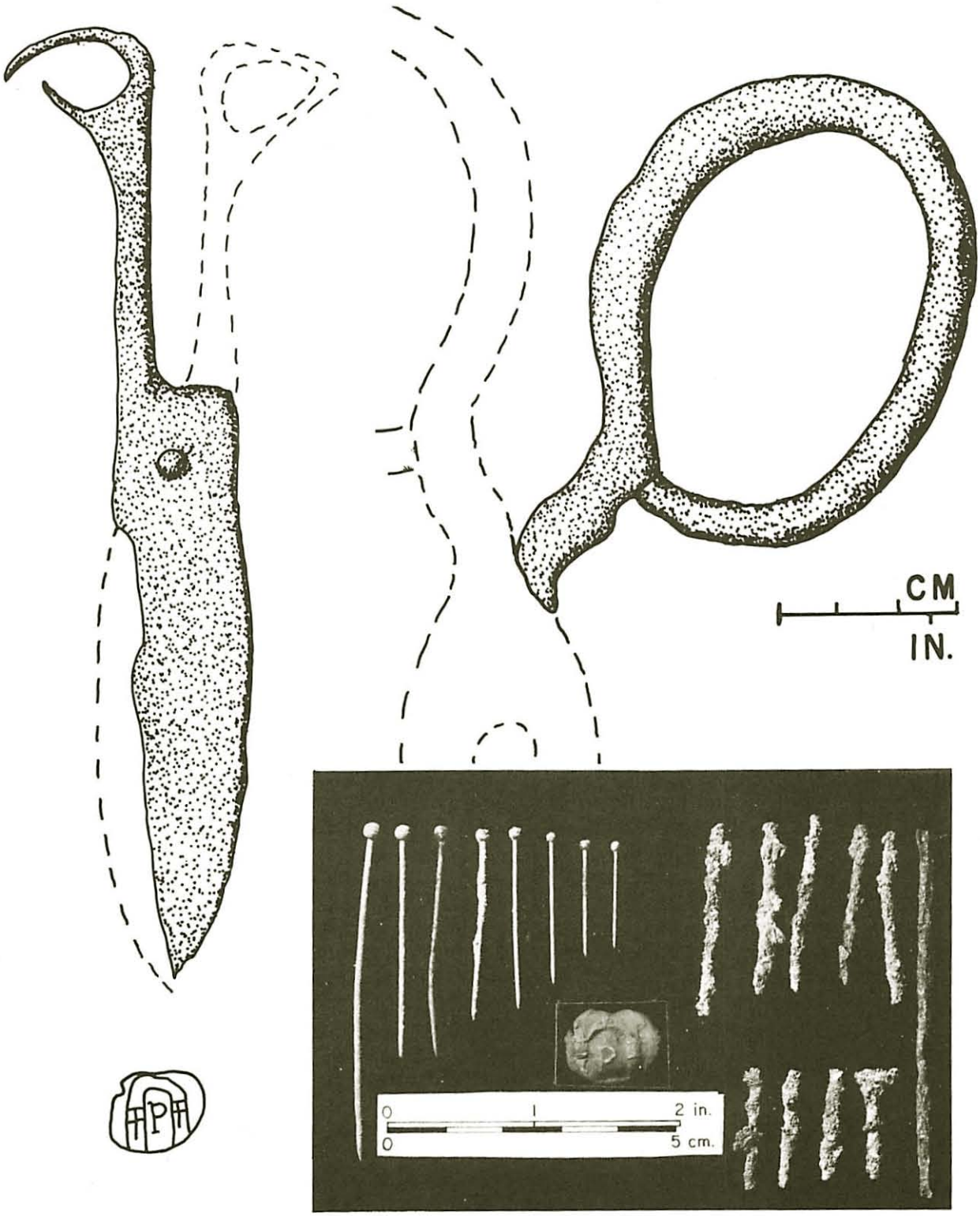


Figure 90. Scissors, shears, bale seal , pins and iron wire. **Left:** Scissors half, 38BU162J-135. Bale seal drawing, showing the Pillars of Hercules, 162G-53B. **Top:** Shears or tong eye, 162-136. **Bottom:** Brass pins and iron wire and bale seal. Pins, 162D-38, 162E-42D, 162D-66, 162G-172B, 162G-172B, 162G-146B, 162G-172B, 162G-172B. Bale Seal, 162G-53B. Iron pins, (right) 162-30A, all others are 162D-67.

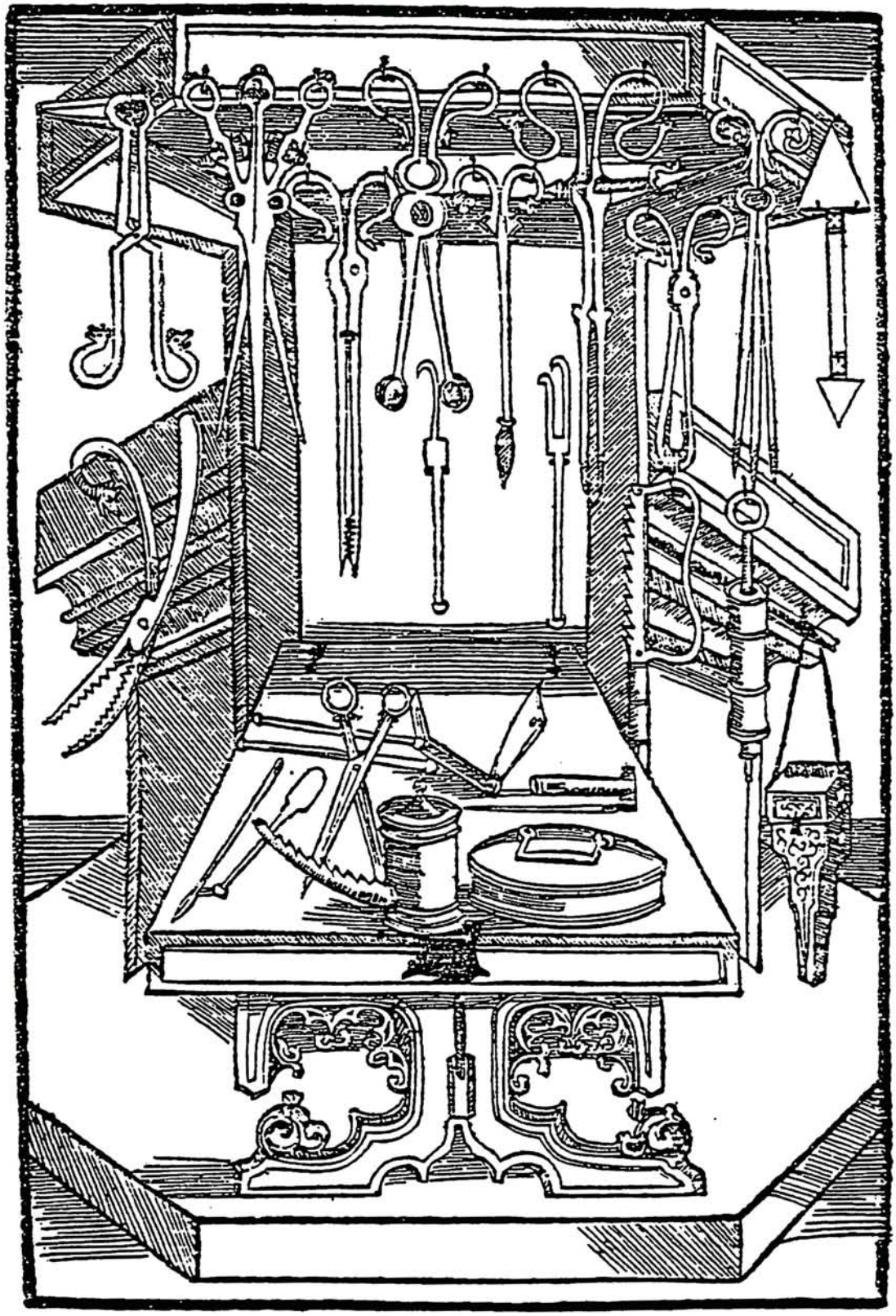


Figure 91. Surgical instruments. Woodcut from H. Brunschwig, Chirurgia (Surgery). Strassburg, 1497. From Held 1957:35, Fig. 59. Note large loop handle eyes with animal heads.

Thimbles

Four whole and fragmented brass thimbles were found in the area east of Structure 5 in Santa Elena in the Spanish B-level and in the Spanish midden in Feature 162C-117 (South 1982:55). These are illustrated in Figure 92. None were found in Fort San Felipe or elsewhere in Santa Elena. Since all these thimbles were found in the refuse area east of the large 42 foot long Structure 5, one wonders if this may have been the house of Olmos, the tailor.

Noël Hume points out that thimbles of the sixteenth century have indentations that form a spiral around the thimble, as those from Santa Elena indeed do (1970:256). This can be seen on one Santa Elena example in Figures 83 and 92. The whole example from Feature 162C-117 had a hole in the crown. Inside the thimble was a wad of string (Fig. 83), likely placed there (by Olmos?) to pad the finger to protect it in case the needle head happened to come through the hole, as indeed may have happened, causing the owner to discard it, probably sucking blood from the needle hole in the finger the whilst. Only one thimble has a decorated border around the open end, the others being encircled with one or two parallel lines.

Thimbles have been around since Egyptian times (Wilkinson 1986:21), and were, in the sixteenth century, still made by hand as the illustration of a thimble maker in a Jobst Amman woodcut of 1568 in Figure 92 reveals (Lehmann-Haupt 1976:Plate 1). It was not until 1696 that John Lofting developed sand casting of thimbles in Holland, making their production cheaper and more widely available (Wilkinson 1986:21).

Pins and Iron Wire

Pins

A total of 22 brass pins with wire wound heads were found at Santa Elena, with 57 coming from excavations at Fort San Felipe. Noël Hume says wire wound pins did not begin to be used until early in the seventeenth century, but their presence at Santa Elena indicate that wire wound pin heads were being made a quarter of a century earlier (Noël Hume 1970: 254). The range of size is from 18.45mm to 42.25mm in length, with a median length of 30.35mm, or from 3/4 inch to 1 5/8 inches in length, with a mean length of 1 and 3/16 inches. These data are seen in Appendix XIV, and a sample of pins is illustrated in Figure 90. It is interesting that over twice the number of pins were found in Fort San Felipe as in Santa Elena's domestic refuse deposits. Does this mean that soldier's dress required more straight pins to maintain?

Iron Wire

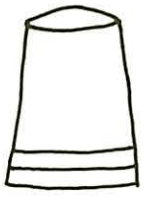
Fragments of straight iron wire, badly corroded, were found in the features in Santa Elena. Some of these may be the remains of needles or from iron wire. If the latter, they are always straight. Wire thread was mentioned in the inventory lists of goods from Spanish Florida (Fig. 10), but it is thought this has reference to wire thread used in relation to bordado, either to make it or to fasten it to clothing. The iron wire fragments are illustrated in Figure 90. One appears to have a slight head and this suggests they may be fine, finishing nail type wire nails for delicate fastening, but most examples are without heads.

Whatever the function of the iron wire "pins," they were used almost entirely in a domestic context, since 37 of these were found in midden deposits in Santa Elena, and only one at Fort San Felipe (Appendix XIV, Fig. 90).

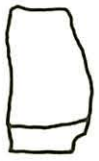
38BU162C-65B
16.00 mm (W)
18.15 mm (H)

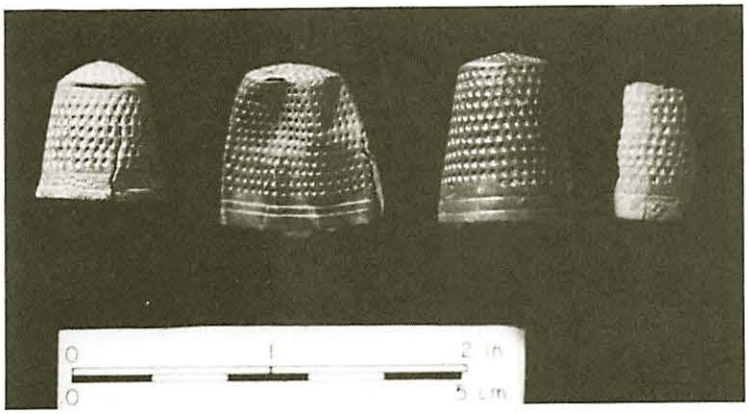
162C-133B
22.00 mm (W)
21.50 mm (H)

162C-117
18.00 mm (W)
22.65 mm (H)



162C-53B
fragment





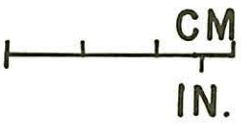
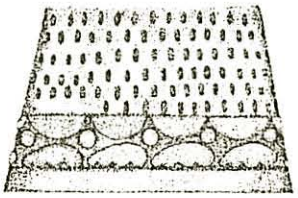
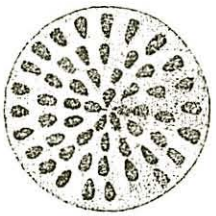


Figure 92.

Thimbles from Santa Elena. **Top left:** "The Thimble Maker," 1568. Woodcut by Jobst Amman in Hartmann Schopper, *Panoplion* (Frankfurt: Sigmund Feyerabend, 1568). From Lehmann-Haupt 1976: Plate 1. **Bottom Left:** Thimbles, 162C-65B, 133B, 117, 53B. **Right:** Thimble drawings. **Bottom right:** Drawing of 162C-65B by Ann Salter.





Bale Seal

A single lead bale seal was found on the site of Fort San Felipe in the Spanish zone beneath the plowed soil level. According to Noël Hume, such seals date primarily from the eighteenth century (Noël Hume 1970: 269-271). However, this seal has impressed on it the Pillars of Hercules joined by an arch above, with a cross appearing on each column in relief, with a capital "P" in relief in the center. The Pillars of Hercules, according to Olds, is the most frequently seen stamp on silver ingots from a sixteenth century Spanish shipwreck site (Olds 1976: 124, 132). It is thought that such stamps indicate that the royal tax had been paid. The Pillars of Hercules are a variation of the royal arms (Olds 1976: 131). It is thought, therefore, that this is indeed a Spanish artifact from the occupation of Santa Elena. It is illustrated in Figure 90. These seals were made to stamp on bags of merchandise during shipment (Noël Hume 1970: 269-271). It is presented here because such seals were also used to fasten on bolts of cloth during shipment.

CHAPTER 7

THE PERSONAL GROUP OF ARTIFACT CLASSES

Introduction

Some artifacts, usually small ones, fall into the Personal Group of artifact classes (South 1977: 95), which involves items carried on, or used by a person in carrying out daily activities. Artifacts sometimes called "personables" fall into this group, such as keys for locks and doors and chests, coins, beads, crucifixes, earrings, ornaments worn on clothing, dice for gambling and gaming, mirrors, chessmen and other gaming discs and paraphernalia, as well as book hinges, brushes, rings, etc.

Personal items often have great symbolic value assigned to them by the culture of which they are a part or by the person on whose person the object is carried or worn. The symbolism often is of a religious nature and so a study of the "personables" or personal group of artifact classes leads often to the religious belief system the objects symbolize. Just as nails are seen to symbolize St. Helena, the mother of historical archaeology, as a result of her expedition to recover the nails used to fasten Christ to the cross (see Nail Description section of this report), other symbols relate to other saints. Some of these personal ornaments found at Santa Elena and Fort San Felipe are presented in the following section.

Mirrors

One mirror fragment was found in the topsoil zone of Fort San Felipe (38BU162G-40A) that is possibly Spanish. Mirrors were among the items traded to the Indians by Juan Pardo in 1567-68 (DePratter and Smith 1980: 72), (Appendix II).

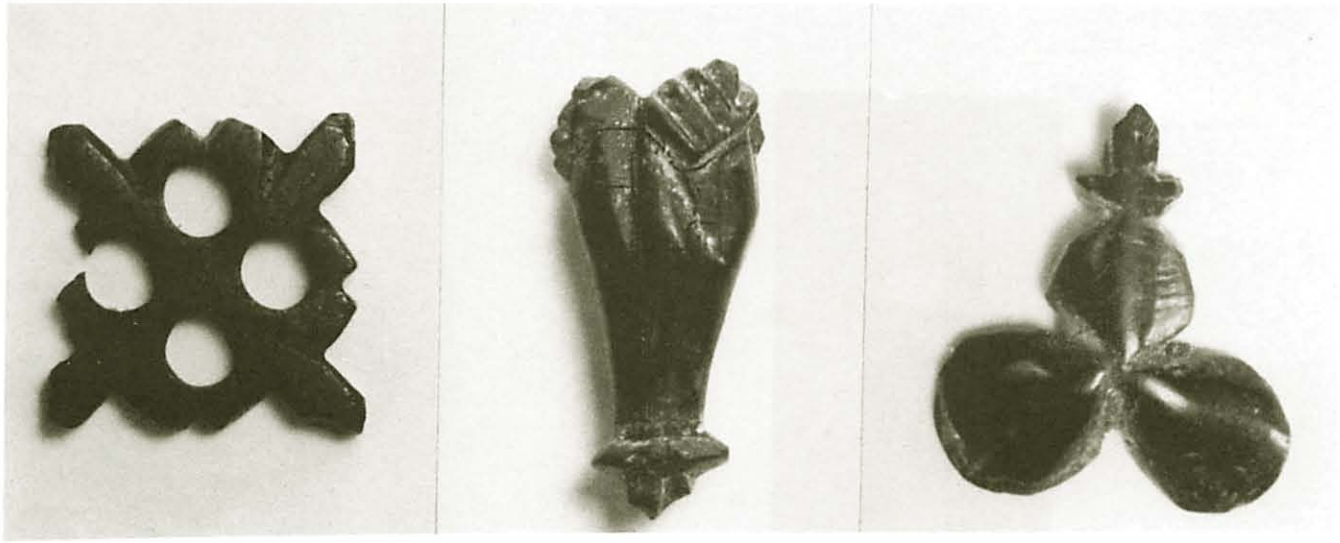
Ornaments

Scallop Shell

A small jet scallop shell with a tang with a drilled hole for attaching to a string for a necklace, or to be sewn onto a garment, was found in Fort San Felipe (Figs. 93 and 95). The scallop shell is connected with St. James, who was the patron saint of Spain (Ferguson 1958: 74; Hulme 1976: 200-202; Post 1974: 18; De Uris 1976: 419; Whittemore 1959: 33; Whittick 1971: 314). The shell also symbolizes pilgrimage and is found as a motif in religious architecture (Kelemen 1974: Plates 5a, 6, 34). The scallop shell was the second most frequently seen symbol impressed on Spanish ingots of silver, second only to the Pillars of Hercules (Olds 1976: 124-125, 132).

PROVENIENCE	LENGTH	WIDTH
38BU162G-52A	12.55 mm	10.65 mm
162G-241A	14.95 mm	7.15 mm
162G-225	10.0 mm	10.0 mm
162C-75	15.45 mm	13.3 mm
162G-147	13.5 mm	12.25 mm
162J-111B and 162J-57A	(not to scale)	

Figure 93. Black, personal ornaments made of jet, and glass beads. (Provenience. length and width)



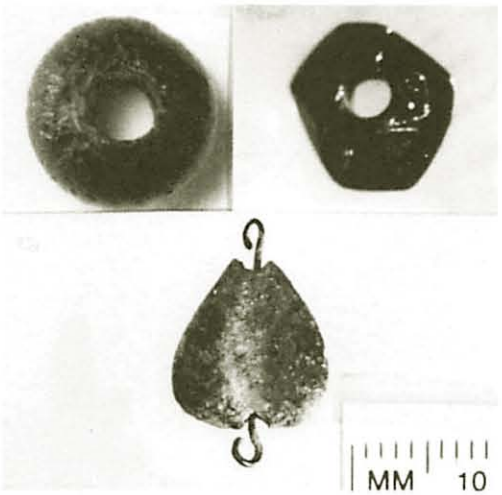
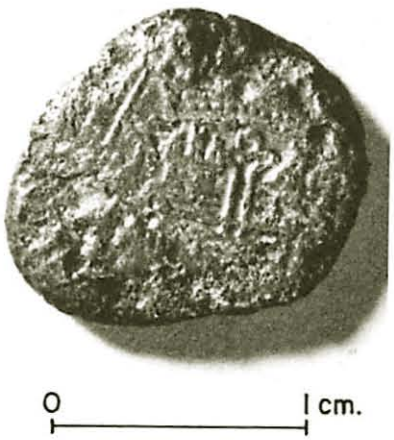
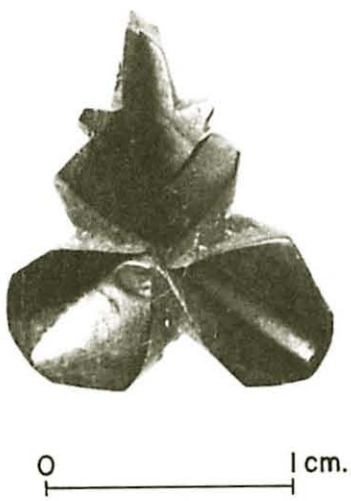


Figure 94. Personal ornaments. **Top:** 162G-225, 242A, 147. **Row 2 Left:** "Prince Felipe Próspero" by Velázquez, ca. 1659 (Vienna Kunsthistorisches Museum). From López-Rey 1968: 143, Plate VI. **Center:** "Arraignmentof St. Peter, Section of Retable" by Nicholás Solana?, late 16th c.? *(Colegiata, Daroca).* From Post 1970:327, Fig. 126. **Right:** Glass bead, 162G-146A. Garnet bead, 162G-198. Glass earring, 162H-81A.**Bottom left:** Trefoil necklass from "Purifiación" by Leon Picardo (Museo del Prado), second quarter of the sixteenth century. From Angulo 1954: 115, Fig. 114. **Bottom right:** Earring from "Santas Justa y Rufina y San Lucas" by Fernando Storm, ca. 1555, (Catedral de Sevilla). From Angulo 1954: 213, Fig. 219.

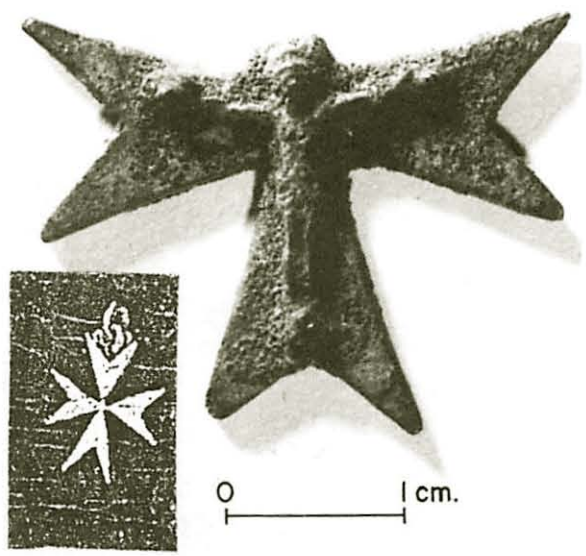
A



B



C



D

Figure 95. Personal artifacts. **A.** Jet scallop shell ornament, the symbol of St. James, 38BU162G-52A. **B.** Silver coin struck on one side only with the arms of Spain 162C-57A. **C.** Jet bead, symbol of the trinity, 162C-75. **D.** Brass crucifix, 162C-14B. **Inset:** Similar Maltese cross, symbol of the hospitaller order of St. John of Jerusalem. From "Alof de Wignacourt, with a Page" by Caravaggio, ca. first decade of the seventeenth century (Musée du Louvre, Paris). From Metropolitan Museum of Art 1985: 331.

Trefoil

Two trefoil jet ornaments with a drilled tang hole were found, one in Santa Elena and one in Fort San Felipe (Figs. 93, 94, 95). The symbolism here is for the Holy Trinity (Cirlot 1962: 48; Post 1974: 22, 65). A similar motif is seen on a necklace in a painting dating from the second quarter of the seventeenth century. In this case we have an indication that such ornaments were sometimes used as beads, but we have included them here under ornaments rather than beads since they were sometimes sewn onto clothing and served as ornaments per se rather than as beads.

Mullrine Cross

A jet ornament made up of four interlocking crosses, leaving four holes where they join, is a version of what Post (1983: 65) calls a Mullrine Cross (Figs. 93, 94). This ornament, too, has religious symbolism. The one illustrated here was found in Fort San Felipe, in the *casa fuerte* ditch dug in 1572 (South 1984: 32-33, 59).

Figas

A jet, triple clinched fist, or figa, representing the clinched hand of God holding the souls of the righteous, was found in Fort San Felipe (Figs. 93 and 94), (Cooper 1978: 78-79; Hulme 1976: 42-44, Fig. 4; Post 1974: 23; Sill 1975: 62-63; Whittemore 1959: 24). This symbol, along with other similar ornaments, were designed to turn away the evil eye (Held 1957: 34-35; Lopez-Rey 1968: 143). They were sometimes said to have such power that they allowed one to acquire invulnerability against bullets and infection. Children are shown wearing such amulets, as are adults, in paintings of the era (Fig. 94). It is clear, therefore, that these ornaments were not simply ornamental, but were thought to contain great power through their symbolic connection with supernatural forces.

Crucifixes

In contrast to the rich complement of religious paraphernalia discovered in association with sixteenth century burials and mission site activity elsewhere (Thomas 1986), years of excavation at Santa Elena have produced only a single brass crucifix (Fig. 95). This object symbolizes the interest of the Spaniards in converting the Indians. Such crucifixes in the shape of the Maltese cross are the insignia of the Knights of Malta, the highest order of the Roman Catholic Church (Sill 1975: 32).

According to Wolf Wolfensberger, professor at Syracuse University (personal communication April 26, 1982), such Maltese crosses:

> were worn by so-called "donate" members of the hospitaller order of St. John of Jerusalem, later (after its relocation to Malta) also called the Maltese Order. A fair number of the Spanish elite were members of one degree or another of the order. A donate member was one of noble birth but unable to prove nobility on both sides of the family for the requisite number of generations. Such a person was admitted to the order at somewhat less than full status, and was expected to make a very generous donation to the order upon admission.

A painting by Caravaggio (Metropolitan Museum of Art 1985: 331) shows a crucifix similar in form to that found in Santa Elena (Fig. 95).

Earring

A heart shaped bead of heavy lead glass of wire wound construction, flattened in section, with an indentation on each side paralleling the perforation, with a wire with a small loop on each end through the hole, was found in Fort San Felipe (Fig. 94). Richard Polhemus has included this object along with his bead analysis and points out that five identical beads have been reported from a pit at the Conklin Site, dated to A. D. 1540-1555 (Polhemus in South 1985: Appendix XI; Pratt 1982:6). This type bead is seen being worn as an earring in a painting dating from 1555 (Fig. 94). Polhemus' report on the beads from Santa Elena and Fort San Felipe is seen in Appendix 15 of this report.

Spanish Context Beads

Beads are an artifact one would expect to find on a site of the period of Santa Elena for many reasons. At the seventeenth century Spanish mission of Santa Catalina de Guale, David Hurst Thomas reports that tens of thousands of "trade beads" were recovered from Indian burials, along with other Spanish goods (Thomas 1986: 40). One might expect similar evidence of Spanish beads at Santa Elena and Fort San Felipe. Chester DePratter and Marvin Smith note that Juan Pardo, traveling from Santa Elena in 1567 and 1568, traded or presented 31 necklaces of beads to the Indians along their way (DePratter and Smith 1980: 72). One might expect that some beads from similar necklaces might well have been broken at Santa Elena to find their way into Spanish features on the site. However, not a single bead has yet been found in a Spanish feature in the domestic area of Santa Elena! Screens 1/8 inch in size and window screens have been used to recover data from Spanish features, but not one bead of any size has been found. Why? Some beads have been found in the plowed soil zone lying above the Spanish features, but none from features. It appears that beads were an item that the Santa Elena citizens just did not allow to find their way into refuse deposits in pits, ditches and other features in Santa Elena.

It was not until excavation was carried out at Fort San Felipe that beads were found in Spanish features for the first time. Here, seven beads have been found in Spanish features. One bead (38BU162G-198), was attached to a mass of bordado wire, and was found in the fill of one of the *casa fuerte* postholes (South 1984: 39-40). Richard Polhemus' analysis determined that it was a garnet, cut with seventeen facets (South 1984: Appendix II), (Figs. 85 and 94). No other bead like this has been recovered from any context at the site.

The second bead (38BU162G-146), from the top fill of a well inside Fort San Felipe, is a tube drawn glass bead of transparent amethyst color and is in the typological class IIa in the Kidd classification (Kidd and Kidd 1970; Polhemus, in South 1984:95). No other bead like this has been recovered from any context at the site (Fig. 94).

The third bead ((38BU162G-146A), from the upper level of the Spanish midden-filled well in Fort San Felipe, was found by Polhemus to be made of amber (Polhemus, in South 1984:96). No other bead like this has been recovered from any context at the site.

The fourth through seventh beads were attached to the back of the gold wire bordado seen in Figure 84 (38BU162E-40C), providing a clear Spanish association. They were found in the C level of the moat of Fort San Felipe at the northwest bastion. They were pink in color and no other beads like them have been found on the site.

It is interesting to note that, whereas thousands of beads have been found on the site in various contexts, the seven discussed above are the ones having the best Spanish contextual association. It is also interesting that all of these beads are unique on the site, i.e., they are not duplicated by other beads of the same type from the plowed soil zone or elsewhere. This suggests that these beads are associated with the Spanish occupation and the others may be from a different period of occupation of the site.

Other Beads

During the excavation of the moat at the northwest bastion of Fort San Felipe, a number of beads were recovered in the C level of the moat fill, which is the top, post-Spanish fill zone. The D level represents the Spanish fill soil, which dates from around 1577, after the destruction of the town and fort by the Indians, thus representing the second period of Santa Elena and Fort San Felipe, from 1577 to 1587 (South 1983: 50-54). It is thought that the D level is more likely to reflect artifacts used by the Spaniards and thrown into the moat as backfill around 1577. No beads whatsoever were found in the bottom foot of eroded-in humus and soil into the bottom of the moat, in the E level, representing the period of occupation from 1572 to 1576 (South 1983: 50-54, 1986: 72-73). The D level beads, therefore, might well represent beads used by Spaniards on the site. There were 33 beads recovered from the D level of the northwest bastion (South 1986: 72-73). Of these 17 were Kidds type IIa, spherical transluscent turquoise blue, and 14 type IVb oblong opaque blue-white over light blue. Two others were of type IIa, a spherical clear cerulean blue and a spherical opaque black. These and other beads from less positive Spanish context are reported by Polhemus in Appendix XV (Polhemus, in South 1983: 145-155, 1984: 95-96, 1985: 225-230, 1986: 67-76).

Cremated Bead Pits

In the northwest corner of the excavated area at the northwest bastion of Fort San Felipe, a burial, which was part of a black graveyard known as the "Mean Graveyard," was found, being part of the "Means" plantation indicated on the Mills Atlas map of 1825 (South 1983: 74-75), (Fig. 96). Twelve graves were found through a one percent sampling program carried out in the graveyard area (South 1983: 77-80). The largest concentration of beads was found in the area of the northwest bastion, adjacent to this graveyard.

A charcoal and bead filled pit was found intruding on the moat fill, representing an event postdating the filling of the moat around 1577. This pit contained charcoal and burned beads, almost four thousand, blue, blue and white and coral, and others (Fig. 96). No means of dating the pit with other artifacts was discovered. My interpretation was that it must date either from the late seventeenth or early eighteenth century period, a few sherds of which have been found in the area, or from the plantation period of the early nineteenth century, during the use of the site by the Means plantation (South 1983: 72-75), a period represented far more extensively on the site than the early eighteenth century.

The question of the relationship between the cremated bead pit and black burial practices that might have been responsible for the beads arose. The Beaufort area today is a place where African beliefs are still prevalent and where root men, white and black, still practice their art.

Figure 96. Black burial and bead pit. **Top:** Burial 69 at the northwest corner of the northwest bastion area of Ft. San Felipe. **Bottom:** Excavating the bead pit, Feature 162E-105, intruding onto the moat fill of Ft. San Felipe.

Nearby is the African-modeled Yoruba ceremonial center, Oyotunji, where a series of festivals honoring a pantheon of gods are held throughout the year under the leadership of King Oba Oseijeman Adefumi I, who was very helpful in providing information on voodoo beliefs. It was learned that a voodoo funeral involves two ceremonies, one where the physical body is buried and a second one when material goods are cremated so they can accompany the soul to the spirit world. Beads are a status symbol among believers and are among the items cremated after the death of an individual. It might well be that this practice of cremating material possessions is responsible for the cremated beads in Feature 105 (South 1983: 75).

During the excavation of an area of the Santa Elena site in 1985, by William Hunt, two more charcoal and bead filled pits containing hundreds of beads were found (South and Hunt 1986: 26). This area is some distance from the black graveyard. However, in one of these pits a clue to the date of these features was found, a ball clay pipestem with a hole diameter of 5/64 inches, which according to the Harrington method of dating pipestems, would indicate that the pit was filled sometime from 1680 to 1800 (Harrington 1954, from Hume 1970: 298). On the basis of this information it is thought that these and other similar bead pits from the site are likely from the plantation period of occupation, in the late eighteenth to mid-nineteenth century.

Richard Polhemus, who conducted the analysis of the Santa Elena and Fort San Felipe beads (Appendix XV), places the beads to the middle of the seventeenth century, a time when there is no other evidence for occupation of the site. I think the problem here lies in the lack of information in bead research studies of the kinds of beads flowing into the African trade from the seventeenth through the nineteenth centuries and still going on today. Most of the bead information comes from Indian burials and little is known of the types of beads used by blacks using beads in daily life and in African rituals. Apparently some of the bead types have a much longer use time than is presently known from information based primarily on the Indian trade, with almost no information known as to the extent of the trade of beads to blacks in Africa and the colonies. Those interested in the detailed taxonomic treatment of the beads from Santa Elena and Fort San Felipe should see the various excellent bead studies carried out by Richard Polhemus in Appendix XV.

It is interesting to note that the bead collections from Indian burial sites at the University of North Carolina Research Laboratories of Anthropology tend to support the conclusion for a mid-seventeenth century date for the blue beads found at Santa Elena. These are seen to be present in some numbers in sites dating from the mid-sixteenth century, but are fewer in number on sites dating from the end of the seventeenth century, with white beads predominating by that time. However, we are comparing beads coming from English sources in this case, with beads from Spanish sources at Santa Elena. Beads such as those from the cremated bead pits at Santa Elena and Fort San Felipe may well have remained in use in a black context longer than on English sites reflecting the Indian trade.

Two beads are of particular interest, the early faceted chevron bead (38BU162J-111B) and the tumbled blue chevron bead (38BU162J-57A), neither of which came from a Spanish context. We had expected to see these sites of the sixteenth century at Santa Elena when we came to excavate there in 1979, but it was not until the 1985 season of excavation that we finally found one whole, type IIIk, faceted chevron bead, and half of a type IVk tumbled blue chevron (Appendix XV), (Fig. 93). Obviously, we are dealing with different cultural phenomena in Spanish settlements such as Santa Elena compared with beads traded to their village from some far distance over some unknown period of time, kept for some unknown time, and finally being buried with

the original or subsequent owner at some distant point in time. Santa Elena, however, represents primarily a Spanish occupation of only twenty years, from 1566 to 1587, with a plantation period occupation occurring two hundred years later. Clearly we need to continue to explore the bead question at Santa Elena in relation to the Spanish occupation and the later plantation period. The discovery of more cremated bead pit features may help to address these question.

Coins

Only one coin, a copper maravedíes, has been recovered from the northwest bastion of Fort San Felipe. A lion appears on one side, with what appears to be a bad imprint of a castle, on the other. Letters "CAS...," and an "...N," appear with the lion, and "...IISA," is seen on the reverse. This coin is illustrated in Figure 97. Three fragments of silver have been recovered from Santa Elena, two with fragments of a mark that may be part of an impressed assayer's official stamp. One of these is a melted blob of silver that was puddled onto a surface and then struck on one side only with a stamp on which a fragment of a castle can be seen, an element in the Royal Arms often seen on coins (Fig. 95). This is a unique coin. A stamped coin fragment and a piece with striations from being melted are seen in Figure 97.

Keys

Two keys have been found, one at Santa Elena in a Spanish midden deposit and the other in the topsoil zone inside Ft. San Felipe. The Santa Elena key (38BU162C-171) has a single hole in a flat surface for suspension (Fig. 98) and is much like a key from sixteenth century Puerto Real (Willis 1984: 181, Fig. 57c) and from a 1554 shipwreck site (Arnold and Weddle 1978: 287; 291, Fig. 64). The Fort San Felipe key (38BU162H-87A) is a fragment but is of the type having a loop for suspension as illustrated in paintings from the late fifteenth and early seventeenth centuries in Figure 98. As can be seen from these illustrations, keys are personal items, carried on the person and are, therefore, dealt with here rather than with architecture, where the locks the keys unfasten are discussed.

Dice

Two bone dice, one whole (38BU162D-63) and one-half of a burned die (38BU162D-5B), were recovered in Santa Elena (Fig. 99). The whole die is somewhat eccentric, not being perfectly square on all sides. The burned calcined fragment has small circles inscribed around a central dot, apparently made with a very small drill bit with pilot point. The whole die was recovered from a Spanish midden pit (South 1983: 14, 24-25) and has small drilled depressions for dots. Dice are considered symbolic of the passion of Christ since one interpretation of "lots" being cast for His garment in the Middle Ages is dice (Sill 1975: 67). This connection is seen in the early sixteenth century painting illustrated in Figure 99.

The fickleness of fate is symbolized by dice. Breaking dice in two (as in the case of the half die) symbolizes a contract between individuals or a renewal of friendship (Cooper 1978: 51). In the sixteenth century, fortune telling books could, with three dice, indicate how an individual's fate and future could be determined (Cooper 1978: 51).

Although dice were not listed in the inventory of goods in Figure 10, there is an interesting reference describing the hunger and need for supplies at Santa Elena for the soldiers and saying that gambling helps them to forget their troubles and "makes them stay quiet in the presidio" (Connor 1925: 315; Lyon 1977). The dice we have found no doubt related to this therapeutic activity in Santa Elena and Fort San Felipe.

PROVENIENCE	Length	Width	Thickness
38BU162C-16A (silver)	22.5 mm	14.5 mm	4.15 mm

162C-195B (silver)	22.5 mm	16.0 mm	4.1 mm

162E-24A (copper)	24.55 mm	23.75 mm	.85 mm

162C-57A (silver)	15.0 mm	12.7 mm	(see Fig. 95)

Figure 97. Coins and fragments from Santa Elena and Ft. San Felipe.

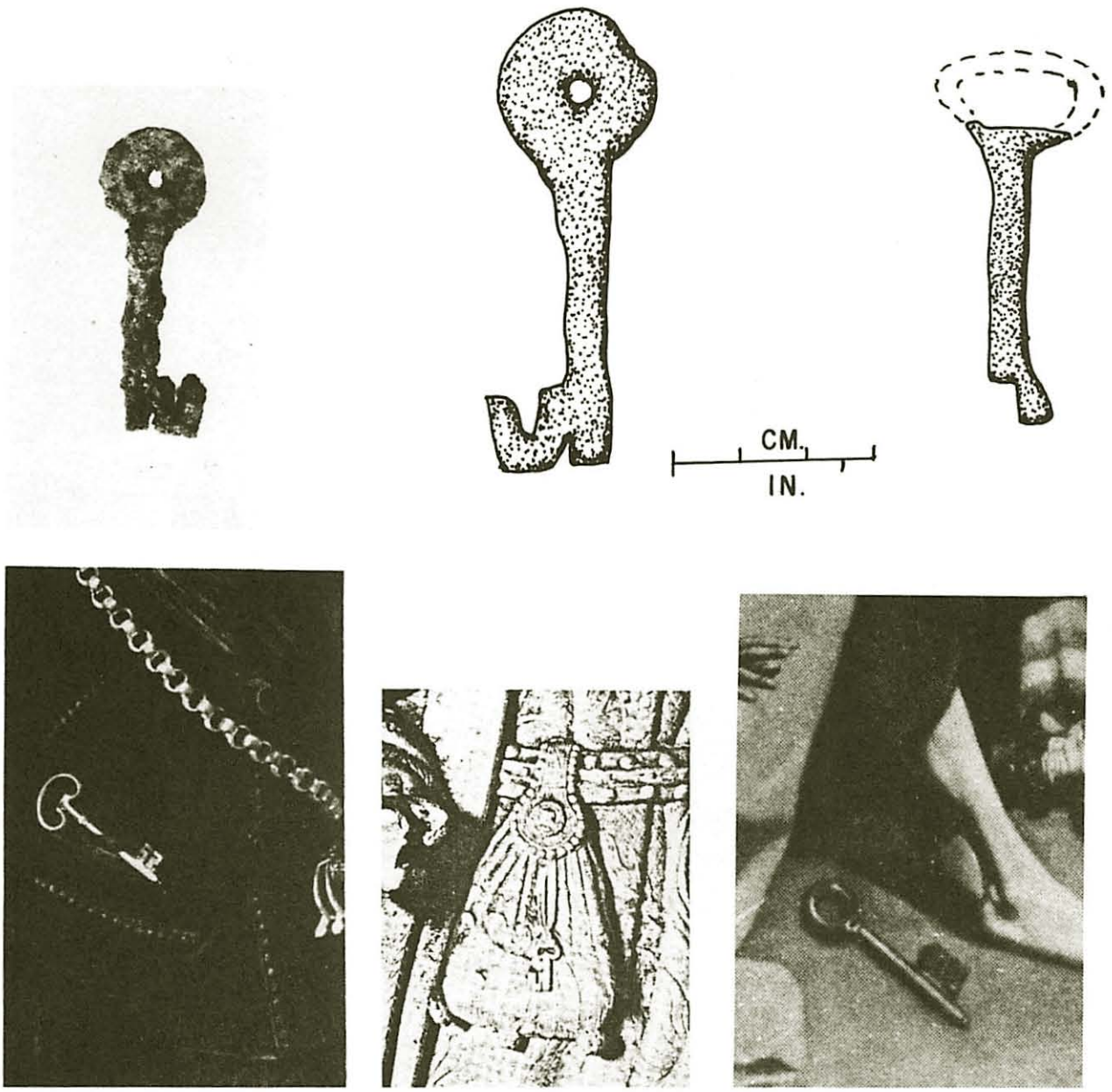


Figure 98. Sixteenth century keys. **Top left:** Santa Elena key, BU162C-171. **Top Center:** View of the Santa Elena key, BU162C-171. **Top Right:** Ft. San Felipe, key, 162 H-87A. **Bottom left:** Key from "Olivares," Velázquez, 1624, surrounded by ball buttons. (São Paolo, Museo de Arte). From López-Rey 1968: Plate 44. **Bottom center:** Key on purse, ca. 1498-99, from "Dignitary," from figure in decorative framework beside "Jesus Bearing the Cross," (Burgos. Cathedral, Trasaltar). From Anderson 1979: 88, Fig. 219. **Bottom right:** Key from "*La venida del Espíritu Santo,*" by Juan Bautista Maino, ca. 1612 (?) (Museo del Prado, Madrid. Photo by Archivo Espasa-Calpe y Mas). From Aznar 1977: 70, Fig. 48.

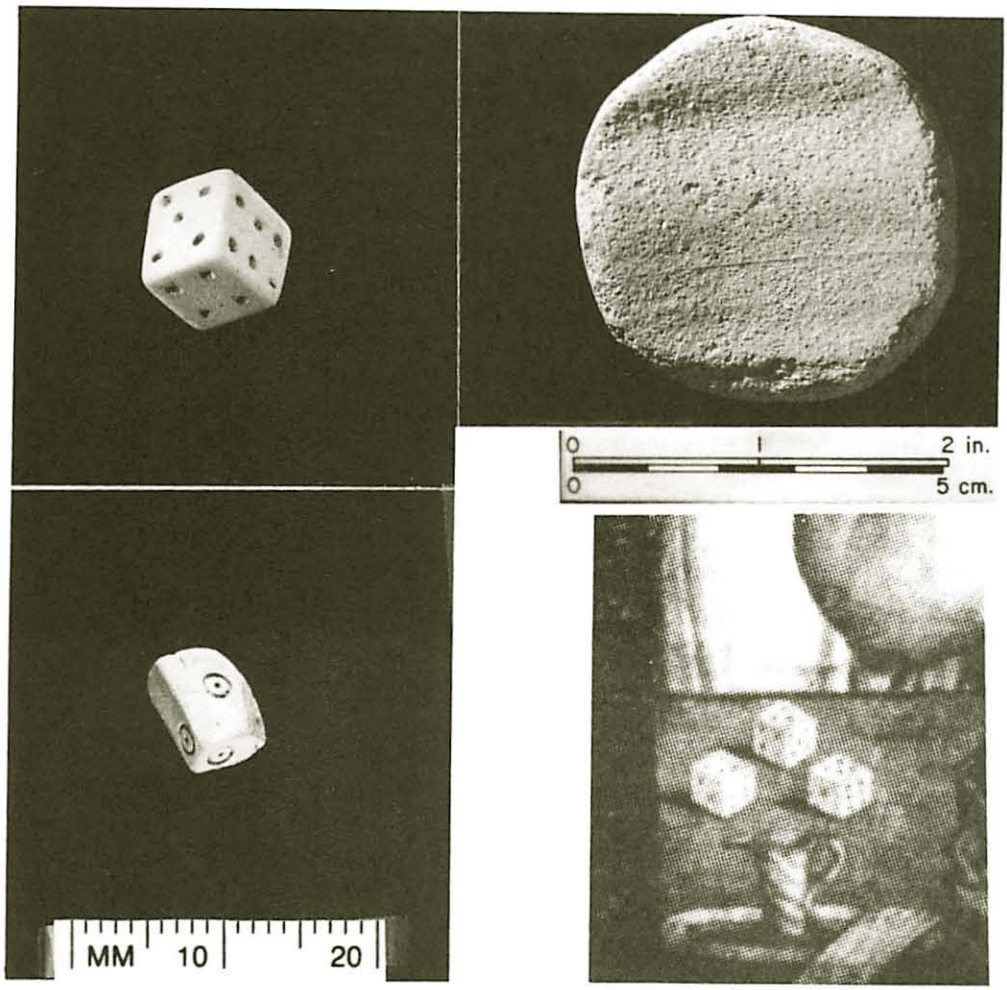


Figure 99. Dice and an olive jar gaming disc. **Top left:** Bone die from Santa Elena, 38BU162D-63. **Top right:** Gaming disc from Ft. San Felipe, 162H-1. **Bottom left:** One-half of a burned bone die from Santa Elena, 162D-5B. **Bottom right:** Dice in "Christ of the Mass of St. Gregory" by Alonso de Sedano, ca. 1516 (Raimundo Ruiz Collection, Madrid). From Post 1970: 344, Fig. 136.

Figure 100. Bone finials from Santa Elena, 162B-36A,162A-2A,162B-58B.

Gaming Discs

Many ground Indian pottery discs are found at Santa Elena in the collection of Indian pottery contemporary with the Spanish occupation (DePratter, this volume). These have often been interpreted as gaming discs for gambling and games of chance since the Indians at the contact period were said to have been inveterate gamblers (Culin 1907: 170, 44-225, 485-488, 510), using peach seeds, bone discs, stone discs, persimmon seeds and European china from earliest contact to the nineteenth century in various games.

Given the above background for the presence of ground pottery discs at Santa Elena and Fort San Felipe, it may well be that such discs of Indian pottery are for gaming. It is of particular interest, therefore, that one of the ground pottery discs found in the topsoil zone at Fort San Felipe (38BU162H-1) was made from a Spanish olive jar sherd (Fig. 99). This may reflect the interest of Indians continuing their use of pottery discs for gaming purposes using Spanish pottery, or it may reveal that the Spaniards had picked up on Indian gaming patterns, since they too were said to be involved in gambling (Connor 1925: 315; Lyon 1977).

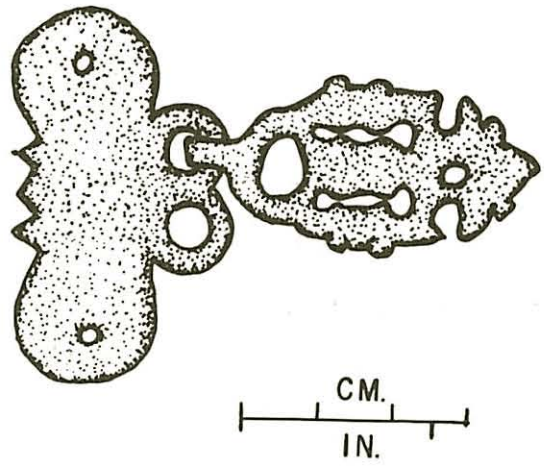
Bone Finials

Three lathe turned bone finials were found in the topsoil zones of the site and so their Spanish origin is in doubt. One is a tapered and grooved finial. Another is a pineapple shape with cross-hatched design and a brass wire through a hole in the basal shaft, apparently to aid in securing it in a socket. The third has a round knob finial with a cylindrical, hollow socket for attaching over a shaft (Fig. 100). One might imagine they are the finial tips of bishop and castle chessmen, but their function is not known. They could date from the plantation period on the site. They are included here in the personal section since the delicateness of their form suggests they were likely associated with a personal function than the other artifact class groups.

Book Hinges

Two flat brass objects are probably parts of hinges for books, though one with double eyes (38BU162E-55) from the northwest bastion of Fort San Felipe may be the end for a strap, to be attached to double hooks on another strap or perhaps to fasten a strap to armor (Fig. 101). The second object (38BU162C-205B) is more ornate and is more likely a book hinge half. These two objects are shown juxtaposed in Figure 101, to illustrate how the loop from one half hooked through the eye of the other to produce a hinge of the type used on books of the era (Fig. 101).

Willis (1984: 187-192) reports on similar book hardware from the sixteenth century site of Puerto Real, Hispaniola, and illustrates a number of examples from engravings of the period. These objects are included here with the personal group of artifact classes since a book, like a key or dice, is a personal type object, though it might well relate to religion since many books of the period were connected with the church.



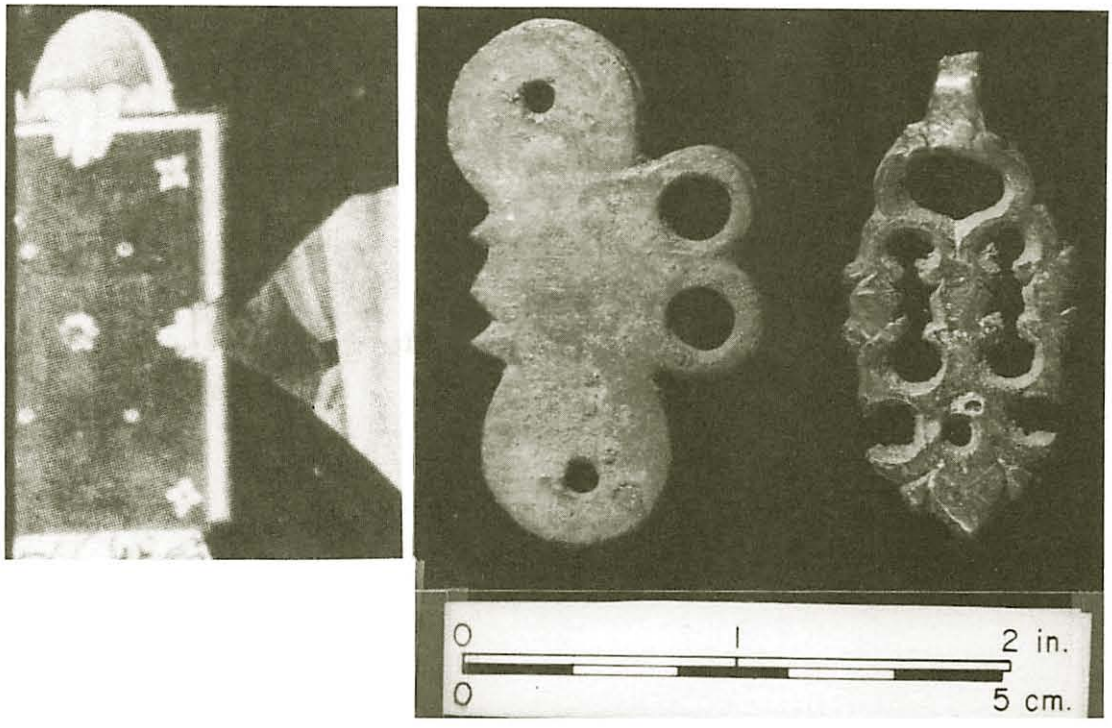


Figure 101. Brass book hinges. **Top:** Female and male hinge halves, not mates, but placed here to reveal the manner in which such hinges functioned on books. Left, from Ft. San Felipe 162E-55. Right, from Santa Elena 162C-205B. **Bottom left:** Book shown in "St. Dominic" by Juan de Zamora (?), ca. 1526-1565 (Díaz Molero Collection, Seville. Photo. Archivo Mas). From Post 1970:127, Fig. 42. **Bottom right:** Cast brass hinge halves. Left, 162E-55. Right, 162C-205B.

THE TOBACCO PIPE GROUP OF ARTIFACT CLASSES

Tobacco pipes were obviously not part of the Spanish colonial material culture since none except Indian pipes were found at Santa Elena and Fort San Felipe. Fragments of boat- shaped Indian-made tobacco pipes were found and these are reported in Part III of this report. The Spaniards apparently used cigars, a habit adopted from Indians in the Caribbean, in strong contrast to the English who quickly adapted to Indian-made pipes and soon began to imitate them with pipes of their own.

CHAPTER 8

THE ACTIVITIES GROUP OF ARTIFACT CLASSES

Introduction

Some artifact classes reveal a variety of behavioral activities reflecting the processes involved in establishment and operation of a colonial frontier city such as Santa Elena. Activities such as agriculture, basketmaking, brassworking, fishing, hardware relating to various activities, Indian relationships, maritime activity, well-digging and woodworking are seen in the artifacts used, and the by-products resulting from them. I have called this the Activities Group of artifact classes (South 1977: 92-99).

The Kitchen Group artifacts deal with the procurement, consumption, breakage and discard of artifacts relating to food preparation. The Architecture Group artifacts involve objects related to structures. The Furniture Group of artifact classes deals with furniture within the structures, the Arms Group with arms and the Clothing Group with clothing. The Activities Group of artifact classes deals with a more diverse set of functions reflecting a wider range of activities than do the other artifact groups.

Agriculture

Evidence of corn agriculture was found at Santa Elena in the form of burned corncobs, both the 12 row Mexican variety and the eight row type more typical of the Southeast (Fig. 102). These have been previously reported in South (1980: 15-18). This is not surprising since a document indicates that corn from Yucatan was being imported by the Spanish to Santa Elena by way of Havana (Lyon 1976: 157). Such evidence is not included in the classification of artifacts as such, but we mention agricultural remains such as seeds, because of their important subsistence role.

Wheat and other subsistence items in the form of seeds have been recovered from Santa Elena: watermelon, squash/pumpkin, persimmon seeds, and even the larvae case of a roach (Fig. 102). The plant remains are not a part of this report, but are reported by Gardner in South (1980 and 1982), and by Scarry in South (1983, 1984, 1985a). The burned corn-on-the-cob remains and cornless cobs have been reported by Cutler in South (1980). It should be mentioned that roach egg cases and other organic material from sixteenth century context have been reported in Arnold and Weddle (1978: 264-265).

Viticulture

Many ditches were found at Santa Elena, some intruding on Spanish features and some intruded on by Spanish features. These ditches are parallel to one another about five feet apart and twelve to eighteen inches wide. They have been interpreted as vineyard ditches reflecting the viticulture of the Spaniards at Santa Elena (South 1980, 1982, 1983, 1984, 1985a, 1986). In one such ditch the handle for what has been interpreted as a pruning shears was discovered (South 1980: 13-15), (Figs. 15 and 90).

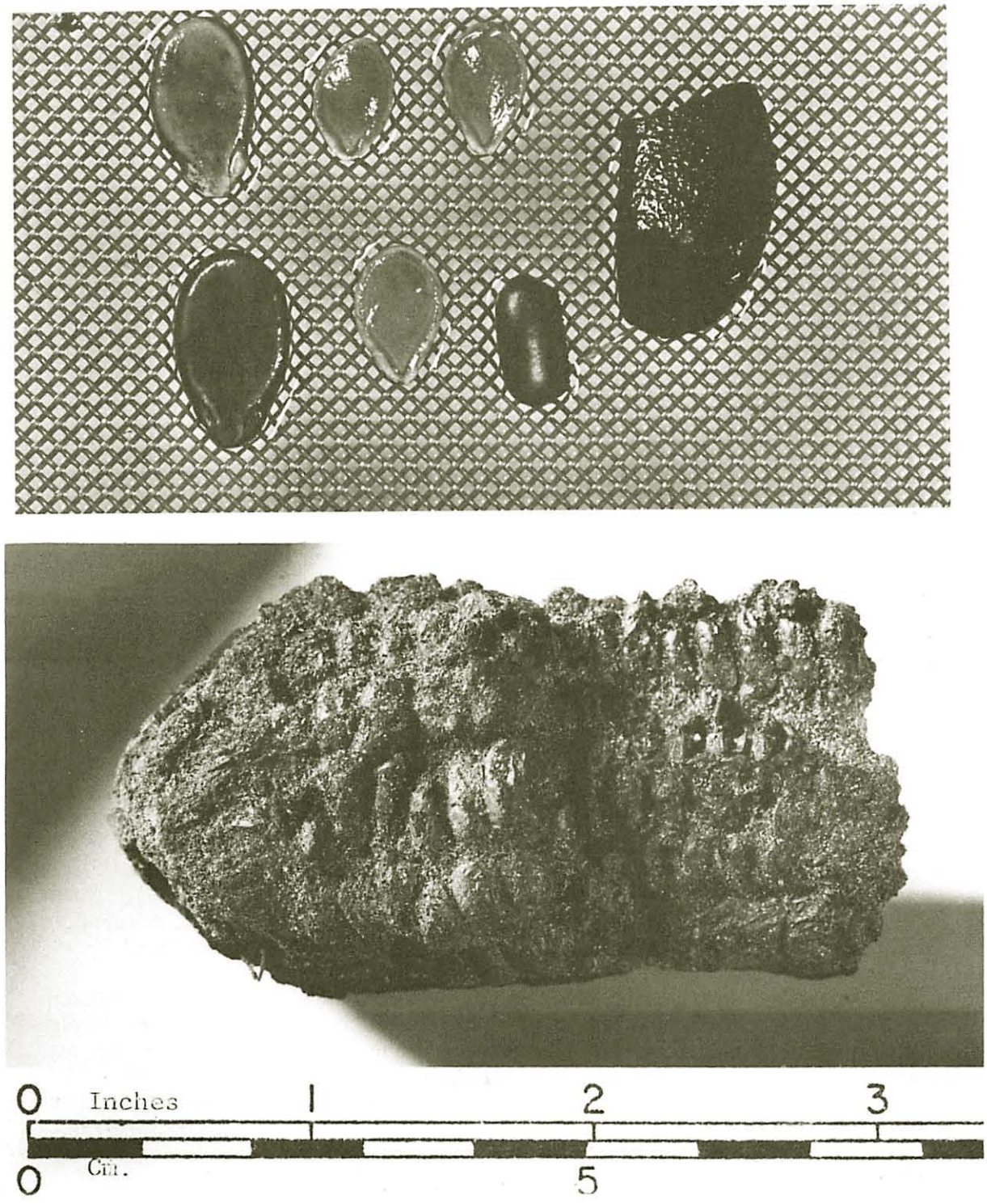


Figure 102. Seeds and Mexican corn. **Top:** Watermelon seeds *(Citrullus vulgaris)*, squash/pumpkin *(Cucurbita pepo)* seeds, the larvae case of a roach, and a persimmon seed *(Diospyros virginiana)* from the north well of Ft. San Felipe, 162H-217H. **Bottom:** Mexican corn-on-the-cob from, 162A-73, the Spanish hut.

The vineyard ditches are characteristically filled with dark humus containing artifacts and midden from the refuse placed in them to provide a rich humus deposit in which the vines could flourish. This is in accord with a description of how such vineyards were planted (Saint Pierre 1772). St. Pierre said in 1772 that vineyard ditches should be gradually filled with humus and offal over a period of a year so that the vines will be richly nourished and deeply rooted. Apparently, the Santa Elena ditches were similarly planted two centuries earlier. When Father Juan Rogel visited Santa Elena in 1568, he reported seeing thriving vineyards there (Lyon 1976: 204). A woodcut dating from 1568 by Jobst Amman (Lehmann-Haupt 1976: Plate 1) illustrates a vintner at work in the vineyard (Fig. 103). Nearby is his spade for digging the ditches and stakes for holding the vines.

Hunting and Gathering and Animal Husbandry

Oystershells, fish bones, shrimp remains, mammal bones, etc., have been recovered in some quantity from refuse deposits at Santa Elena and Fort San Felipe and have been reported by Reitz in South (1980, 1982, 1983, 1984, 1985a). Insight into subsistence strategies, status and diet are coming from these analyses (Reitz and Scarry 1985), as well as other valuable data of the type not revealed by artifacts alone. In the present study, however, our emphasis is on the man-made artifacts relating to various activities rather than on the subsistence and exploitative strategies relating to survival in the environment of Santa Elena as seen in the plant and animal remains.

Basketmaking Awls

Two bone awls, such as those used in basketmaking or net making, were found in Fort San Felipe. These are illustrated in Figure 103. They are not necessarily Indian in origin but could relate to anyone involved in making baskets.

Metalworking

Many fragments of sheet copper and brass were found, some riveted together by copper rivets (Figs. 104-106). The thickness of the fragments varies from .5mm to 1.8mm. The average thickness is .8mm. The cut fragments of scrap indicate that the metalworking of sheet copper and brass was taking place on the site. One feature (38BU162D-124) contained a large quantity of such metalworking by-products (South 1983: 17-21). This feature also contained copper stars and the by-products of their manufacture, revealing that these objects were made in Santa Elena.

Brass discs (Fig. 68) used to make quilted armor jackcoats *(escaupiles)* also appear to have been made locally, perhaps by the same metalworker. A clue to this is found in the hammered dome of the octagonal brass discs and in the hammered dome on the rectangular brass plate (Figs. 104 and 105). These may have been made on a small iron anvil shaped object (38BU162C-236) illustrated in Figures 106 and 129. The sheet brass objects may well have come from brass kettles such as the one from the early seventeenth century in Figure 106.

The manufacture of *escaupiles* (jackplates for quilted armor coats) and copper stars and rectangular metal plates (probably also for jackcoats) in Santa Elena by a metalworker produced considerable scrap sheet copper and brass fragments in the area of the domestic occupation.

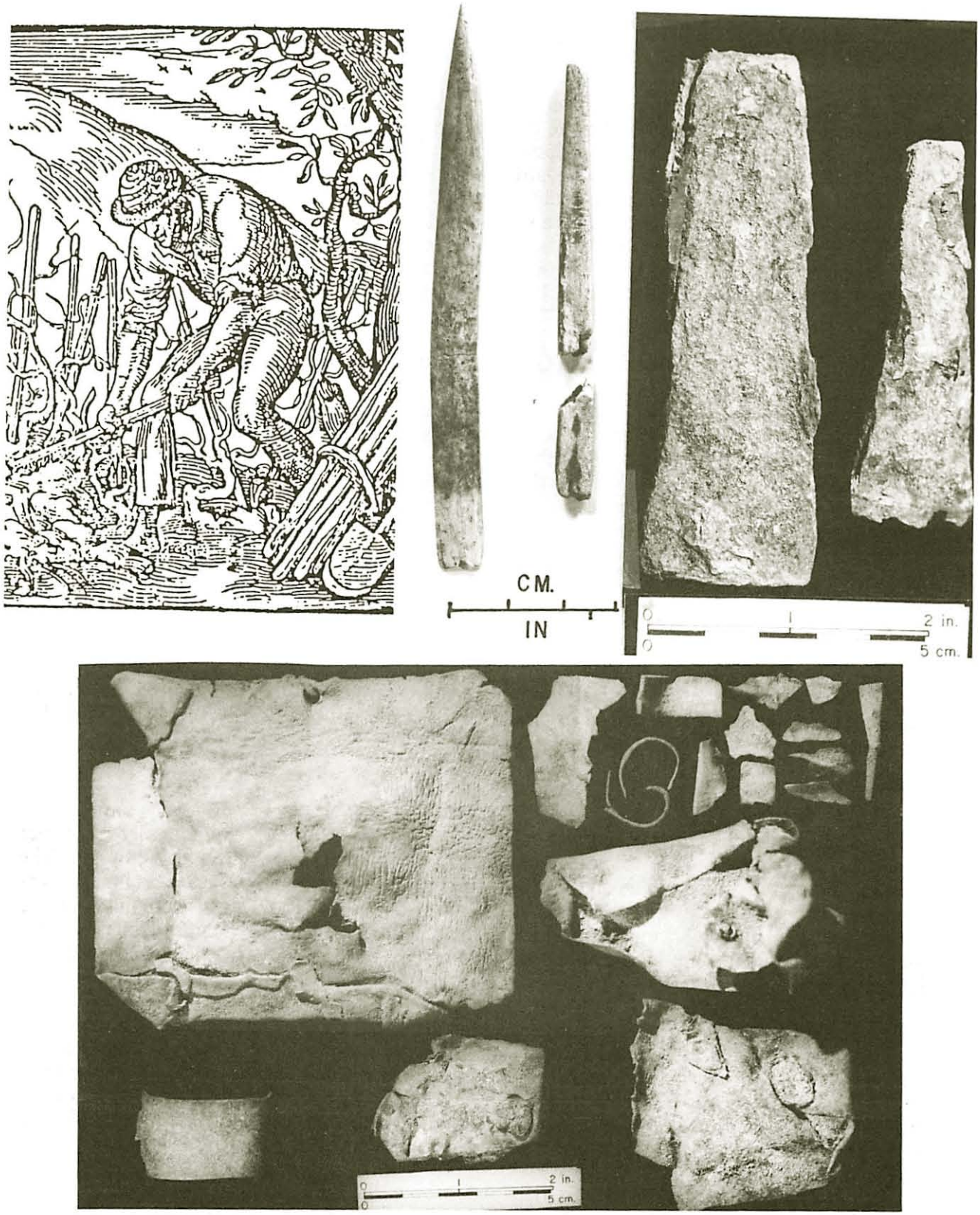


Figure 103. A sixteenth century vintner at work and bone awls such as are used in basket making. **Top left:** "Vinitor" by Jobst Amman, 1568. From Lehmann-Haupt 1976: Plate 1. **Top center:** Bone awls from Ft. San Felipe, 162G-202B, 162G-225.

Figure 104. Iron wedge and chisel and metalworking by-products. **Top right:** Iron wedge, 162-103B and chisel, 162C-201B. **Bottom :** Left, brass plate, 162D-18B. Top right group, scrap by-products, 162D-124. Right center, 162A-64. Bottom row, metal band and riveted fragments, 162D-124, 162G-175, 162D-124.

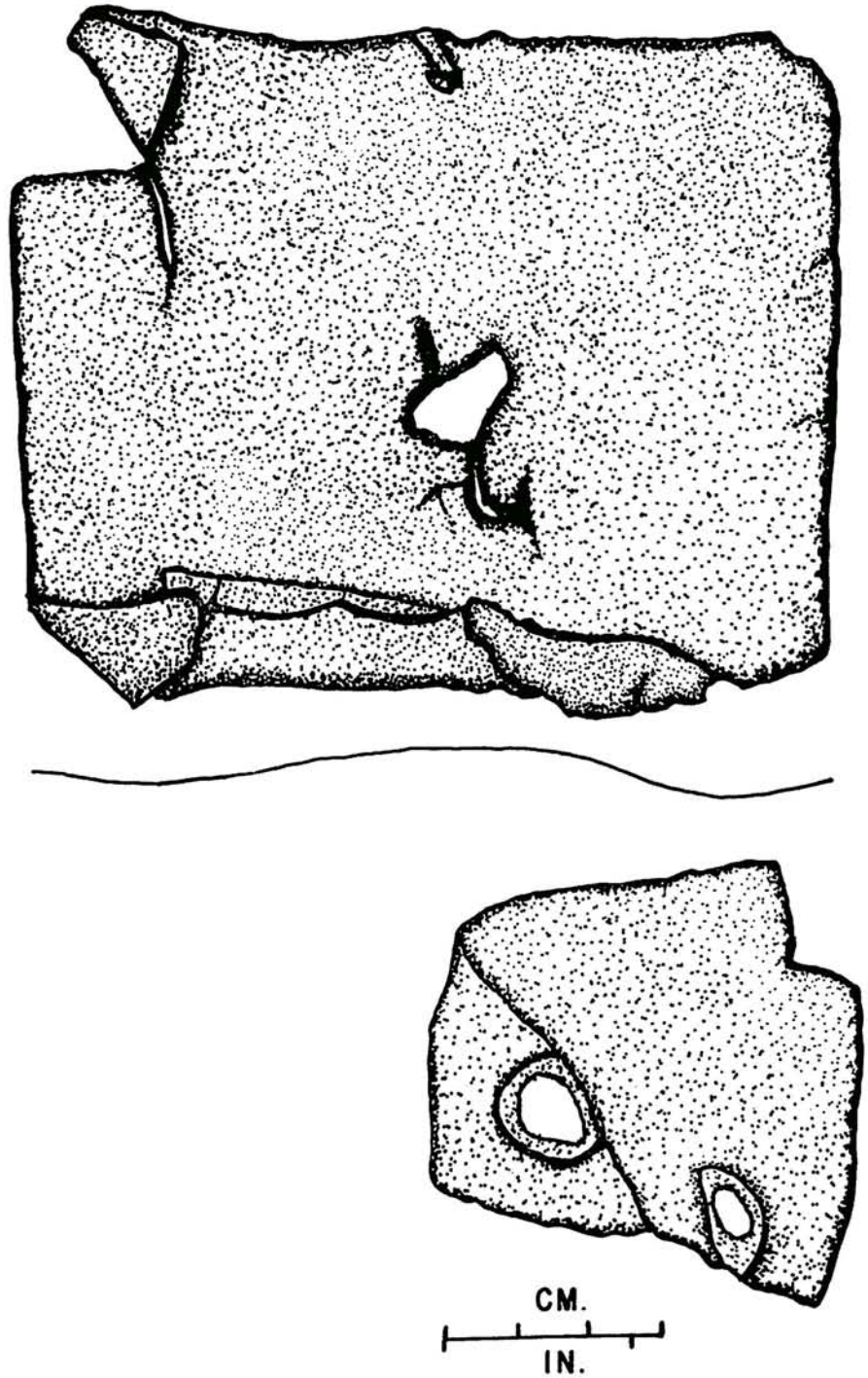
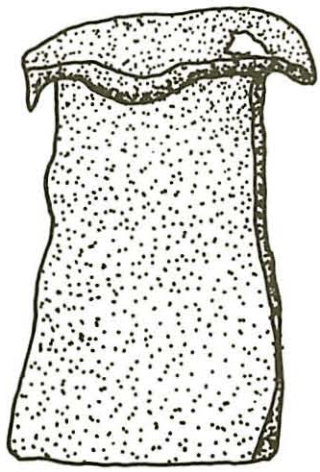


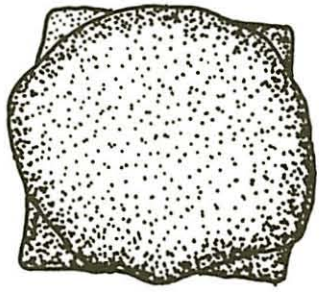
Figure 105. Metalworking fragments.
Top: Plan and profile of hammered brass plate with slight dome in center, 38BU162D-18B, 1.0-1.5 mm thick. **Center:** Riveted fragment, 162D-124, .8 - 1.0 mm thick. **Bottom:** Riveted fragment, 162C-175, .5 - 1.0 mm thick.

38BU162C-236

This object appears to be an iron anvil with a battered head, possibly used to hammer brass and copper objects. The height is 58.5 mm, weight 42.15 grams, with the base measuring 37.0 by 36.15 mm.



Top view of the anvil showing shape of the head in relation to the base.



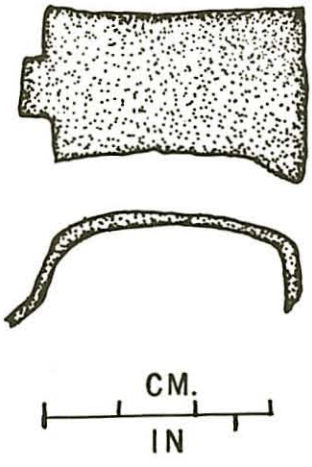


Figure 106. Metalworking objects **Top:** Side view of anvil, 38BU162C-236. **Center:** Top view of the anvil. **Bottom left:** View of brass kettle from "The Cook" by Velázquez, 1618 (The National Gallery of Scotland, Edinburgh). From Troutman 1967: 36, Plate 4. Such kettles may well have been the source of the brass being used to make jack plates and other objects. **Bottom right:** curved brass strap, plan and profile, 162D-124, 1.5 - 1.8 mm thick.

Fishing

Fishing activity from the use of lines and nets to catch a variety of seafood and the gathering of oysters has been well documented at Santa Elena and Fort San Felipe through faunal remains (Reitz in South 1980, 1982, 1983, 1984, 1985). Lead sinkers from line fishing and coils of lead, thought to have been used to wrap around the mesh of fishing nets, have been recovered at Santa Elena and Fort San Felipe along with two iron fishooks (Figs. 107-109).

Hooks and lead weights are mentioned in the inventories of material goods in Spanish Florida (Fig. 10). The lead curls are interpreted as fish net weights though there is no documentary evidence for this conclusion.

Hardware from Various Activities

Chisels and Wedges

Iron chisels with tapered sides and wedges with parallel sides have been recovered from Santa Elena but none from the military context at Fort San Felipe (Figs. 104 and 110). These iron objects are of particular interest in that chisels and wedges were mentioned in a list of trade materials distributed to Indians by Juan Pardo in 1567-68 (DePratter and Smith 1980: 72). This is one function of these objects, so they could be included with the Indian related objects. We have included them here since they may also have functioned in Santa Elena in other contexts, since chisels were listed on the inventory of goods in Spanish Florida (Fig. 10).

Some of the chisels and wedges traded by Juan Pardo have been found in areas from "the upper Coosa River drainages of Alabama and Georgia to the Little Tennessee River drainage of Tennessee" (Smith 1975, 1976 and 1977), as quoted and illustrated in DePratter and Smith (1980: 75). They were, according to DePratter and Smith, intended particularly for distribution to the Indians (1980: 76).

Cotter Pin Shaped Hinges

A number of cotter pin shaped objects of iron were recovered from Santa Elena and Fort San Felipe. Some of these were interlocked and as such served as hinges for large ledgers, lids, doors, etc. (Figs. 111-114). Willis (1984: 181-183) reports such hinges from Nueva Cadiz and from the sixteenth century Spanish site of Puerto Real, Hispaniola. One of the cotter pins was attached to what appears to be a hasp (Fig. 113). These items might well have been included in the architecture section, but we have included them here since they may have functioned in different ways.

Chain Links

Two iron links with circular ends and one hook with a circular end were recovered in Santa Elena (Figs. 115 and 116). These looped links and hook are similar to links on a scale seen in a Caravaggio painting of around 1582 showing a butcher shop scene (Fig. 115).

Iron Discs and Rings

Iron discs, two with square central holes, were recovered from Santa Elena (Figs. 114 and 117). Those with square holes are slightly concave and are reminders of hand guards for fencing foils. Other ring shaped, wrought iron objects are similar to iron washers for wheeled vehicles and broken, half crescents are apparently from similar flat, iron rings (Figs. 114 and 118).

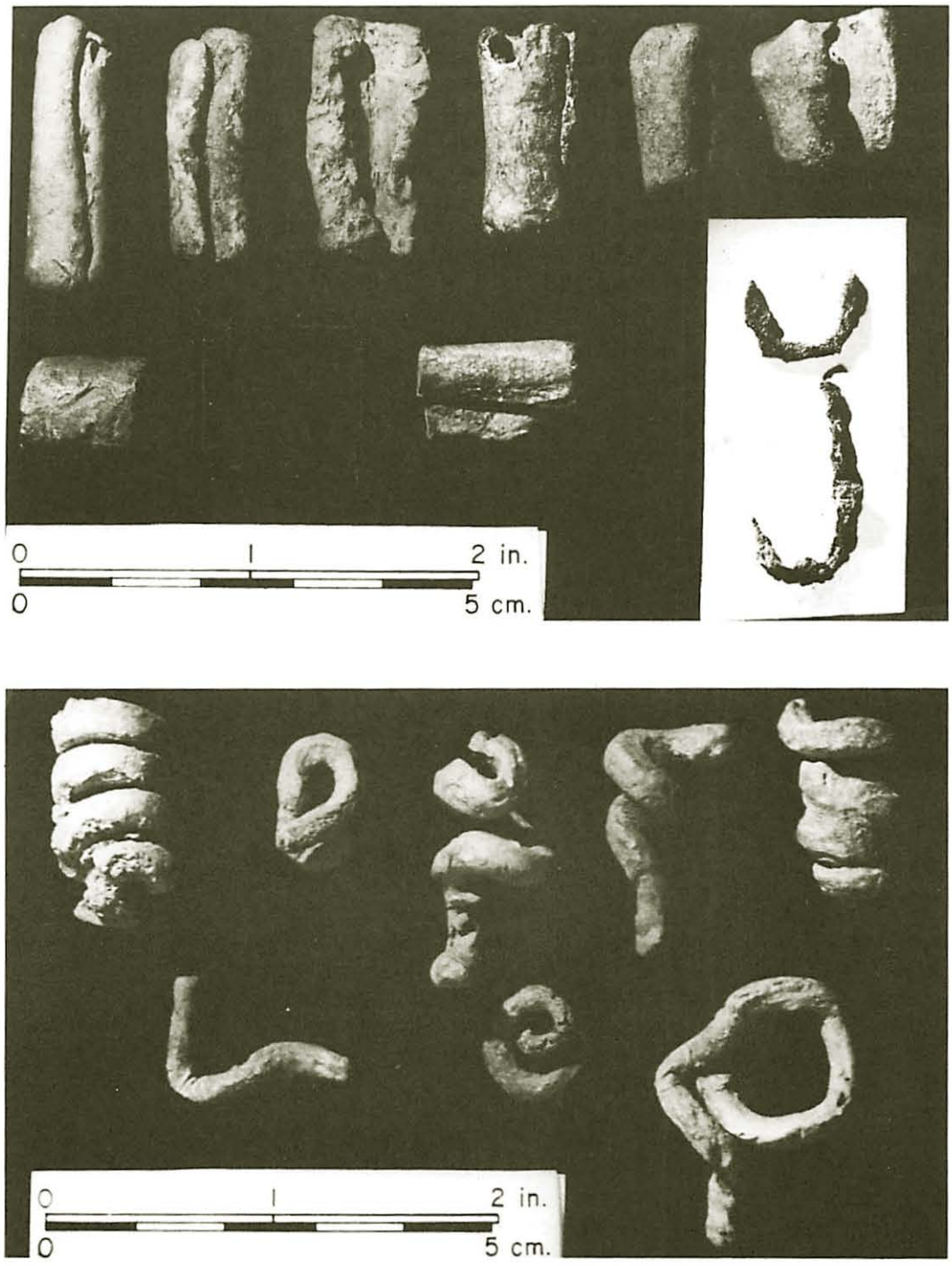


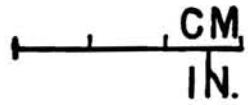
Figure 107. Fishing weights, hooks and curls. **Top:** Lead line weights, 162-8B, 162G-69A, 162C-175, 162H-79A, 162H-333E, 162C-143A. **Row 2:** 162G-269, 162C-156A. **Right:** Fishhooks, top, 162G-173. Below, 162D-71. **Bottom:** Lead curls, probably used to provide weight on fish net cords, top, 162C-265, 162C-171, 162C-140B, 162C-2A, 162C-297. Below, 162C-2A, 162H-112A, 162C-171.

38BU162D-71
Single barb fishhook
Length 22.8 mm
Wire dia. 1.95 mm

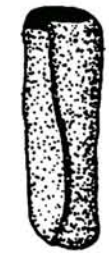
162G-173
Double barb fishhook
Length of frag. 11.2
Wire dia. 2.10 mm

162J-71A

162G-247A



38BU162-8B



162G-69A

162H-79A

162C-175

162C-143A

162H-333E

162C-156A

162G-269

Figure 108. Drawings of lead sinkers and hooks.

PROVENIENCE	Lead width range	hole width range
38BU162C-265	4.0 mm	3.5 mm
162C-257	4.0 - 5.0 mm	3.0 mm
162-140B	4.0 - 4.8 mm	-
162C-2A	4.0 - 4.8 mm	-
162C-171	3.0 - 3.5 mm	-
162H-112A	3.0 - 3.5 mm	-
162C-171	3.5 - 4.0 mm	-
162C-2A	3.1 - 4.0 mm	-

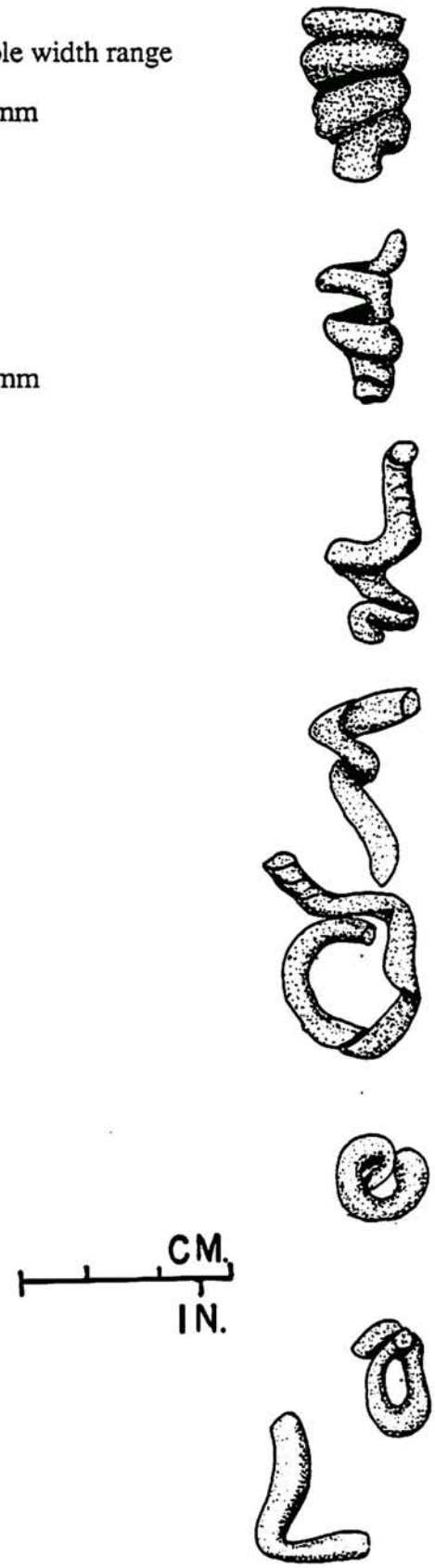


Figure 109. Lead curls, probably used as fish net weights.

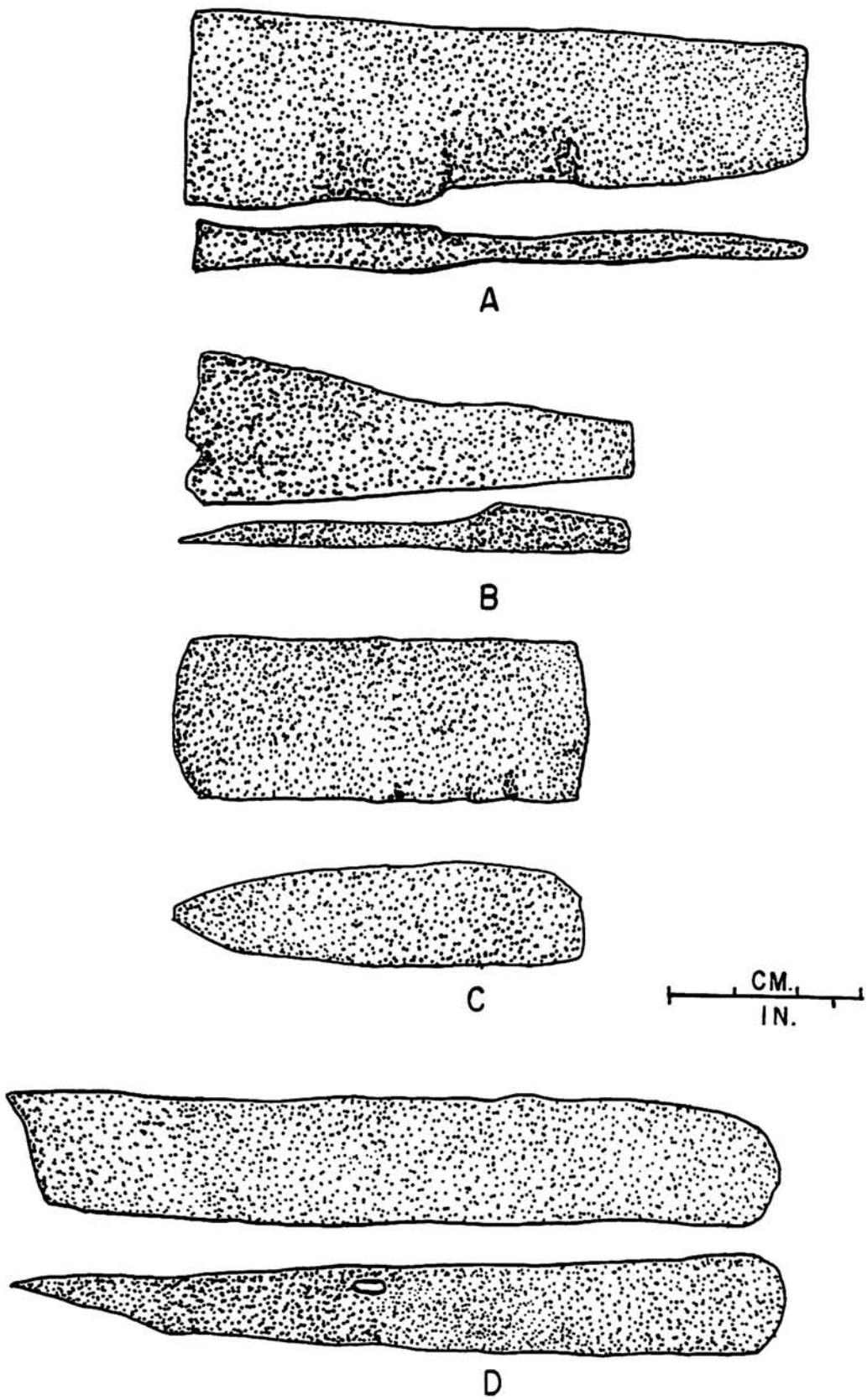


Figure 110. Iron chisels and wedges. (Plans and profiles) **A:** Chisel, 38BU162-103B. **B.** Chisel, 162C-201B. **C.** Wedge, 162C-135B. **D.** Wedge. 162J-106A.

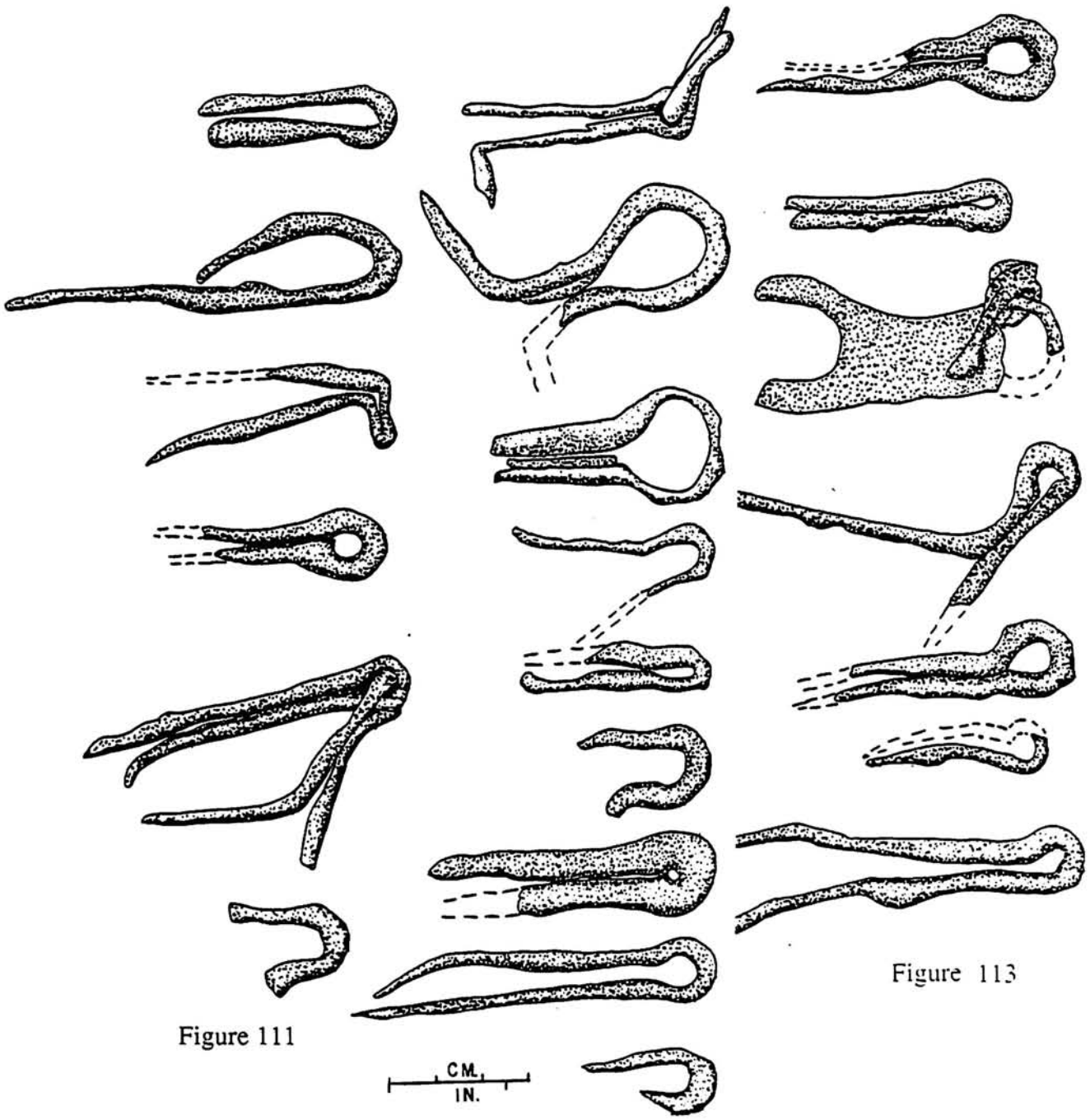


Figure 111

Figure 113

Figure 112

Figures 111 - 113. Iron cotter pin shaped hinge parts. **Figure 111:** (top down) 38BU162C-288, 162C-301 , 162D-66, 162D-118, 162E-38C (interlocked staples to make hinge, 162G-149. **Figure 112:** (top down) 162C-362 (interlocked staples to make hinge), 162C-218B, 162D-5B, 162D-6B. 162G-241A, 162G-172A, 162H-81A, 162H-261, 162J-67A. **Figure 113:** (top down) 162-95B, 162C-172, 162C-196B (cotter pin attached to hasp), first 3 are from 162C-265, 162C-144B.

Figure 114. Cotter pin hinge parts and iron discs and rings. **Top row:** Cotter pin shaped hinge parts, 38BU162-95B, 162H-261, 162C-144B, 162C-218B, 162D-5B, 162C-265. **Row 2:** 162C-172, 162C-265, 162C-362 (interlocked pins to make hinge), 162E-38C (interlocked pins to make hinge). **Row 3:** Iron washers, 162C-362, 162A-127, 162C-90. **Row 4:** Iron discs, 162D-19B, 162D-66, 162C-288.

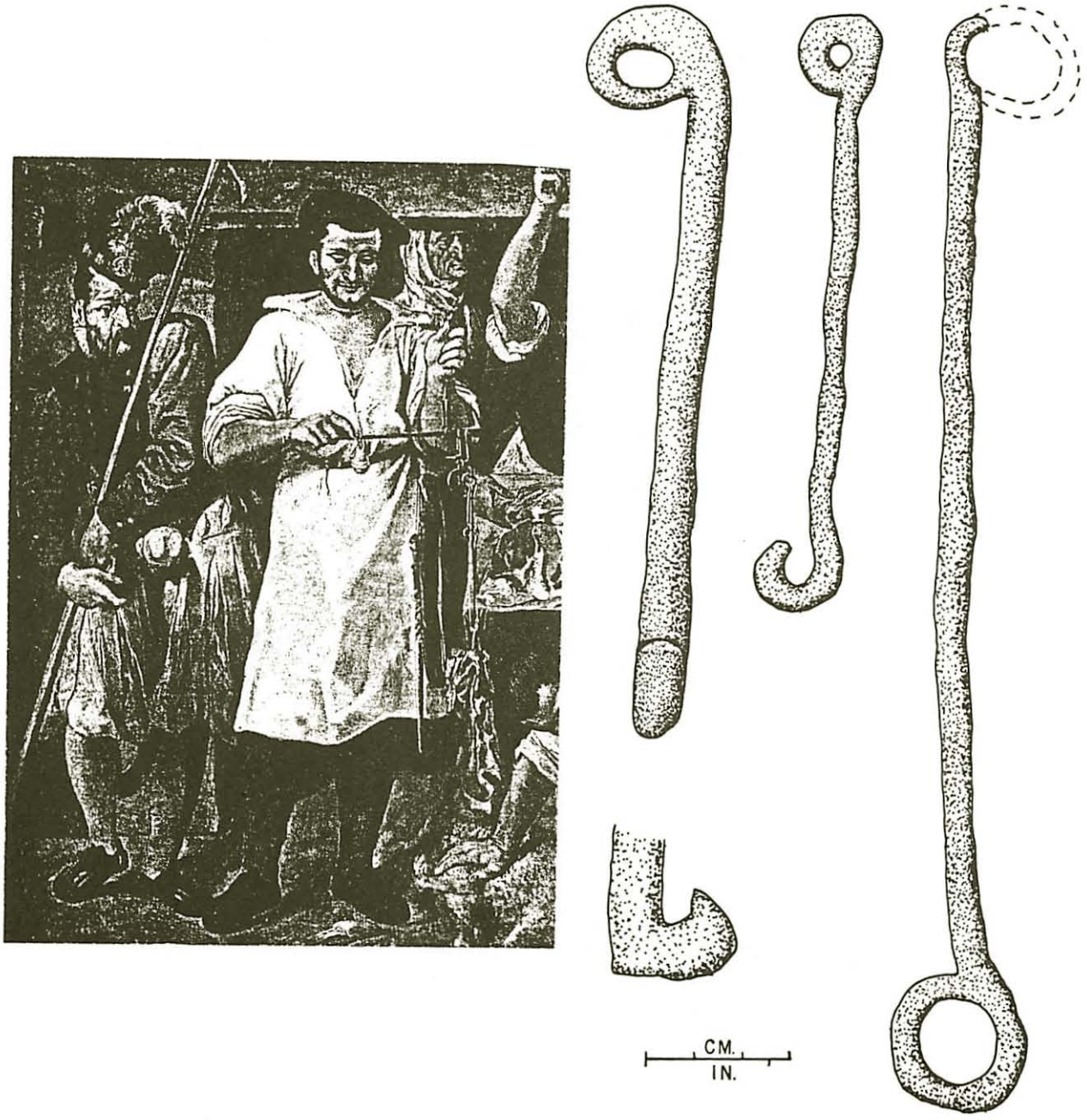


Figure 115. Iron chain links and hooks. **Left:** Scene from "The Butcher's Shop" by Annibale Caracci, ca. 1582, showing chain links and hook on scales for wei ghing meat (The Governing Body, Christ Church, Oxford). From The Metropolitan Museum of Art 1985: 112. **Right:** Iron chain hook and links. Hook with side view of end at bottom (left) 38BU162D-72. Iron chain link (center) 162C-196B. Iron chain link (right) 38BU162C-316.

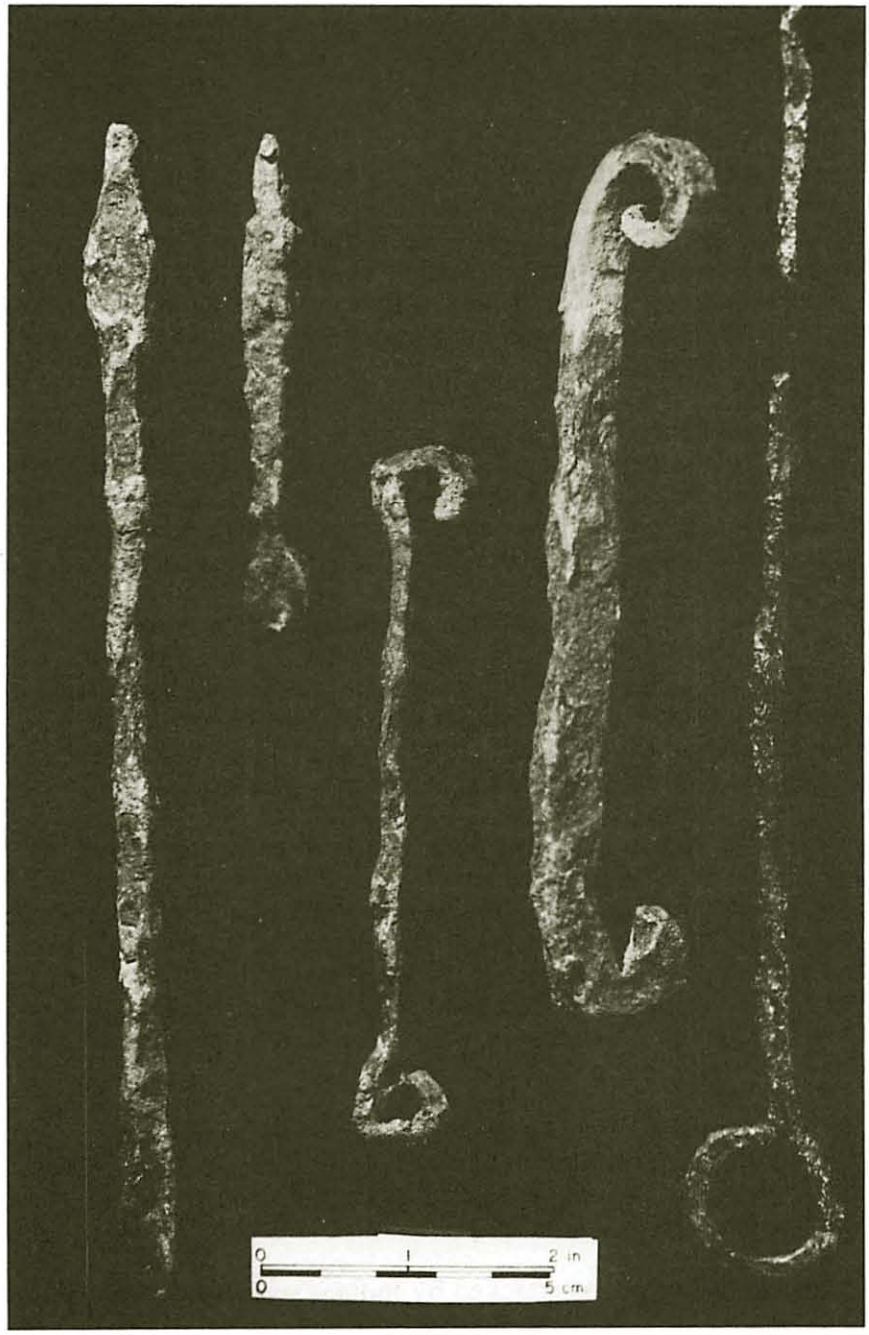


Figure 116. Auger bits and chain links. (left to right) Pod auger bit, 38BU162C-236. Small bit, 162H-90A. Chain link, 162C-196B. Hook, 162D-72. Chain link, 162C-316.

Miscellaneous Hardware

The broken tip of a square iron stake, a "Y" shaped object broken from a round shaft and a tang with a "U" shaped hook on the end were among the miscellaneous iron objects recovered (Figs. 119, and 129).

Whaling

A flat object with a long flat offset handle, looking much like an iron egg turner, was present in Fort San Felipe (Figs. 70 and 119). This has been identified by archaeologist, Alan Albright, as a flensing knife used to strip blubber from whales, an activity pursued by Spaniards from the Basque Provinces of Spain. This has been demonstrated by the archaeology conducted on the wreck of the *San Juan*, a Basque whaling vessel which sank at Red Bay, Labrador, in 1565, from which barrels or casks similar to those from Santa Elena have been recovered (Ross 1980; Ringer 1983).

Among Pedro Menéndez de Avilés' goods in Fort San Felipe on March 23, 1576, were two large copper vessels (*ollas)* "to render whale blubber" (ACR *Canalejas,* Roll 81, *Lejao* 10. Inventories: 1545-1755. No. 2 (Images 0040-0042). The flensing knife is entirely in keeping with the vessels for rendering whale blubber relative to the whaling industry. The presence of archaeological and historical evidence for whaling at Santa Elena certainly gives room for thought.

Spanish-Contemporary Indian Artifacts

The presence of Indians contemporary with the Spaniards at Santa Elena and Fort San Felipe is dramatically revealed in the Indian pottery, which is present in amounts equal to the Spanish imported pottery (South 1980, 1982, 1983, 1984, 1985a, 1986). The Indian pottery taxonomy is presented as a major part of this report in a later section by Chester DePratter.

Other objects of Indian manufacture are also present, such as shell beads, two arrowheads and a fragment of cut mica (Fig. 83). Seven drilled shell beads were found in two features at Santa Elena, six in Feature 38BU162C-293, which was a Spanish midden feature. Three of these were barrel-shaped and three were disc beads (Fig. 83). The size range is from 4 to 6 mm in width and from 1 to 2.5 mm thick. The barrel beads are more uniform: 3 by 3 mm in width and length. All beads have a hole 1 mm wide. One bead from Feature 105 is made from a drum fish tooth. This bead is 3 mm wide and 2.5 mm in length, with a hole 1 mm wide (Fig. 83), (South 1982: 56-58).

Twenty disc type shell beads were found in a daub processing pit (38BU162H-337) used to construct the blockhouse on the *casa fuerte* site, some time after 1580 (South 1985a: 30). These beads, like those from Santa Elena, are thought to be from Indians associated with the Spaniards at Santa Elena and Fort San Felipe.

Although Santa Elena was attacked by Indians with bows and arrows in 1576, only two triangular chipped stone arrowheads of the type contemporary with the Spanish occupation have been recovered (Fig. 120). This is not surprising since other alternatives to chipped stone arrowheads are known to have been used by coastal Indians.

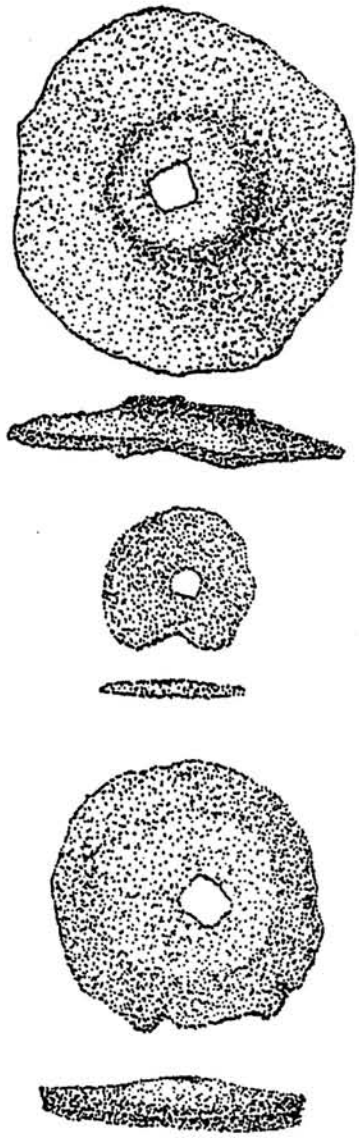
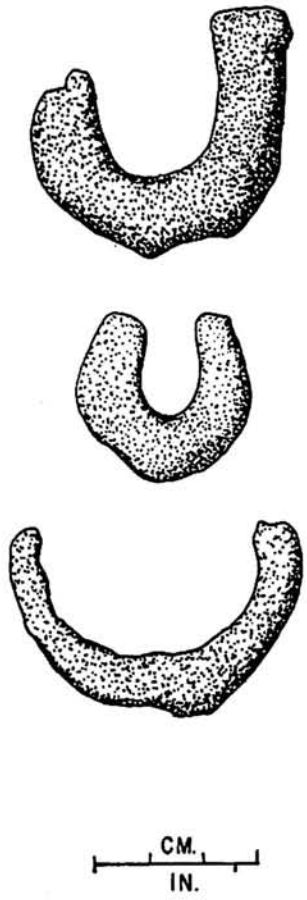


Figure 117.



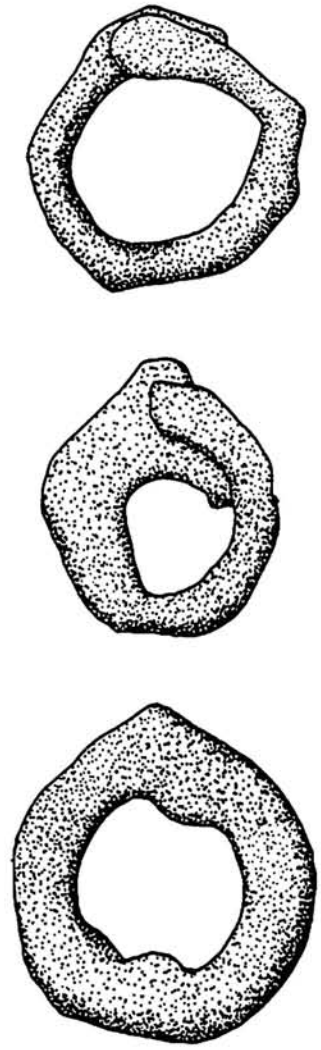


Figure 118.

Figure 117. Iron discs, 38BU162C-288, 162D-19B, 162D-66 (plan and profile).

Figure 118. Iron half-rings, 162C-163B, 162D-2B, 162H-172D (center). Iron rings, 162A-127, 162C-90, 162C-362 (right).

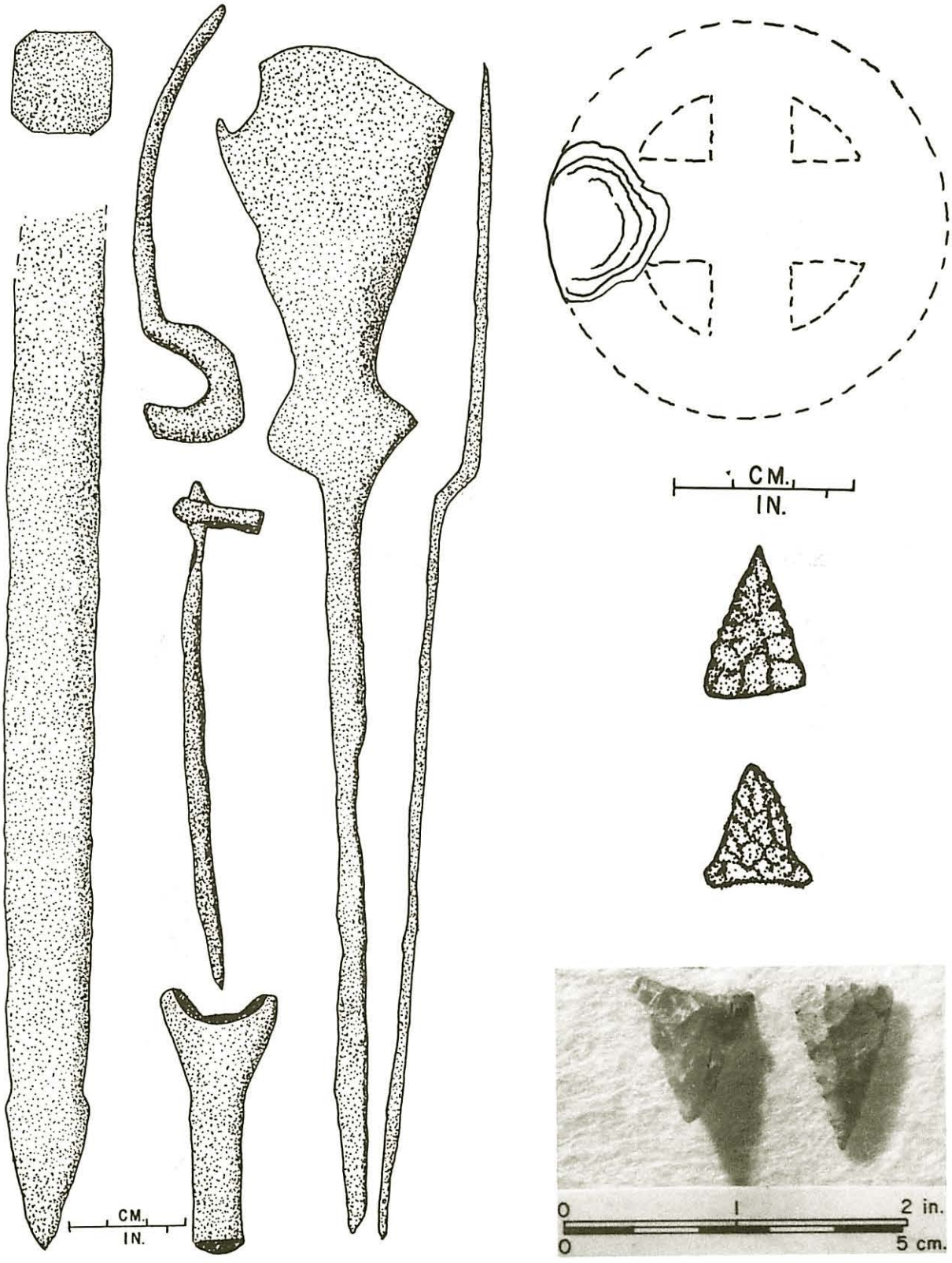


Figure 119. Iron stake, miscellaneous unidentified objects, and flensing knife. **Left:** Iron stake (cross-section at top) 38BU162E-40D. **Center:** Iron object, 162-104B (top), iron bracket, 162D-21B (center), iron "Y" shaped object 162D-27B (bottom). **Right:** Iron flensing knife (plan and profile) 162G-173.

Figure 120. Indian artifacts. **Top:** Cut mica fragment, probably from a cross-in-circle disc 162E- 37C. **Center and below:** Arrowheads (top and right below) 162E-40D, (bottom and left below) 162D-11A.

In the C-level of the moat of the northwest bastion, a cut fragment of mica was found, apparently part of a cut circular disc (Fig. 31). Mica discs with central crosses are well known artifacts of the Southeastern Indian cultures at the time of first European contact. A cache of 30 mica discs were recovered from Kershaw County, South Carolina, from a Mississippian period time frame, all with the cross within a circle motif (Peck 1984: 43-45). The fragment from the Fort San Felipe moat is interpreted as a fragment of such a mica disc (Figs. 31 and 120). Since Juan Pardo traveled from Santa Elena to the interior of South Carolina, into North Carolina and over the mountains to the Cherokee nation, such mica discs may well have been among the items brought back by him from his travels among the Indians (DePratter, Hudson and Smith 1983: 125-158).

Maritime Activity

The tip of a boat anchor fluke was found in the bottom of the moat of Fort San Felipe (38BU162E-39E), (Fig. 121). This is from an anchor typical of Spanish make of the fifteenth and sixteenth centuries (Moriarty and Marshall 1965: Fig. 10), (Fig. 121). The primary contact with the mother country and the rest of the world in the sixteenth century was, of course, through maritime channels. This anchor tip is one of the few artifacts symbolic of this contact with the world cultural system through ships.

Well-digging

Barrels

Four wells, one found in Santa Elena and three inside Fort San Felipe, reveal the Spanish well-digging activity to provide water for the settlement. Three of the wells had barrels located below the water table. A barrel from one of these wells was removed intact and the others were backfilled to allow them to continue the natural preservation process that has acted on them for over four hundred years (South 1982: 111-126, 1985a: 35-50). With the ends removed the barrels were used as liners for the wells, with a bucket being lowered inside the barrels to obtain water (See Appendix III for documentation by Lyon of barrels in Spanish Florida).

The oak barrels were bound with iron and wooden bands, with the wooden bands bound with basketry withes to hold the ends in place. The wood, the cork in the bung, the wooden and iron bands and the fragile basketry withes were all beautifully preserved by lying beneath the water for over four hundred years. The barrel that was removed (38BU162-141) is the largest artifact yet recovered from Santa Elena. The purpose in removing the one barrel was to carry out conservation so it could be exhibited in the South Carolina State Museum as a Spanish artifact symbolic of the Spanish toehold on the North American continent on the threshold of conquest. The barrel was removed in 1981 and at this writing the conservation process has not been carried out. The barrel is stored in the original vat it was placed in after excavation.

The relative position of the two barrels necessary to form a well shaft at Santa Elena is illustrated in Figure 122. The barrel is shown in Figure 123 as it looked after removal to the Conservation Laboratory at the South Carolina Institute of Archaeology and Anthropology.

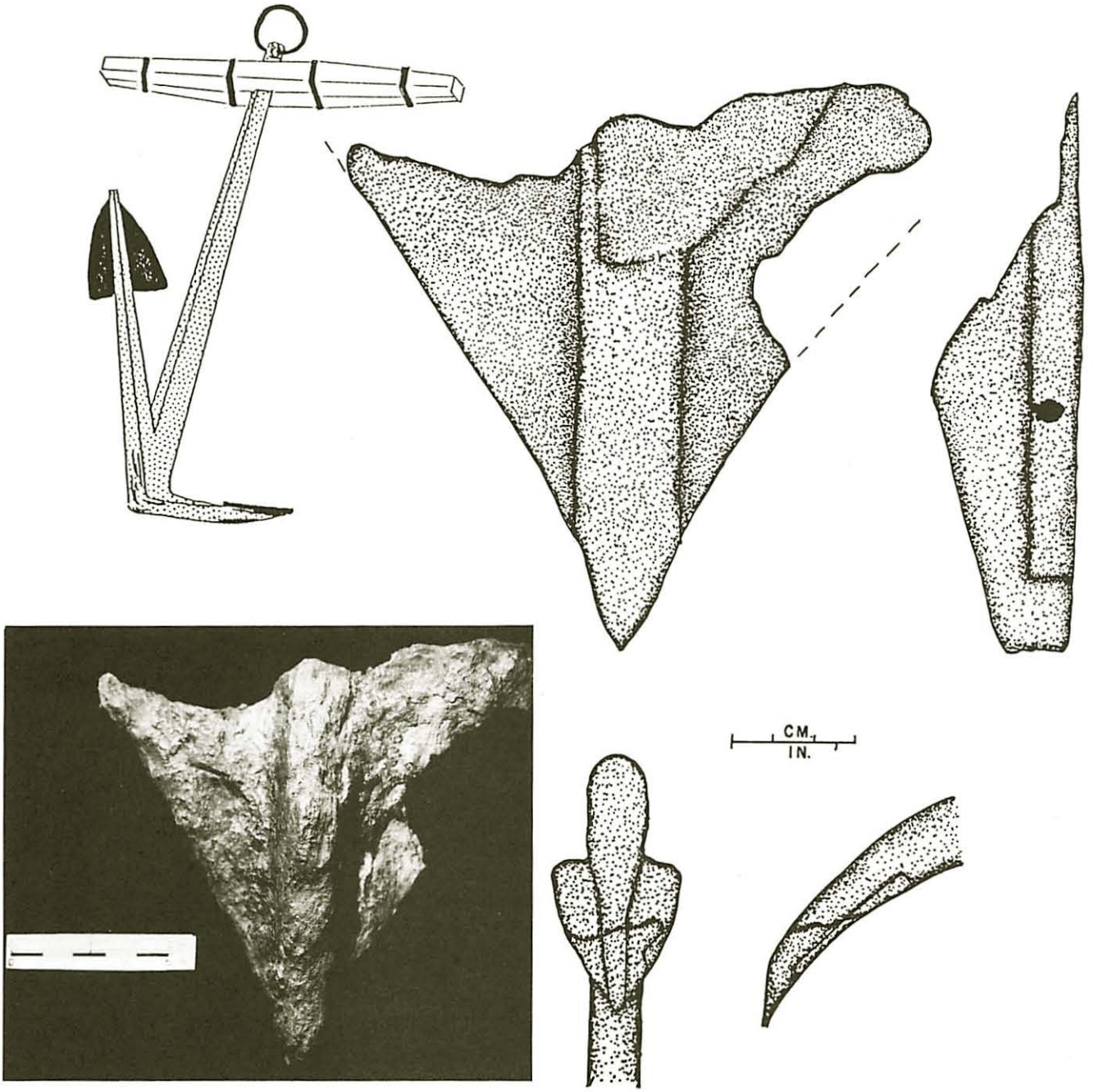


Figure 121. Boat anchor fluke. **Top left:** Illustration of Spanish anchor of the type used in the fifteenth and sixteenth centuries. From Moriarty and Marshall 1965: Fig.10. **Top right:** Plan and side view of boat anchor fluke tip, 38BU162E-39E, from the bottom of the moat of Ft. San Felipe. **Lower right:** End and side view of the location of the broken fluke tip on an anchor. **Lower left:** Photograph of the anchor fluke tip.

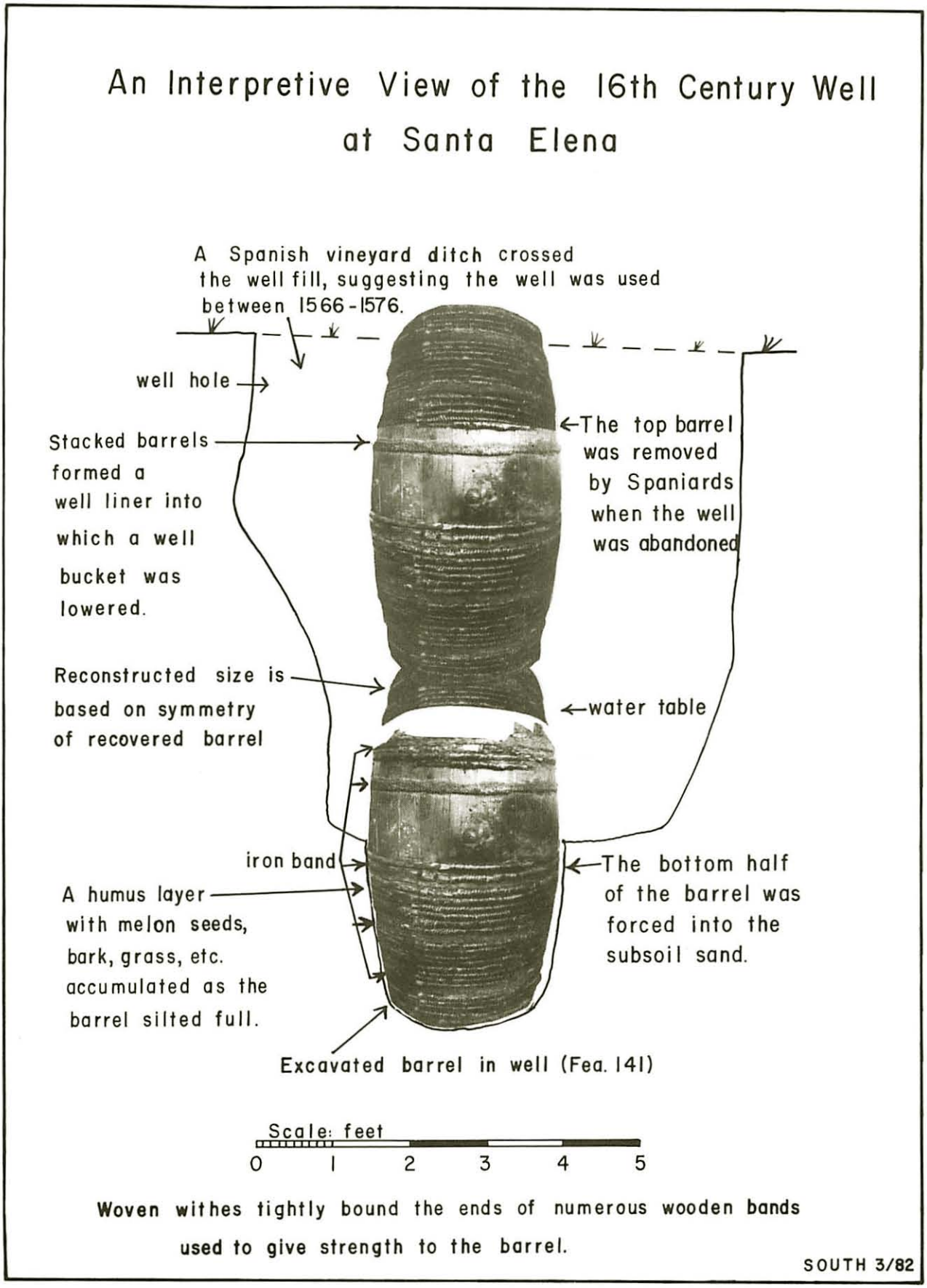
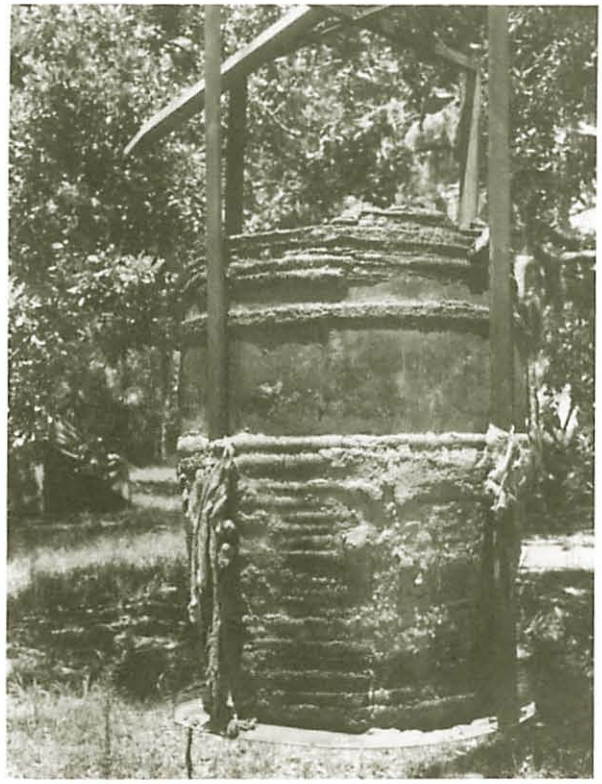


Figure 122. An interpretive view of the sixteenth century well at Santa Elena made of two stacked barrels.

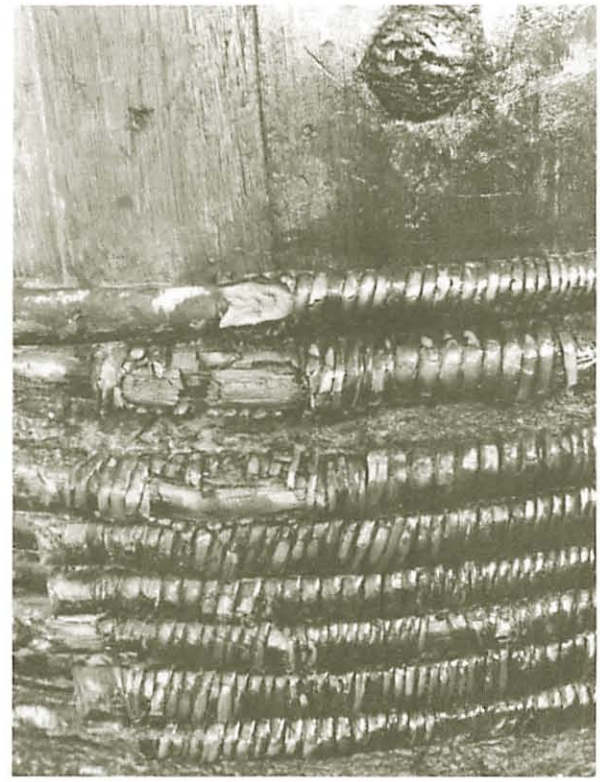
Figure 123. The barrel, 38BU162-141, awaiting the conservation process.



A

B

C



D

Figure 124. Views of the barrel in the field. **A.** The barrel inside the iron framework used to lift it from the well hole. **B.** View of the withe-woven wood barrel bands. **C.** The barrel wrapped in water-soaked plastic sponge being lowered into the tank for transportation. **D:** Close-up of the withe-woven wooden bands. Note the bung in the bung-hole.

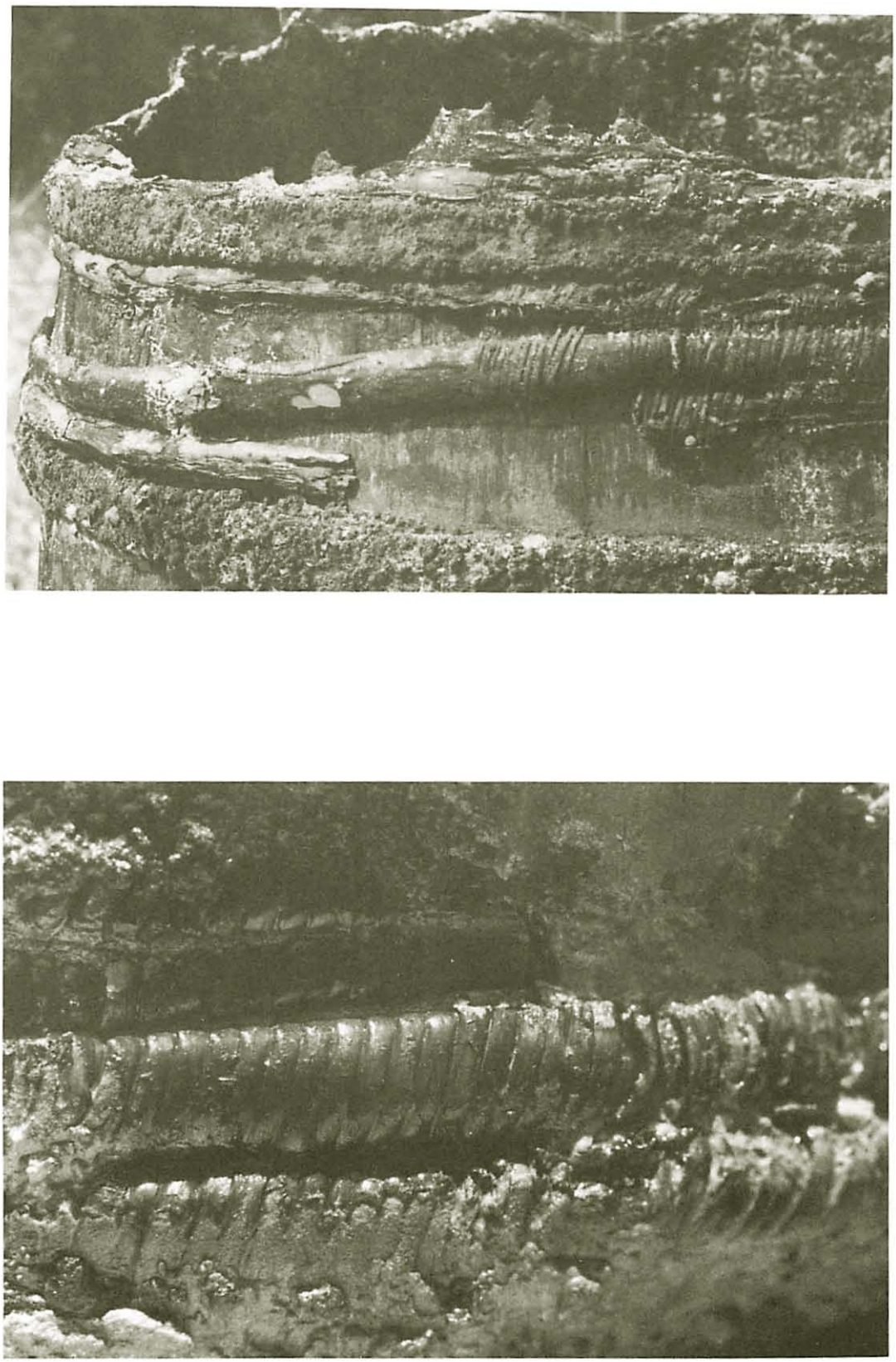


Figure 125. Close-up views of the barrel showing woven withes holding the wooden bands.

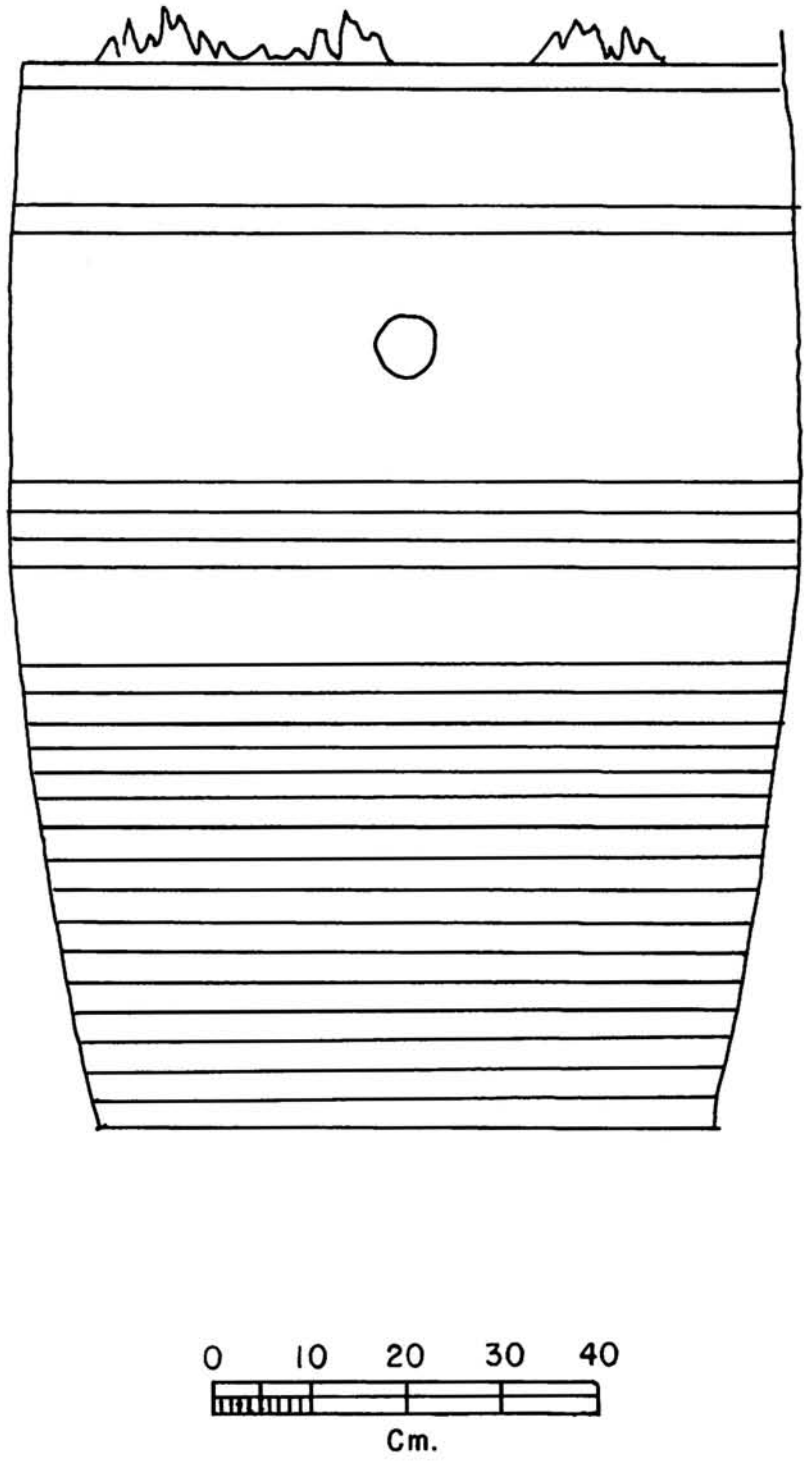
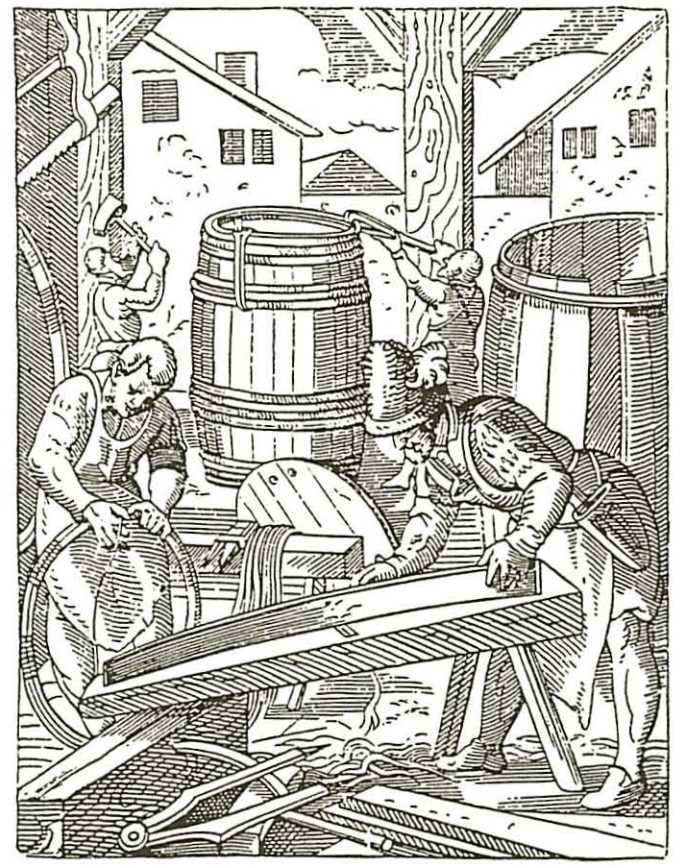


Figure 126. Measured drawing of the barrel (Harold Fortune and Curtiss Peterson).



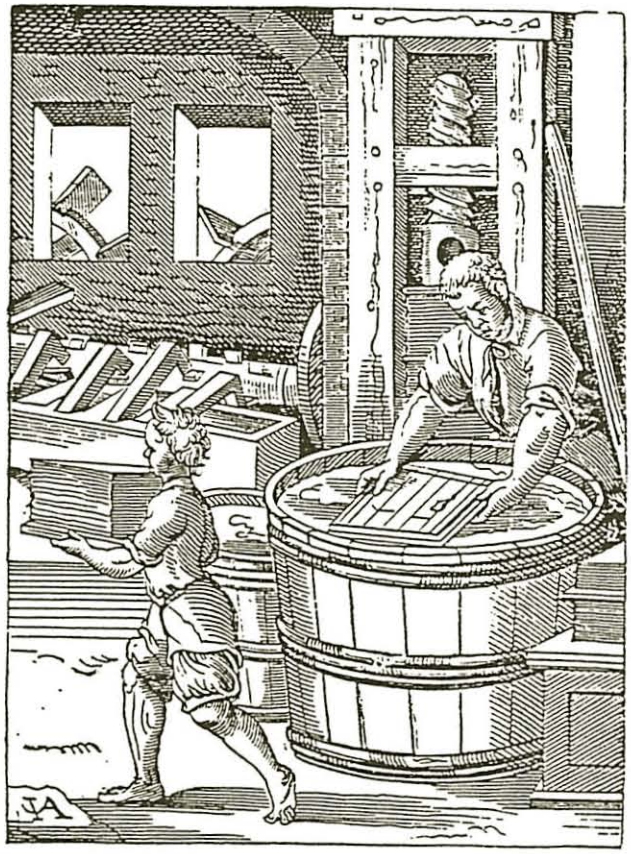


Figure 127. Barrel illustrations. **Top left:** View of the barrel in Ft. San Felipe well 162H-217. **Top right:** A sixteenth century cooper's workshop, 16th c., by J. Amman. From Lacroix 1870:16, Fig. 9. **Bottom left:** View of a paper-maker, drawn and engraved in the sixteenth century by J. Amman, showing barrel with wooden bands and withe bindings. From Lacroix 1870: 420, Fig. 332. **Bottom right:** Barrel with occupants. From "Altar of St. George" by Andrés Marzal de Sas, ca. 1400 (Victoria and Albert Museum, London). From Jedlicka 1977: Plate 5.

As the barrel was removed from the ground a series of photographs were taken to record the appearance of the barrel at that moment so that if conservation efforts were unsuccessful, at least photographs would survive (Figs. 124 and 125). Various measurements of the barrel were taken by Conservationist Curtiss Peterson and his assistant Harold Fortune. Their drawing is shown in Figure 126.

A view of the barrel found in well 217 in Fort San Felipe, which was subsequently reburied, is seen in Figure 127. This barrel had no iron bands.

Various views of such barrels from illustrations of the period are also seen in Figure 127. The Santa Elena and Fort San Felipe barrels represent excellent examples of the cooper's art. An excellent account of the discovery and interpretation of similar barrels (used to hold whale oil), from a sixteenth century ship sunk in Red Bay, Labrador, is seen in Ross (1980: 1-14).

Barrel Bands

Almost 100 barrel band fragments have been found in refuse deposits and Spanish features at Santa Elena and Fort San Felipe. The width and thickness tabulations are found in Appendix XVI. The average width of the iron barrel bands before conservation is 21.9mm, with the average thickness being 4.7mm. One complete, conserved, barrel band from the Santa Elena barrel (38BU162-141) is 27 inches in diameter and from 21.1 to 23.8 mm in width, with the thickness varying from 5.5 to 7.5mm. Two barrel band fragments had been bent to serve a new function after the band was salvaged from a barrel (Fig. 128). It should be noted, not surprisingly, that the Spanish barrel bands of this sixteenth century period are much thicker than those we are accustomed to seeing from British colonial sites of two hundred years later.

Woodworking

Large Auger Bits

Two large auger bit fragments with slot eyes, much like a large needle in appearance, were found, one at Santa Elena (38BU162C-125) and the other at Fort San Felipe in the moat (38BU162E-38C). These were apparently from large augers designed to drill holes into timbers. The fact that sufficient force was used to shear the metal shafts of these augers indicates the difficulty that sometimes occurred in drilling live oak and other hard woods.

The function of the slot eye is revealed by the fact that the Fort San Felipe auger has a crescent shaped, tapered, flat iron "key" or crescent pin designed apparently to fit into a slot in the wooden handle to give a strong purchase between the leverage applied to the wooden handle and the iron shaft of the auger. However, so much pressure was applied to the auger that during the process the crescent key was twisted into an "S" shape by the force applied, which also broke the auger shaft. This is seen in Figures 129 and 130, with other crescent shaped "keys" for such augers illustrated in Figures 129 and 131.

Small Auger Bits

Two small bits for augers were recovered, one 8" long (204 mm) from a Spanish feature in Santa Elena (38BU162C-236) and the other, 3 1/4" long (83 mm) from the topsoil zone inside Fort San Felipe (38BU162H-90A). The longer example is a pod auger and the smaller one has a central pilot screw with outer cutting blades (Figs. 116 and 130). These bits are for drilling much smaller holes than the massive auger fragments with crescent locking keys.

Gouge

Another woodworking tool, recovered from a Spanish midden pit feature (38BU162D-37), was a 13" long iron gouge (331 mm), (Figs. 70 and 130), used to hollow out depressions in wooden beams or to enlarge drilled auger holes to receive tapered wooden pegs.

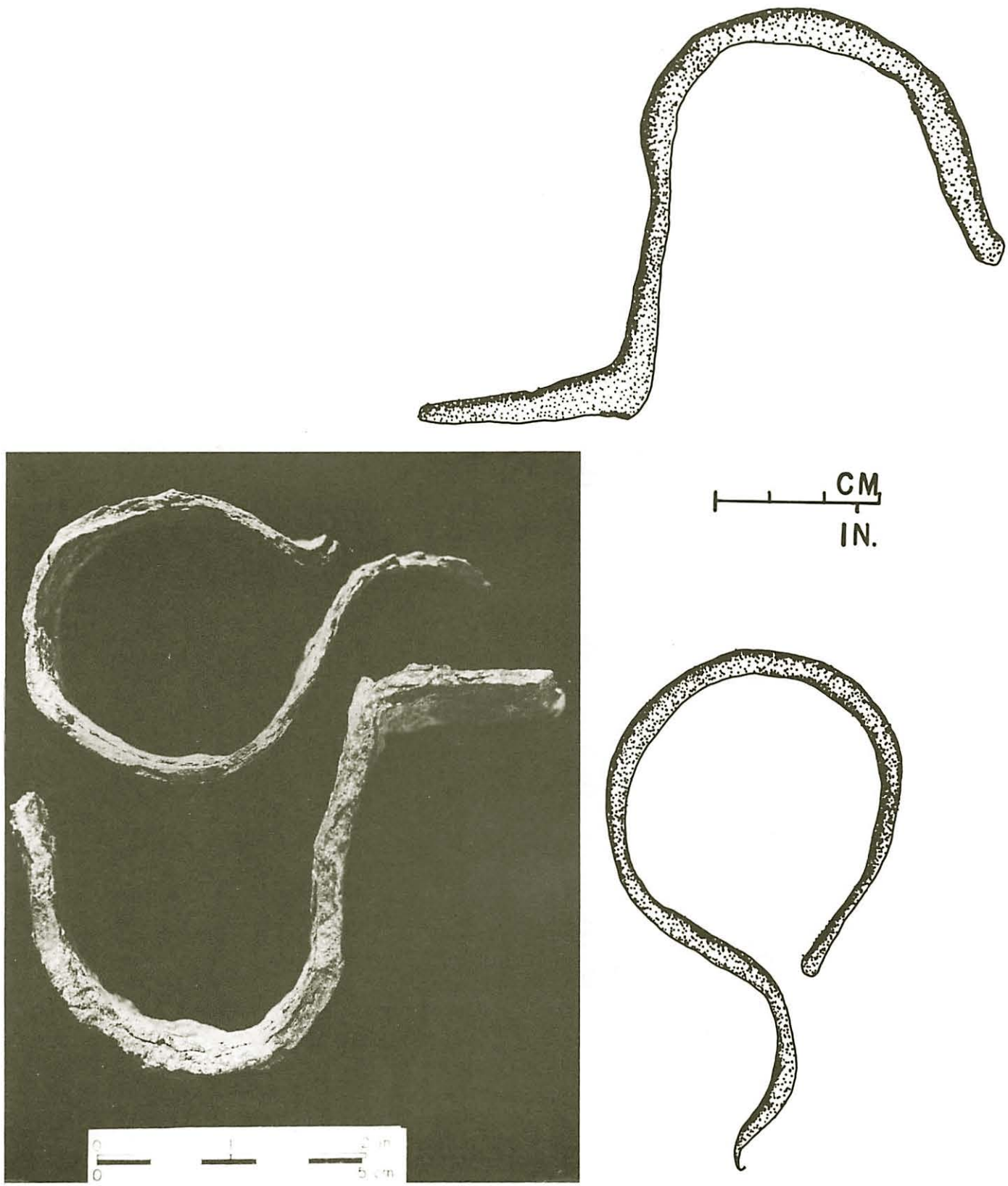


Figure 128. Reworked barrel bands, 38BU162D-66 (angular), 162C-75 (loop).

Figure 129. Auger shafts with crescent shaped "keys" for attaching wooden handle, iron metalworking anvil and unidentified "Y" shaped object. **Top row:** Iron shaft of large auger, showing eye for holding the handle locking "key," 38BU162-125. Iron anvil, 162C-236. **Row 2:** Broken shaft of large auger, showing crescent shaped "key" in eye, 162E-38C. Notice twist on the locking key resulting when pressure was applied to the auger, causing the shaft to twist and break and causing the wooden handle to twist the key. Iron "Y" shaped object of unknown function. **Bottom:** Crescent shaped locking "keys" for auger eyes (top down), 162C-265, 162C-117, 162A-127.

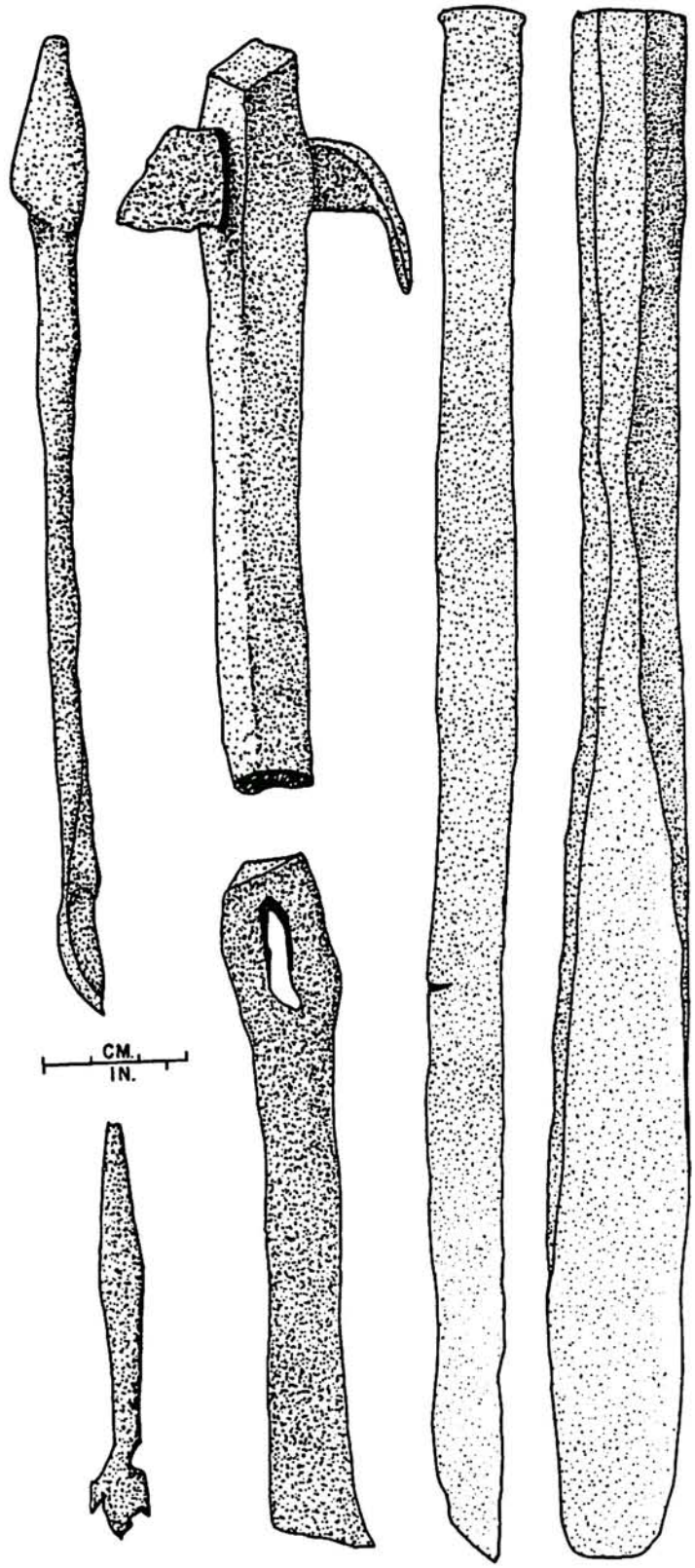


Figure 130. Auger bits, broken auger shafts and gouge. **Top:** Pod auger bit. 38BU162C-236. Broken shaft of large auger with crescent shaped handle locking "key" twisted from extreme pressure, 162E-38C. **Bottom:** Small drill bit, 162H-90A and broken shaft of a large auger with eye for crescent shaped "key," 38BU162-125. **Right:** Side and plan view of woodworking gouge, 162D-37.

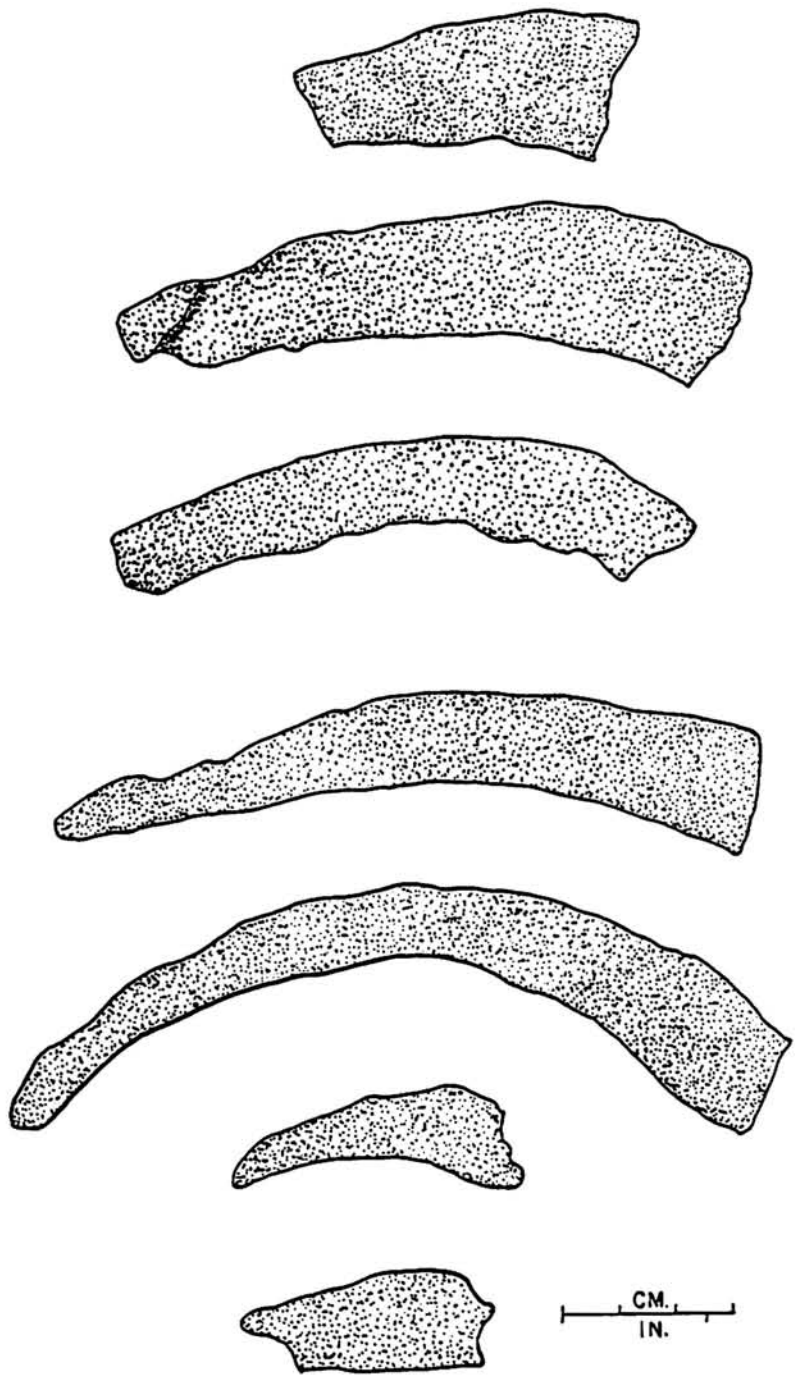


Figure 131. Crescent shaped auger handle locking "keys" and fragments. **Top down:** 38BU162-63, 162A-127, 162C-16B, 162C-117, 162C-265, 162E-38C, 162E-43C.

PART 2

THE SIXTEENTH CENTURY SPANISH IMPORTED CERAMICS AT SANTA ELENA:

A FORMAL ANALYSIS

by

Russell K. Skowronek, Richard E. Johnson
and Stanley South

CHAPTER 9

INTRODUCTION

A 1985 National Science Foundation grant was awarded to Stanley South of the University of South Carolina Institute of Archaeology and Anthropology for the description of the entire range of sixteenth century Spanish and contemporary Indian artifacts from Santa Elena. This report presents the descriptive analysis of the Spanish imported pottery collected during six years of excavation (South 1979, 1980, 1982, 1983, 1984, 1985). This study includes those collections excavated under the auspices of the University's Institute of Archaeology and Anthropology (1979-1985). Also viewed were those ceramics reported to be from Major Osterhout's 1923 excavation which are in the possession of the Charleston Museum, The Huguenot Society and the Beaufort County Museum. A discussion and drawings of three storage jars in the Beaufort County Musum is included. Additionally, the artifacts in the possession of historian-collector Charles Gay of the South Caroliniana Library were viewed to establish similarity between the collections.

Condition of the Collections

Ceramics collected under the auspices of the University of South Carolina Institute of Archaeology and Anthropology were, on the whole in a good state of preservation, given the methods of excavation in field, processing and storage of the materials and the natural setting of the site in low, sandy soil on a brackish marsh edge. Given the softness and porosity of the low-fired pastes and glazes associated with tin-glazed coarse earthenwares or majolicas, mechanical and chemical changes were both expected and found.

Chemical changes causing discoloration, and in some cases alteration, of the glaze occurred in two ways - refiring and infusion. Refiring of pottery in the fire of 1576 caused reduction (to a dark greasy grey/black) and often pocking of the surface glaze through revitrification. Chemical infusion of sulfer and iron compounds into the tin-glazes in the reduced oxygen atmosphere of pit and well features resulted in a grey to black discoloration of the glazed surfaces (Plate 1). Cleaning by Curt Peterson, Conservator for the South Carolina Institute of Archaeology and Anthropology, with a 3% solution of hydrogen peroxide almost instantly removed the stains and restored the original color (Plate 2). Similar chemical discoloration of majolica glazes has been noted by Colin Martin (1979: 285) in his study of pottery from the Spanish Armada shipwrecks. The Listers have used this method to distinguish between discoloration and gunmetal majolica for some time (Personal communication to Stan South, February 1984).

Plate 1. **Top:** Santo Domingo Blue on White pitcher in its "gunmetal" stage before cleaning, 38BU162H-217G, H.
Plate 2. **Bottom:** Santo Domingo Blue on White pitcher after cleaning with hydrogen peroxide.

Loss of glaze and rounding of broken edges through mechanical alterations affected the typing and reconstruction of soft-bodied coarse earthenwares such as majolica. The majority of the transformations from cleanly broken sherd to rounded glazed bisque no doubt took place at the time of deposition into the archaeological context. However, erosion was sometimes caused by the motorized shaker screens used in the excavation process. Future researchers planning formal analysis of European sites occupied prior to the advent of harder, refined earthenwares should be certain to carefully monitor the motorized shaker screens to guard against further erosion.

Methodology

Hispanic empire ceramics were initially separated from prehistoric and contemporary aboriginal wares and later Plantation and U.S. Marine Corps-related pottery. The Hispanic material was then sub-divided into storage and archival categories. The former contained all of the non-diagnostic olive jar and Columbia Plain body sherds, bisque, and those ceramics rendered unrecognizable through secondary burning and revitrification. All archival ceramics were permanently labeled with india ink and, like those in the storage category, were bagged by field provenience. This bagging by provenience allowed for a two-dimensional table-top replication of the site which, in turn, aided in the reconstruction of rim to base pottery forms from sherds in adjacent units and features. Reconstructions were accomplished by employing white glue (Elmer's) for coarse earthenwares and Duco cement for porcelains. These rim to base "runs" were then drawn by Skowronek and Johnson at a 1:1 scale with the aid of a Stockton profile gauge. Each drawing included notations detailing observations of glaze, form and paste color, the latter keyed to a Munsell Soil Color Chart. The original drawings are currently on file at the South Carolina Institute of Archaeology and Anthropology. From the originals, the ink drawings were rendered by South, and shading added by Ann Salter, Illustrator for the Institute, resulting in the reduced drawings illustrated herein as figures. Also, all crossmended sherds recovered from adjacent or distant proveniences were schematically mapped from the greatest concentration outward in order to provide temporal data regarding contemporaneity of features (Fig. 1).

In drafting the vessel profiles, Stan South illustrated the sherd or sherds used to determine the vessel form as a solid black profile in the various figures. In many cases the entire profile is available to clearly indicate the vessel form. In other instances several sherds are used to gain an understanding of the vessel represented by the sherds, in which cases conjectural areas are indicated by a dashed line in the figures. Some forms were derived by matching sherds with forms, illustrated in Lister and Lister 1976a and Martin 1979, and by this means an interpolation of the form represented by the sherds was derived. In some cases, however, insufficient evidence of form was present to warrant a drawing beyond the profile of the sherd itself.

A sub-division was made within the "Archival" category which essentially became a "Super Archival" type and form collection and includes all of the drawn and photographed museum quality sherds and vessels as well as fragments deemed diagnostic and/or typical of the sixteenth century Spanish occupation of the site. This collection is curated through the University of South Carolina Insitute of Archaeology and Anthropology and the Registrar of the U.S. Marine Corps History and Museums Division.

The Ceramic Collections

Sixteenth century Hispanic empire ceramics found at Santa Elena serve as a roll call and gauge of the expansion of this first modern world empire. Wares from Hapsburg-dominated Italy, Spain, Portugal, the New World, and the Far East via the Philippines are present and

some ceramics of unknown origin may represent types associated with the Low Countries, Germanic Europe or France. Most of the sixteenth century material found at the Santa Elena site has been formally defined elsewhere and, as such, discussion of those wares will deal specifically with their formal attributes and idiosyncrasies, while new types will follow the more traditional type description format as referenced in Goggin (1968). Since all of the ceramics examined in this study were earthenwares (except, of course, porcelain) the collections were, for the purpose of this description, grossly divided by surface treatment (i.e., glaze). The order of analysis and type list follows.

TIN-GLAZED EARTHENWARE
- Morisco Wares
  - *Columbia Plain*
  - *Columbia Plain (Gunmetal variant)*
  - *Yayal Blue on White*
  - *Yayal Blue on White (variant)*
  - *Isabela Polychrome*
  - *Santo Domingo Blue on White*
- Sevilla Wares
  - *Sevilla Blue on White*
  - *Sevilla White*
- Guadalquiver Ware
  - *Caparra Blue*
- Italian Majolicas
  - *Montelupo Blue on White*
  - *Montelupo Polychrome*
  - *Ligurian Blue on Blue*
- New Majolica Types
  - *Santa Elena Mottled Blue on White*
  - *Santa Elena Green and White*
  - *San Felipe Green-edged Majolica*

LEAD-GLAZED EARTHENWARE
- Honey-colored
- Red
- Green *(lebrillo, bacín, Bacín Verde)*
- Orange and Green

UNGLAZED EARTHENWARE
- Mexican Red Painted (Aztec Red Ware)
- Orange Micaceous
- Thin
- Feldspar-inlaid
- Incised Smoothed
- Plain Sandy

OTHER CERAMICS
- Mortars *(mortero)*
- Storage Vessels
  - *Olive Jar*
  - *Flat-based (tibor)*

CHAPTER 10

TIN-GLAZED EARTHENWARES - MAJOLICAS

For over a decade controversy over the proper name for Mediterranean and Mediterranean-derived tin-glazed earthenwares has confounded ceramic researchers. Some (Martin 1979) simply describe these wares while Spanish speakers use their own cognate (Muller 1981: 10) of "*mayolica*". Although the Listers have demonstrated that the term "maiolica" was an Italian rubric erroneously applied to Spanish ceramics thought to be from Majorca (or Mallorca - 1982: vii) we feel that Goggin's (1968: 1-3) research and precedence in the literature makes the term" majolica" most appropriate as a descriptive adjective for these tin-ash glazed ceramics.

Morisco Wares

The Listers (1982: 45) have identified Sevilla as the manufacturing locale for four types of majolica which were produced following Moorish style modes. These Morisco Wares consist of Columbia Plain and its variants, Yayal Blue on White, Isabela Polychrome and Santo Domingo Blue on White - all of which have been found at Santa Elena.

Columbia Plain

Originally defined by Goggin (1968: 117), Columbia Plain is the most frequently found tableware at the site. This soft bodied, cream colored, plain, off-white ceramic has been found in two forms at Santa Elena. The first form (Fig. 2 and Plate 3), a shallow, footless plate or "*plato* " (Lister and Lister 1976a: 72), in all cases exhibits characteristic central bossing and obversal ridges (Goggin 1968: 119-121; Lister and Lister 1982: 48). Measurable diameters range from 16.5-20.5cm but tend to cluster at 19cm. This regularity in size suggests that the jigger and jolly method of mass production, proposed by both Martin (1979: 286) and the Listers (1982: 47) for the provisioning of the military and the New World trade system, was utilized in the manufacture of the vessels recovered at Santa Elena. Artistic representations of Columbia Plain *platos* are common in the work of the early seventeenth century artist Velázquez. Examples of these views include: "Three Men at Table" - 1618 (Plate 4) (López-Rey 1968: Plate 13); "Old Woman Frying Eggs" - 1618 (Plate 5) (Troutman 1968: Plate 4); "A Girl and Two Men at Table" - 1618-19 (Plate 6) (López-Rey 1968: Plate 18); "Christ at Emmaus" (Plate 7) and it's variation "The Servant" - 1620-1621 (Plate 8) (López-Rey 1968: Plates 20, 21); and "Two Men at Table" - 1619-20 (Plate 9) (Troutman 1968: Plate 5).

The second major form is a cup or bowl shape referred to as an "*escudilla* " or "*taza* " (Fig. 3, Plates 9 and 10) (Lister and Lister 1976a: 41-42; Goggin 1968: 119). Most observed vessels of this form have a pronounced foot-ring, although at least one from the Osterhout collection exhibits sharply angled sides coming to a simple concave base. Similar *escudilla* forms without pronounced foot-rings have been observed in the 1984 collections from Puerto Real (Charles Ewen, personal communication, August 27, 1985), the Convento de San Francisco in the Dominican Republic (Goggin 1968: 120, Fig.4e), and in Mexico City (Lister and Lister 1982: 47, Fig.4.3d). Surface finish follows styles previously defined by both Goggin (1968:119) and the Listers (1982: 48), including the presence of clear green lead glaze trailing on *escudilla* exteriors. Sizes seem to have been standardized at 13-14cm, again suggesting mass production in Sevilla, the acknowledged base of operation for Morisco production wares. *Escudilla* forms of Columbia Plain appear partially hidden in Velázquez' paintings of "Christ at Emmaus" (Plate 7), "The Servant" (Plate 8) (López-Rey 1968: Plates 20, 21) and "Two Men At Table" (Plate 9) (Troutman 1968: Plate 5).

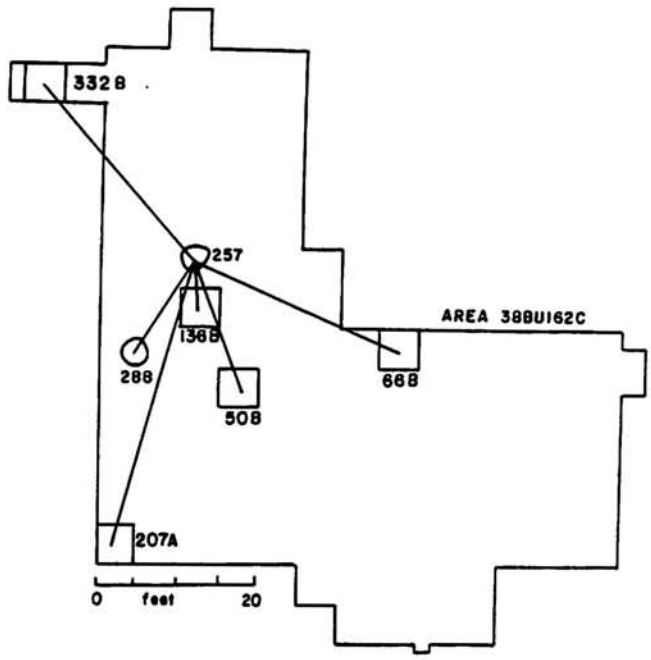


Fig. 1

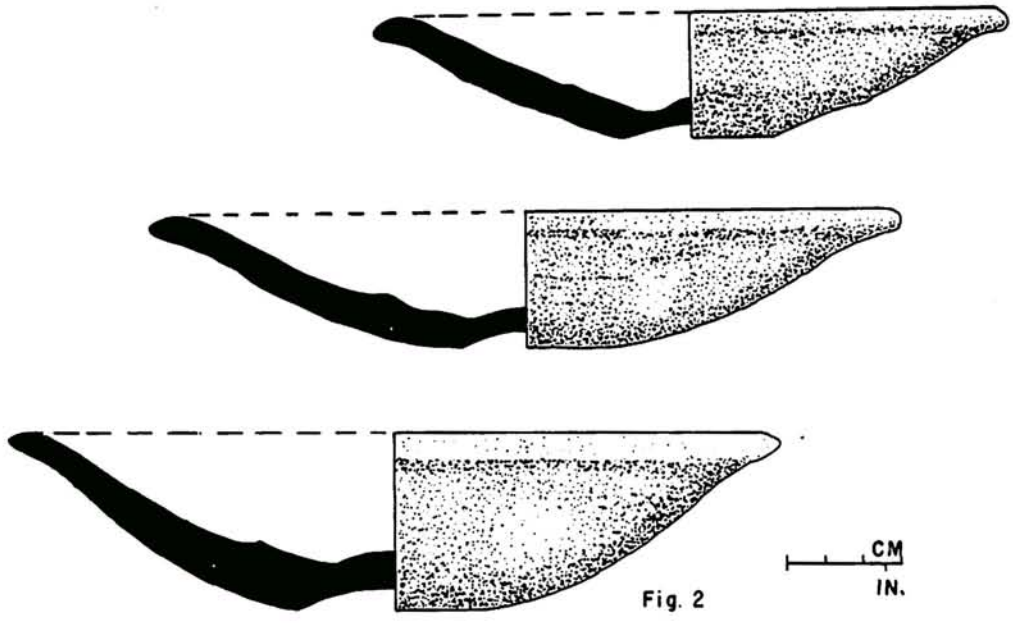


Fig. 2

Figure 1. Distribution of crossmended sherds of Italian Montelupo Polychrome majolica in the 30 by 100 foot area of 162C.

Figure 2. Majolica plate forms or *platos*.

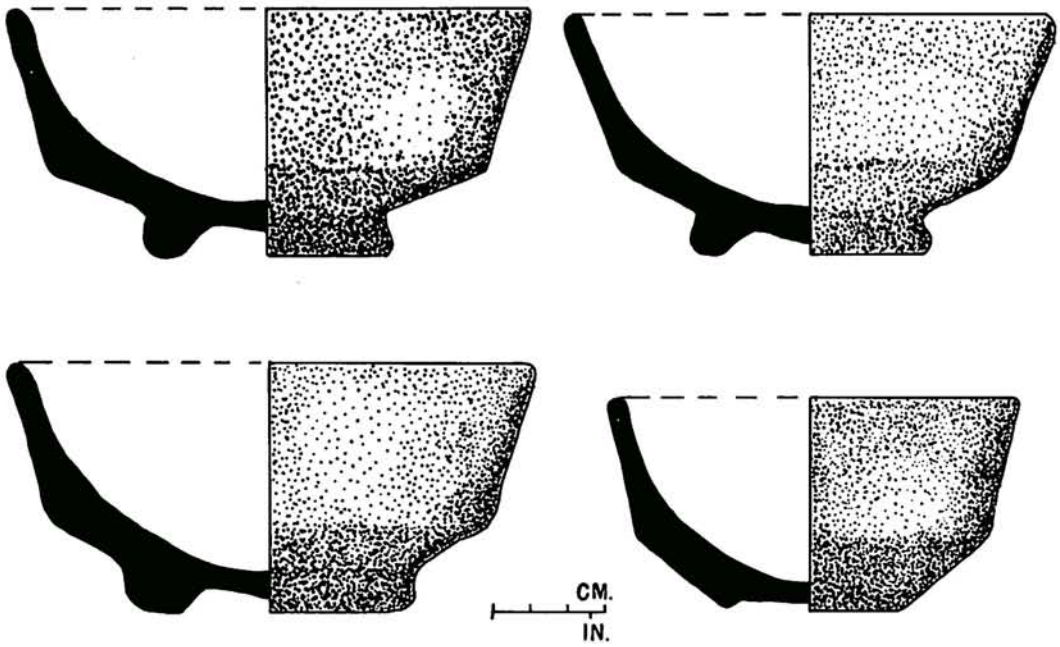


Fig. 3

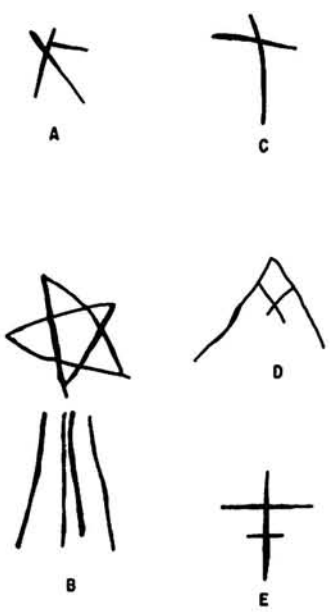


Fig. 4

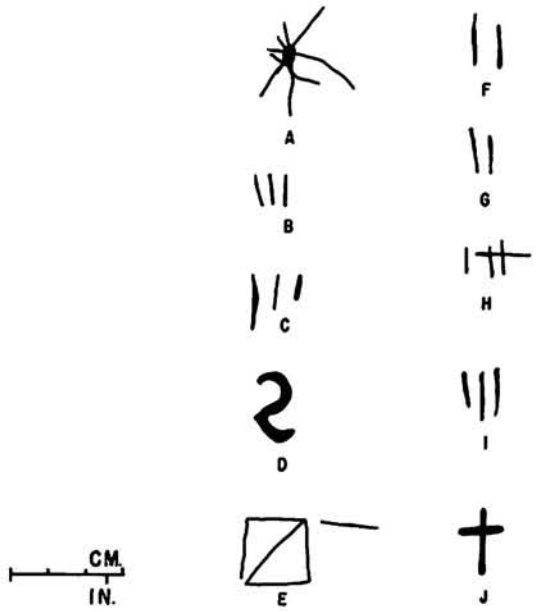


Fig. 5

Figure 3. Majolica bowl forms or *escudillas*.
Figures 4 and 5. Engraved marks on Columbia Plain majolica vessels.

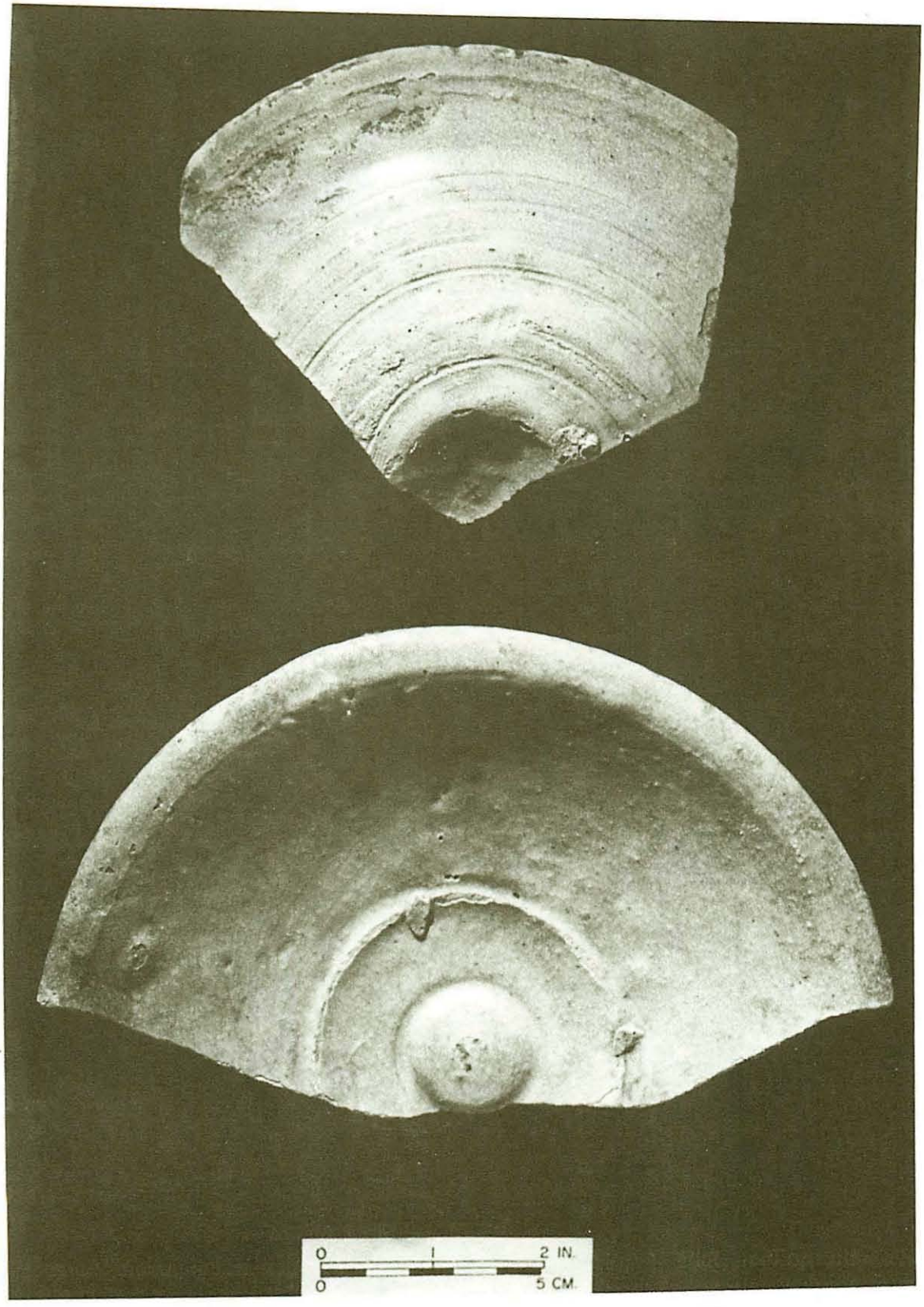


Plate 3. **Top:** Columbia Plain *plato* fragment, 38BU162C-257.
Bottom: Columbia Plain *plato* fragment, 38BU162D-72.

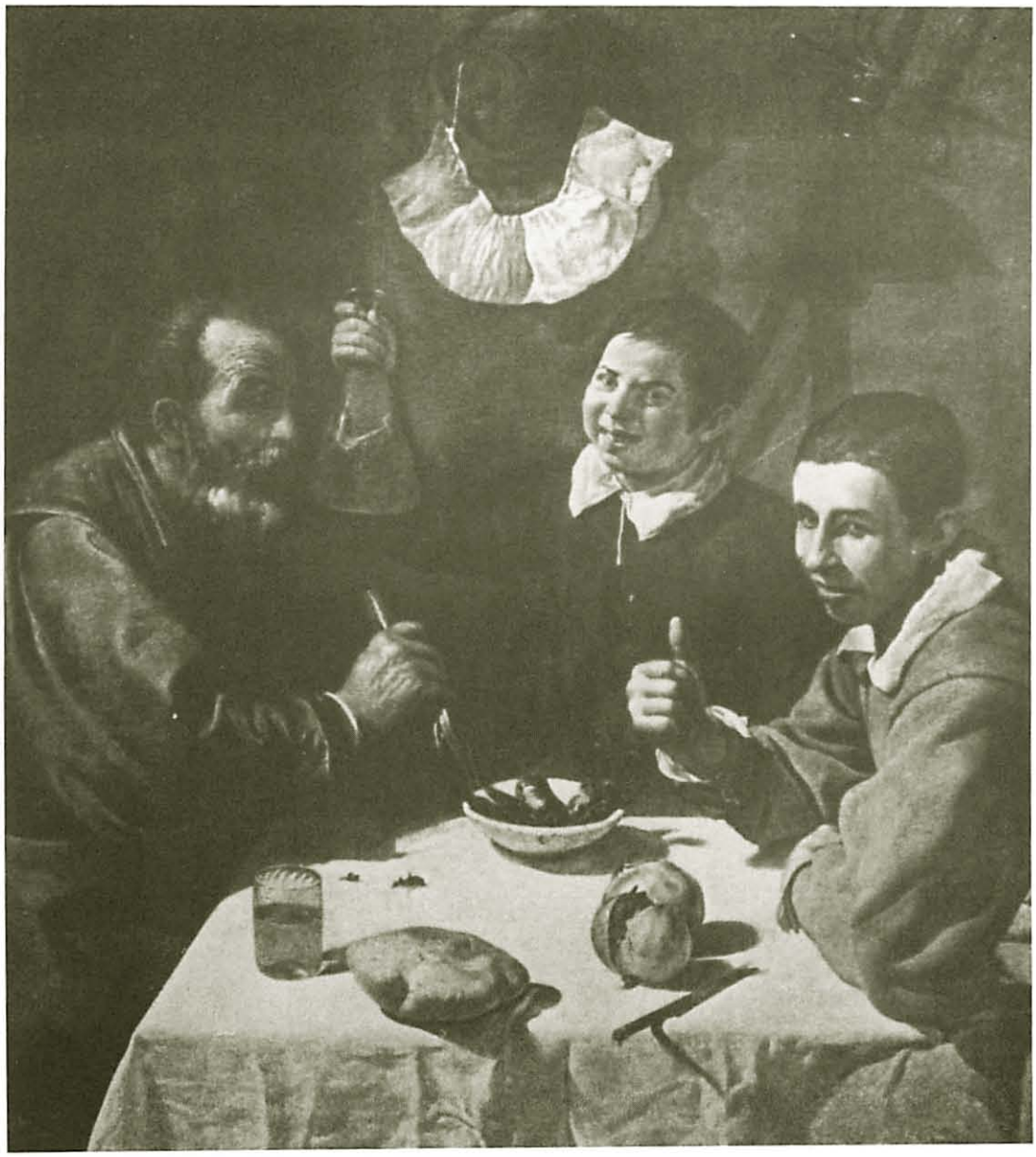


Plate 4. Columbia Plain *plato* in "Three Men at Table," by Velázquez, ca. 1618, (Hermitage). From López-Rey 1968: Plate 13.

Plate 5. "Old Woman Frying Eggs," by Velázquez, 1618, (Edinburgh, National Gallery). From Troutman 1968: Plate 4, showing Red Lead-glazed Earthenware, Columbia Plain *plato* , a brass mortar and pestle, a Green-glazed Earthenware pitcher, and a Santo Domingo Blue on White pitcher.

Plate 6. "A Girl and Two Men at Table," by Velázquez, ca. 1618-19 (Budapest, Hungarian Museum of Fine Arts), showing *plato* and glass tumbler and goblet. From López-Rey 1968: Plate 18.

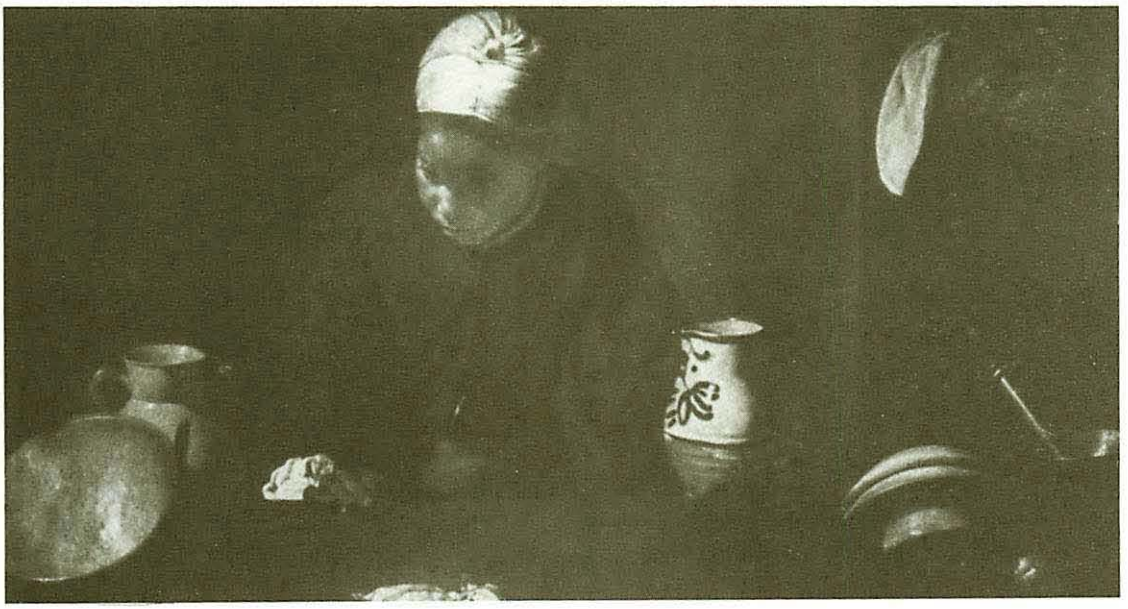


Plate 7. **Top:** "Christ at Emmaus," ca. 1620-21, by Velázquez. From López-Rey 1968: Plate 20 (Blessington, Ireland, Beit Collection), showing a Santo Domingo Blue on White pitcher and Columbia Plain *platos*.

Plate 8. **Bottom:** "The Servant," by Velázquez, ca. 1620-21. From López-Rey 1968: Plate 21 (Chicago Art Institute).

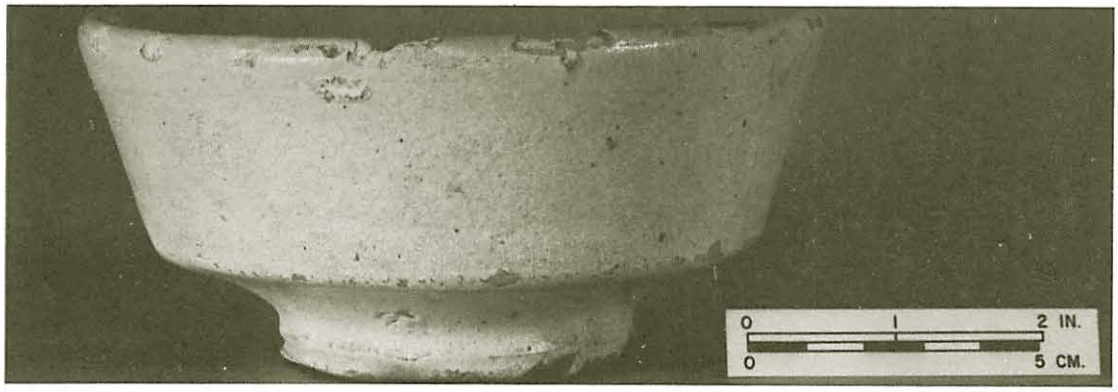


Plate 9. **Top:** "Two Men at Table," by Velázquez, ca. 1619-20, (Wellington Museum, London). From Troutman 1968: Plate 5, showing brass mortar and pestle, jugs, and Columbia Plain *platos*. **Bottom:** Columbia Plain *Escudilla* , 38BU162C-236.

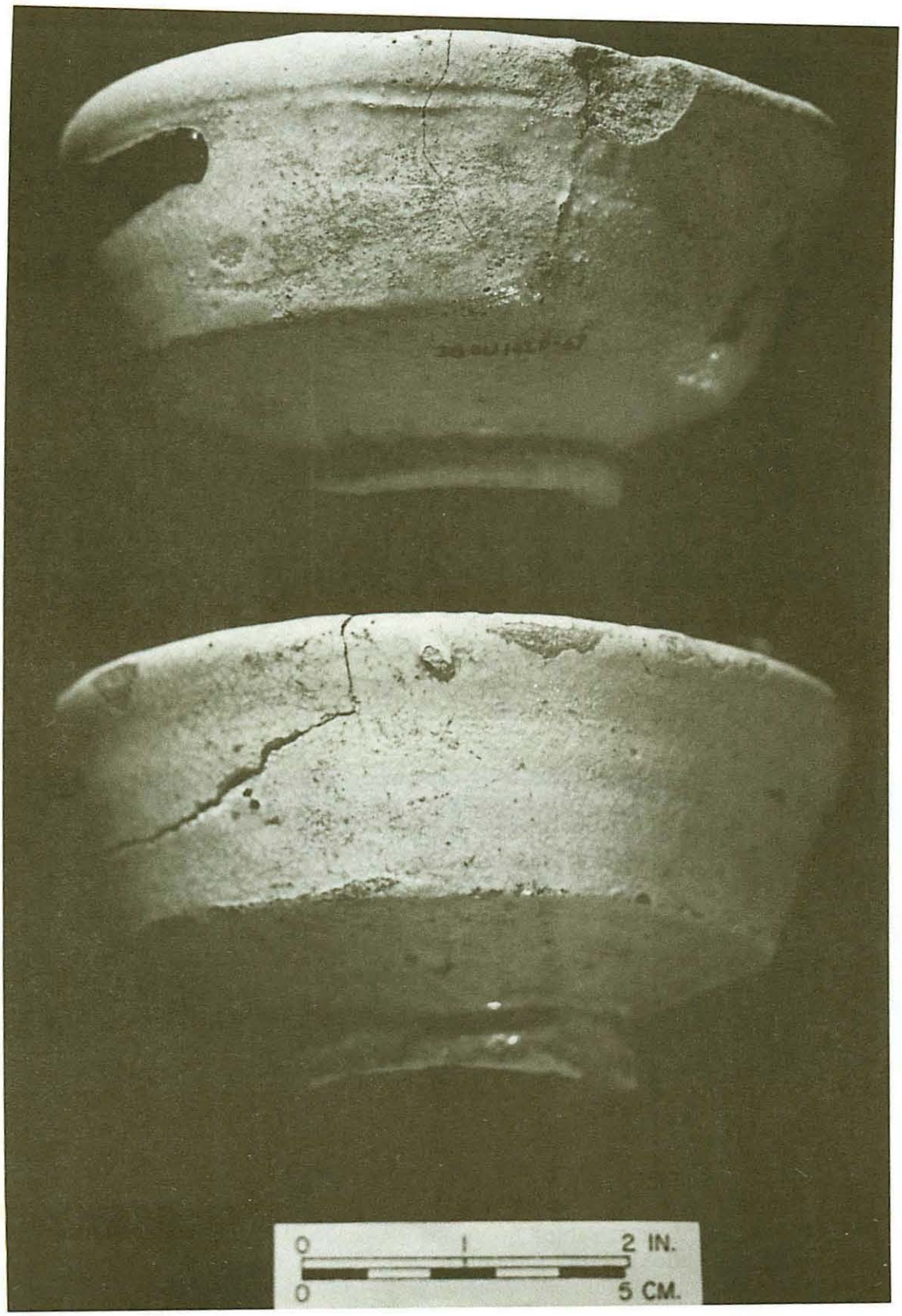


Plate 10. **Top:** *Escudilla* of Columbia Plain type with a touch of green glaze, 38BU162D-67. **Bottom:** Columbia Plain *escudilla,* 38BU162H-260B.

Past researchers (Goggin 1968; Martin 1979) have recorded the presence of engraved marks scratched through the tin-glaze on the interiors and exteriors of both the *plato* and *escudilla* forms. It has been suggested that they represent maker's tally marks (Martin 1979: 286) or owner's marks (Goggin 1968: 119). Similar engravings are present on some Columbia Plain vessels found at Santa Elena (Figs. 4 and 5; Plates 11 and 12). The diversity of motifs (paired and trebled hash marks, asterisk, simple cruciform, cross of Lorraine, reversed "S", shooting star, and a diagonally halved square - possibly an "Ave Maria") seem more suitable as owner's marks than maker's tally marks (Fairbanks 1973: 153).

Columbia Plain (Gunmetal Variant)

First Deagan in 1978 (pp. 39-40) and Lister and Lister in 1982 (p.48) proposed that *plato* and *escudilla* forms glazed "from a dense irridescent black to a light speckled grey" be considered a variant of Columbia Plain called "Gunmetal." At Santa Elena, several fragments meeting these criteria for the variant and matching the dimensions for standard Columbia Plain vessel forms were identified (Fig. 6). As stated above (see "Condition of the Collection"), project researchers had discovered that variable discoloration of Blue on White majolica vessels from a black to grey ground had occurred. Treatment of these presumed "Gunmetal" vessels with a 3% solution of hydrogen peroxide resulted in the removal of the discoloration and a restoration of the vessels' surface color to their original hue (Plate 2). It is assumed that in a reduced oxygen state the tin and lead glazes combine with naturally occurring sulfurs in the ground and darken in color. Similar treatment of the so called "Gunmetal" wares from the Santa Elena site revealed that these pieces had also been discolored and were in fact standard Columbia Plain vessels (Plate 13). Therefore, we suggest that Gunmetal Columbia Plain is an ecofact and is not a legitimate variant of the Columbia Plain type. Other researchers are strongly urged to examine their collections to further demonstrate the validity of this test.

Yayal Blue on White

Initially defined by Goggin in 1968 (128-130), Yayal Blue on White has been found in sixteenth century contexts in Mexico (Lister and Lister 1982: 53-55) and Haiti (Willis 1984: 158). In the Santa Elena collections Yayal Blue on White is found in both *plato* and *escudilla* forms (Fig. 7, Plate 14). Measurable *plato* forms of this cream-colored paste ware have a diameter range of 19-22cm and at least one example exhibits a possible owner's mark of three parallel hash marks (Plate 11c). *Escudilla* bowls are slightly larger than Columbia Plain forms with a 15-16 cm diameter at Santa Elena. *Escudilla* forms exhibit blue-glaze motifs on a white ground which may represent *alafias* or palmettes (Plate 14d-f) (Lister and Lister 1982: 53). Examples of Yayal Blue on White appear in the artwork of Zurbarán. These works include: "St. Hugo in The Refectory" - 1641-1658 (Plate 15) (Gállego 1977: 301) and "Sts. Justa and Rufina" (Plate 16) (Aznar 1977: 296).

Yayal Blue on White (Variant)

This variant appears to incorporate design elements common to both Yayal (Lister and Lister 1982: 58) and La Vega (Goggin 1968: 130-131) blue on white forms (Plate 17a). This thick, 19cm diameter, pink-pasted plato form has a series of stylized maize motifs radiating out from its center and overlapping a Yayal border of concentric circles. Similar variants appear in the Valley of Mexico for this period (Lister and Lister 1982: 58). On at least two other *plato* examples, the central medallion is sectioned into four relatively equal parts by a cruciform design element created by paired lines intersecting at the center of the boss and bordered by the typical paired concentric circles just outside the obverse ridge (Plate 17b and 17c). The presence of pinkish paste on at least one *plato* may suggest that it is *contraheco* ware from Mexico City (Lister and Lister 1976b: 36).

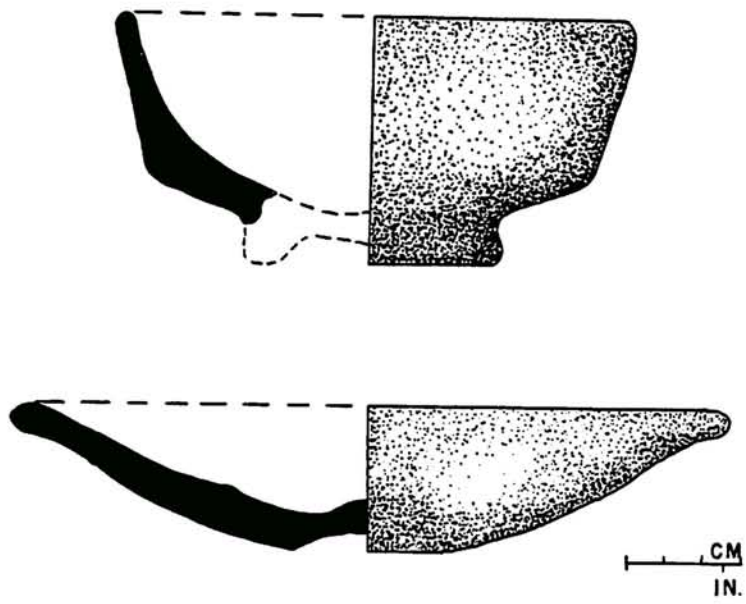


Fig. 6

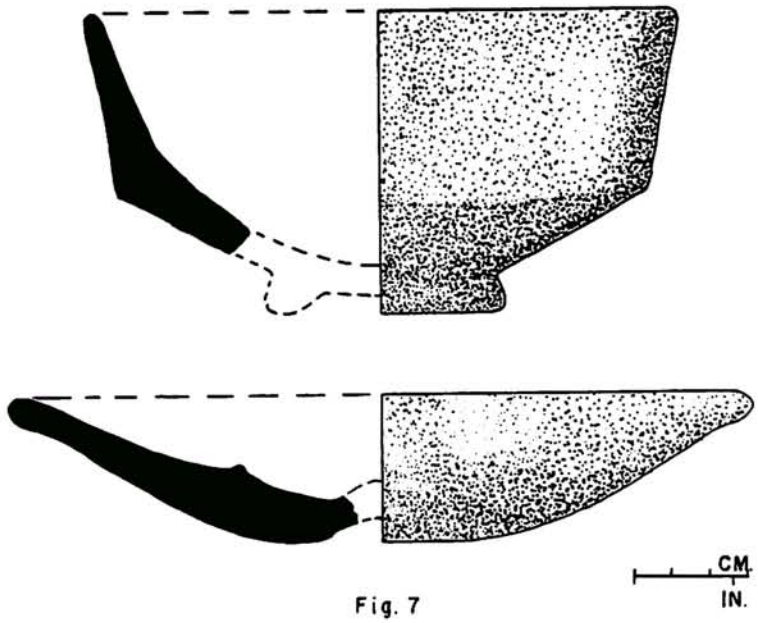


Fig. 7

Figure 6. Gunmetal Columbia Plain majolica *escudilla* and *plato* forms.
Figure 7. Yayal Blue on White majolica *escudilla* and *plato* vessel forms.

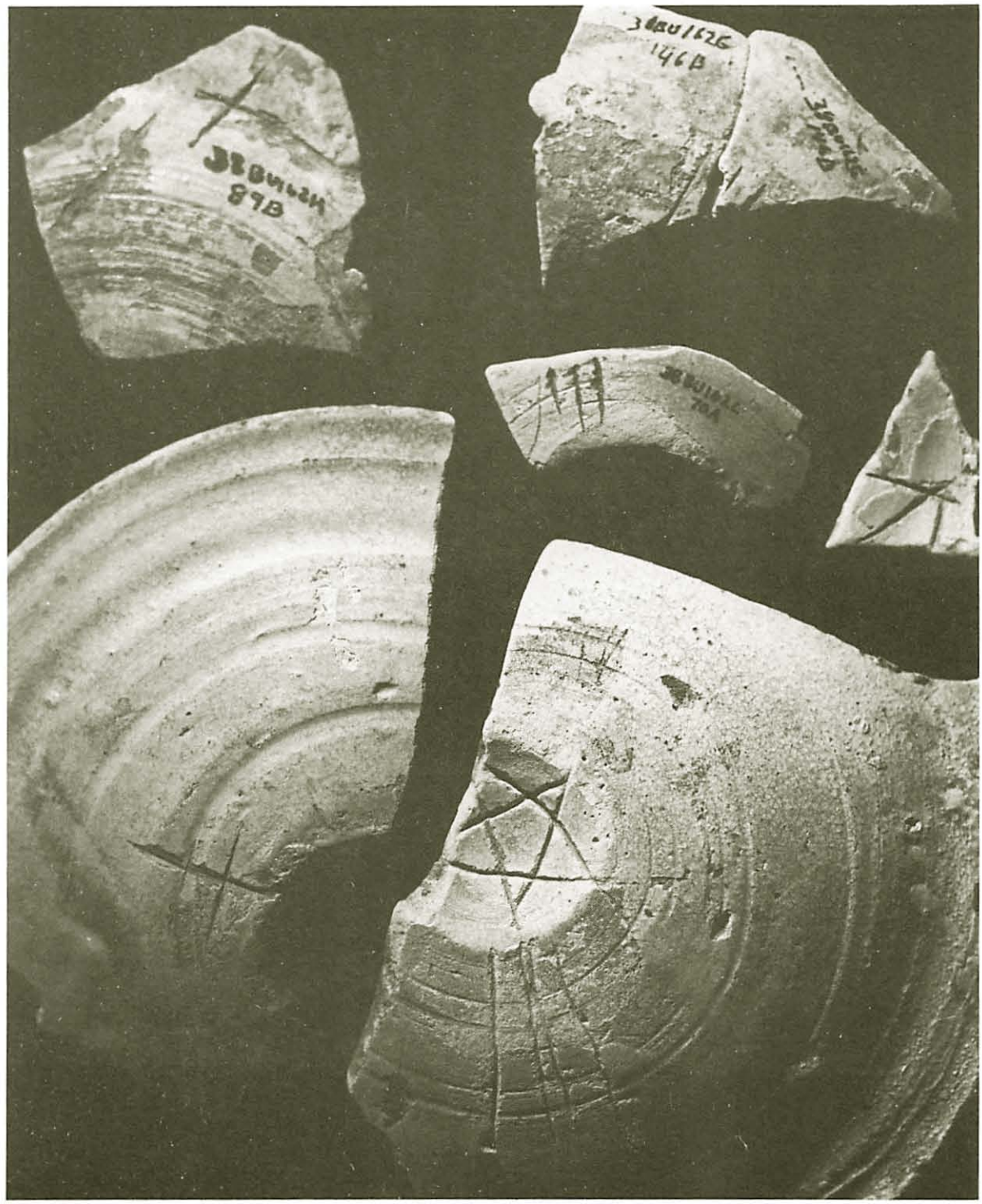


Plate 11. Engraved marks on majolica. **Top:** 38BU162H-89B, 162G-146B. **Right:** 38BU162C-70A, 162C-116B. **Bottom:** 38BU162G-49, 162D-90.

Plate 12. Engraved marks on majolica. **Top**: 38BU162E-42D, 162G-146B. **Center:** 38BU162C-164B, 162E-41D. **Bottom:** 38BU162G-54A, 162C-257.

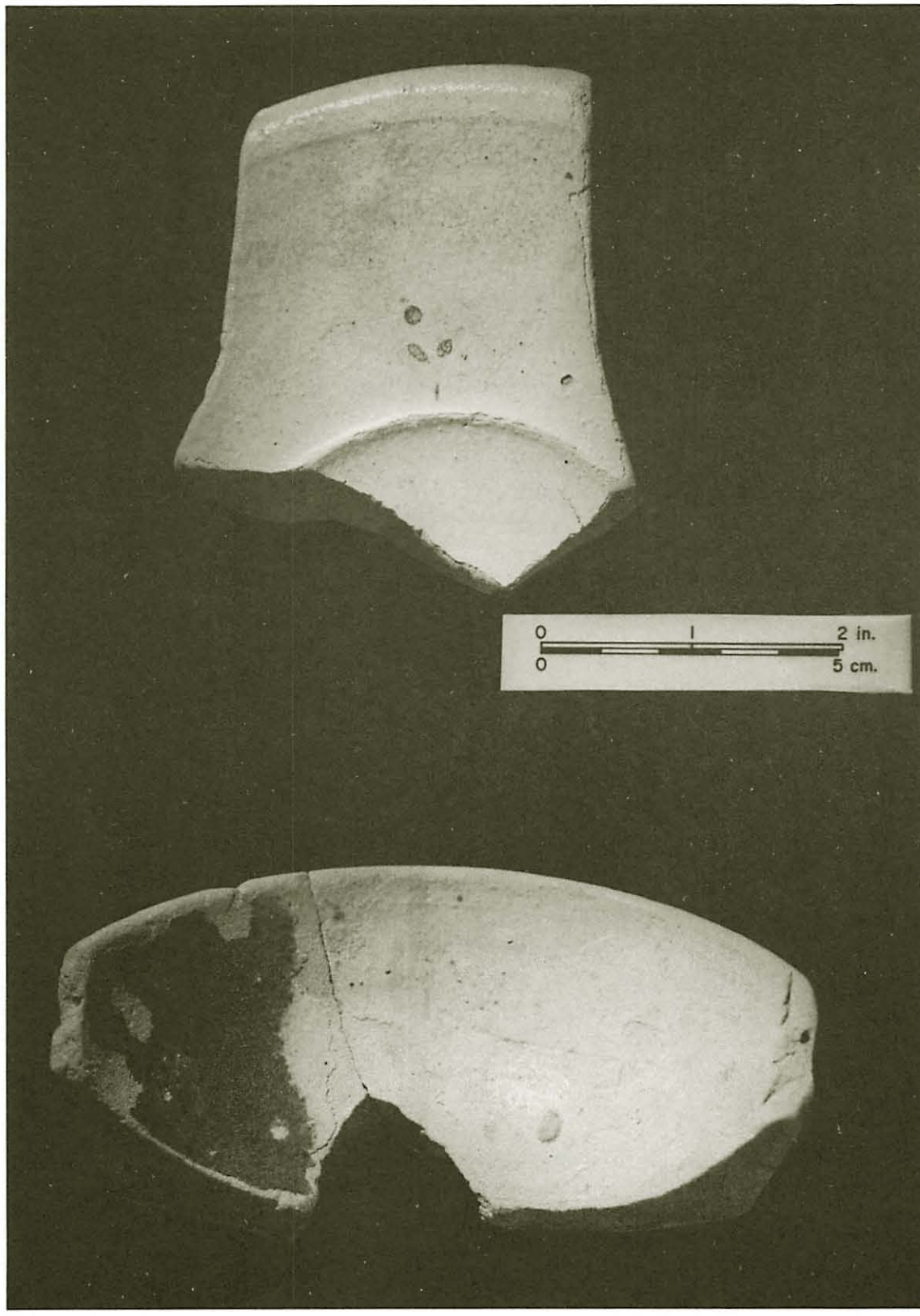


Plate 13. **Top:** Columbia Plain *plato* cleaned of the "gunmetal" color.
Bottom: Columbia Plain *Escudilla* cleaned of its "gunmetal" discoloration on the right sherd, with the "gunmetal" attribute not cleaned from the left sherd.

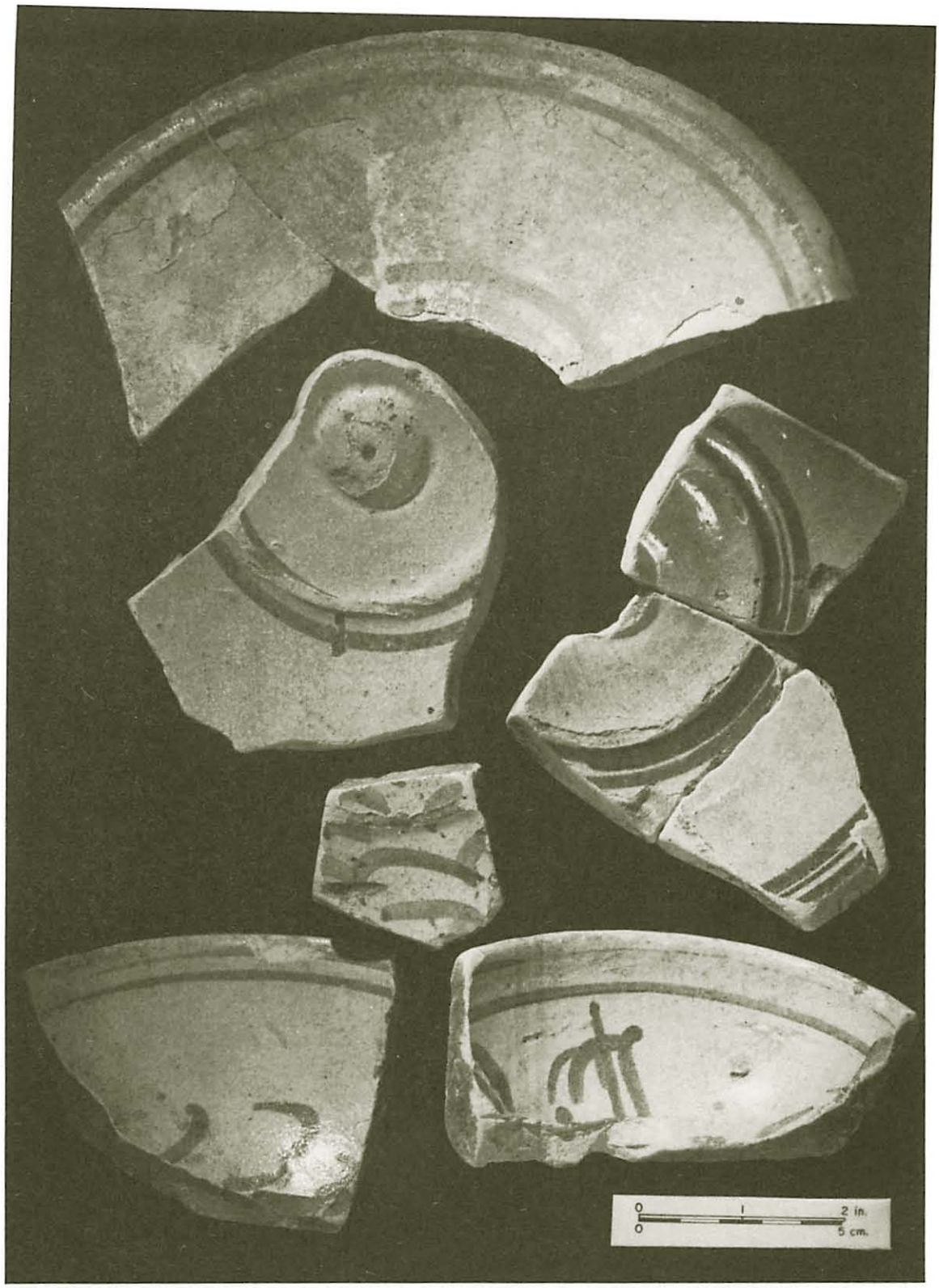


Plate 14. Yayal Blue on White majolica sherds. **Top**: 38Bu162G-146B. Row 2: 38BU162C-75, 162C-75 glued to 162C-20B. **Center:** 38BU162G-70A. **Bottom:** 38BU162G-241R, 162G-149.

Plate 15. Yayal Blue on White majolica bowl (center), from detail of "St. Hugo in the Refectory," by Zurbarán, ca. 1641-1658. From Gállego 1977: 301 (Seville: Provincial Museum of Fine Arts. Cat. No. 299).

Plate 16. Yayal Blue on White majolica (left), in "Sts. Justa and Rufina," by Zurbarán, (*Colección Arburúa*, Madrid). Photo from *Archivo Espasa-Calpe*. From Aznar 1977: 296.

Plate 17. Yayal Blue on White majolica variant sherds. **Top**: 38BU162H-172E glued to 162H-172C. **Bottom left:** 38BU162H-89B. **Right:** 38BU162G-149.

Isabela Polychrome

Isabela Polychrome (Goggin 1968: 126-128), in both *escudilla* and *plato* forms, is present at Santa Elena (Fig. 8; Plate 18). Both forms, *platos* on the obverse, *escudillas* on the exterior, carry the stylized *alafia* design commonly associated with this vessel type on other New World sites (Deagan 1978: 44; Lister and Lister 1982: 52-54; Willis 1984: 158). Forms examined from the Santa Elena collection seem to be slightly larger than Columbia Plain *escudilla* and *plato* forms, with an average diameter of 16-17.5cm for *escudillas* and 22cm for the Isabela Polychrome *plato* forms.

Santo Domingo Blue on White

The Santa Elena collections have yielded Santo Domingo pitcher, bowl and *bacín* (chamber pot) forms from which Goggin's (1968: 131-134) original type description could have been written (Fig. 9; Plates 2, 19, 20). The foot-ringed, brimmed bowl form (Fig. 9 center; Plate 19) with a diameter of 29cm falls within the range of Goggin's larger bowl form description (1968: 133). The rim flange is covered with blue dots and dashes which may represent stylized *alafias*. A medallion of two concentric circles encloses a central bird and floral motif on the interior of the bowl. Goggin (1968: 132) suggested that similar bird effigies may represent a *pardalot.*

Jarros (Lister and Lister 1976a: 54) or handled-pitcher forms, almost identical to those reported and reconstructed by Goggin (1968: 132-133; Plate 5) from the Convento de San Francisco, have been found at Santa Elena. These flat bottomed vessels display exterior glazing that extends down to within 2-3cm of the base, leaving the vessel base itself unglazed. Design motif includes a scalloped-edged medallion on the "chest" of the pitcher. It is surrounded by a floral design with a blue stripe encircling the body below the medallion (Fig. 9; Plate 2). An example of a pitcher of this type was depicted in 1619-21 by Velásquez in his paintings of "An Old Woman Cooking Eggs", "Christ at Emmaus" and "The Servant" (Plates 5,7,8) (Troutman 1965: Plate 4; López-Rey 1968: Plate 20, 21).

Bacín or chamber pot forms appear in heavy, vertical walled vessels with horizontal flanged rims. Decoration consists of poorly applied vertical blue stripes on a grey-white ground (Fig. 9; Plate 20).

Sevilla Wares

Lister and Lister (1982: 57-60) discuss a fine white and blue-and-white series of majolicas which are"technically and stylistically dramatically superior to the previously discussed Morisco wares" and are related to the Italianate movement at Sevilla. This ware may be that which Goggin refers to as "thin white majolica" (1968: 144). The Listers (1982: 62, Fig. 4.32) imply that Sevilla wares represent a fine grade ceramic in opposition to the Morisco common grade wares.

Sevilla Blue on White

At Santa Elena the Sevilla Blue on White majolica sherds (Plate 21) are from a bowl, or porringer form, or jars with constricted necks, everted rims and ring-footed bases (Lister and Lister 1982: 68, Fig. 4.23 a-e). They may also be from a hollow ware vessel bearing a motif similar to that associated with those bearing "IHS" in Lister and Lister (1982: 63, Fig. 3.44).

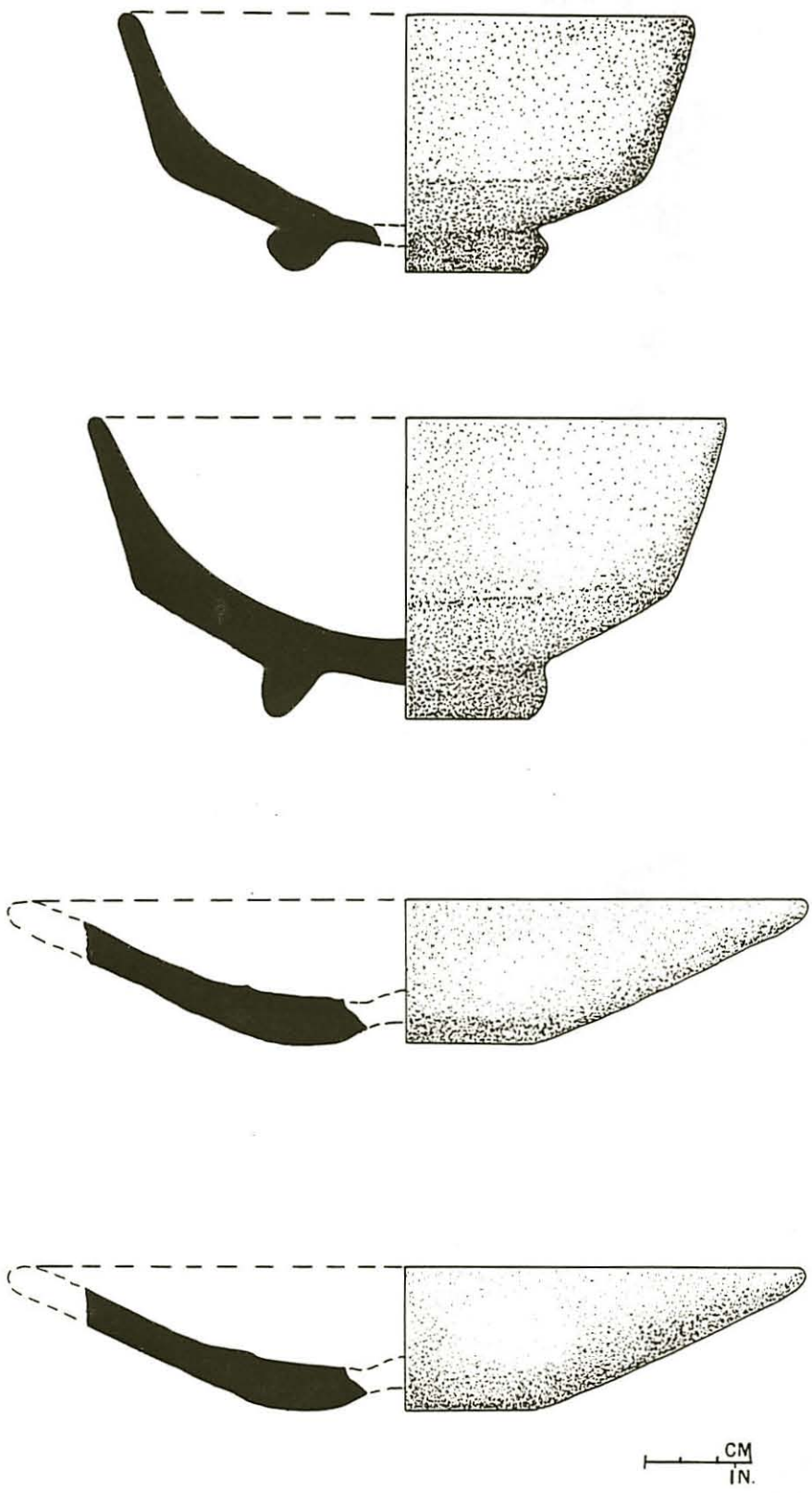


Figure 8. Isabela Polychrome majolica *escudilla* and *plato* forms.

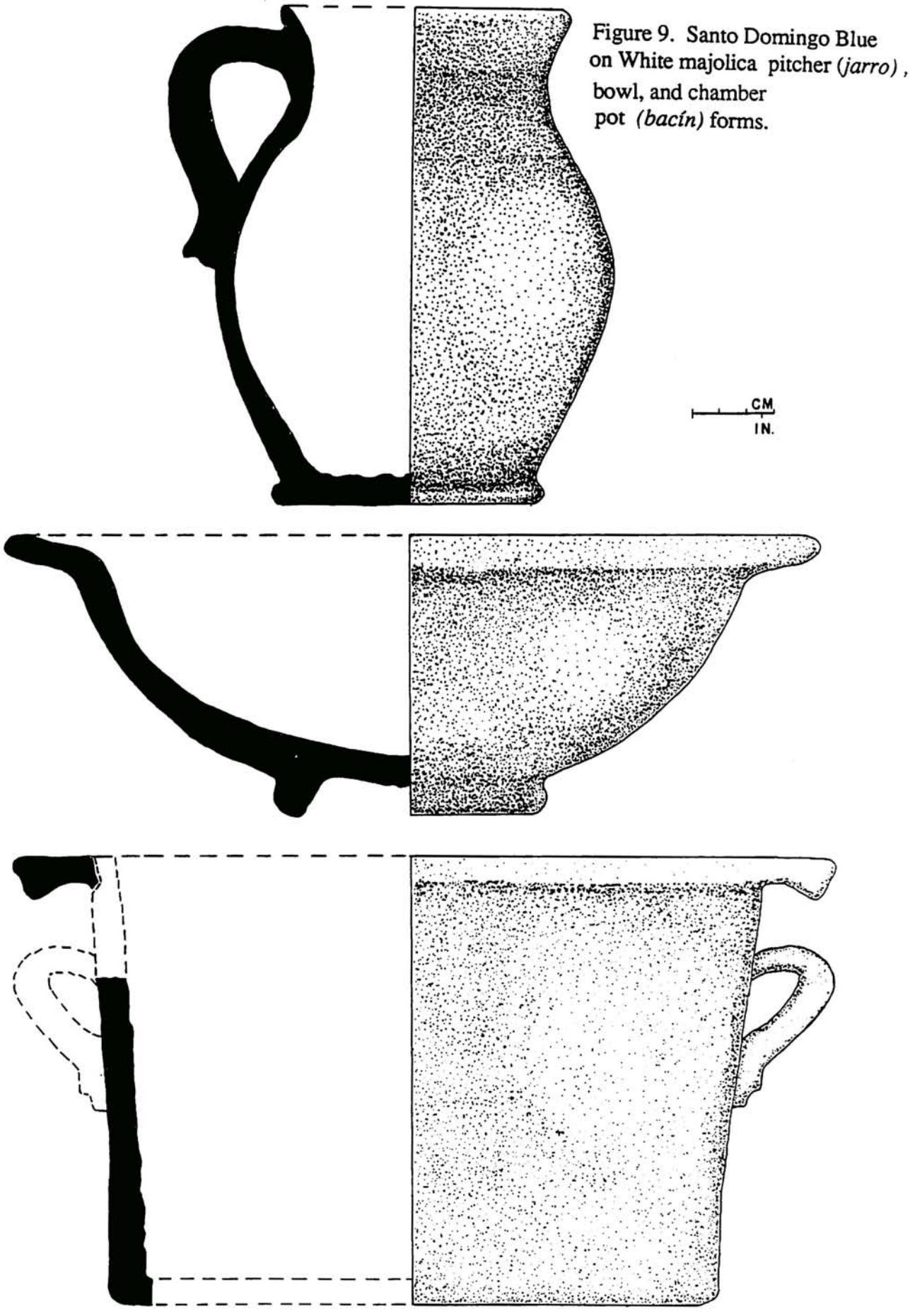


Figure 9. Santo Domingo Blue on White majolica pitcher (*jarro*), bowl, and chamber pot (*bacín*) forms.

Plate 18. Isabela Polychrome majolica sherds. **Top:** 38BU162C-323, 162H-146F. **Center:** 38BU162J-143. **Bottom:** 38BU162C-207B.

Plate 19. Santo Domingo Blue on White majolica bowl. Top and side views. 38BU162C-75.

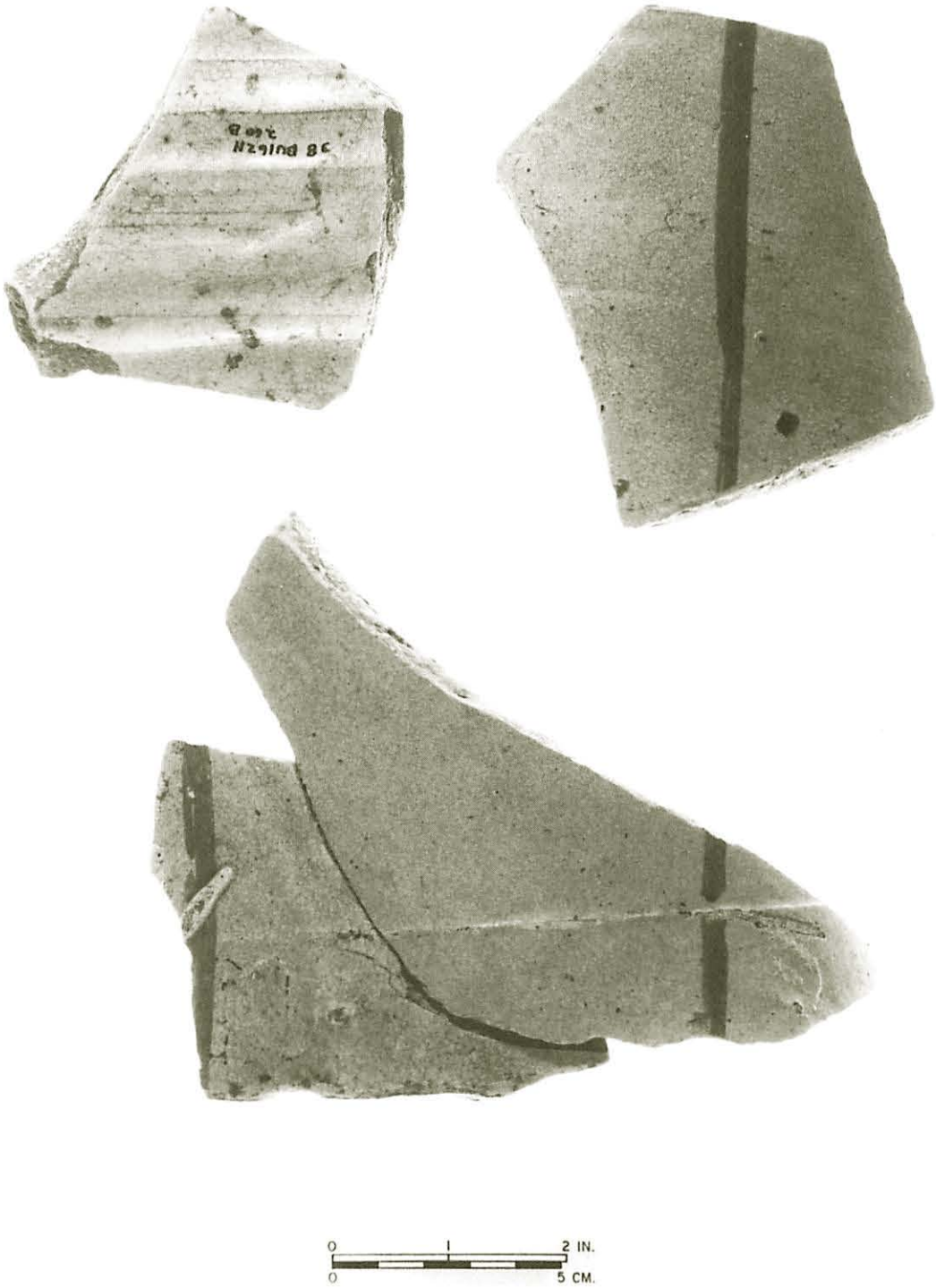


Plate 20. Santo Domingo Blue on White chamber pot sherds. **Top:** 38BU162H-260B, 162C-21B. **Bottom:** 38BU162C-20B glued to 162C-75.

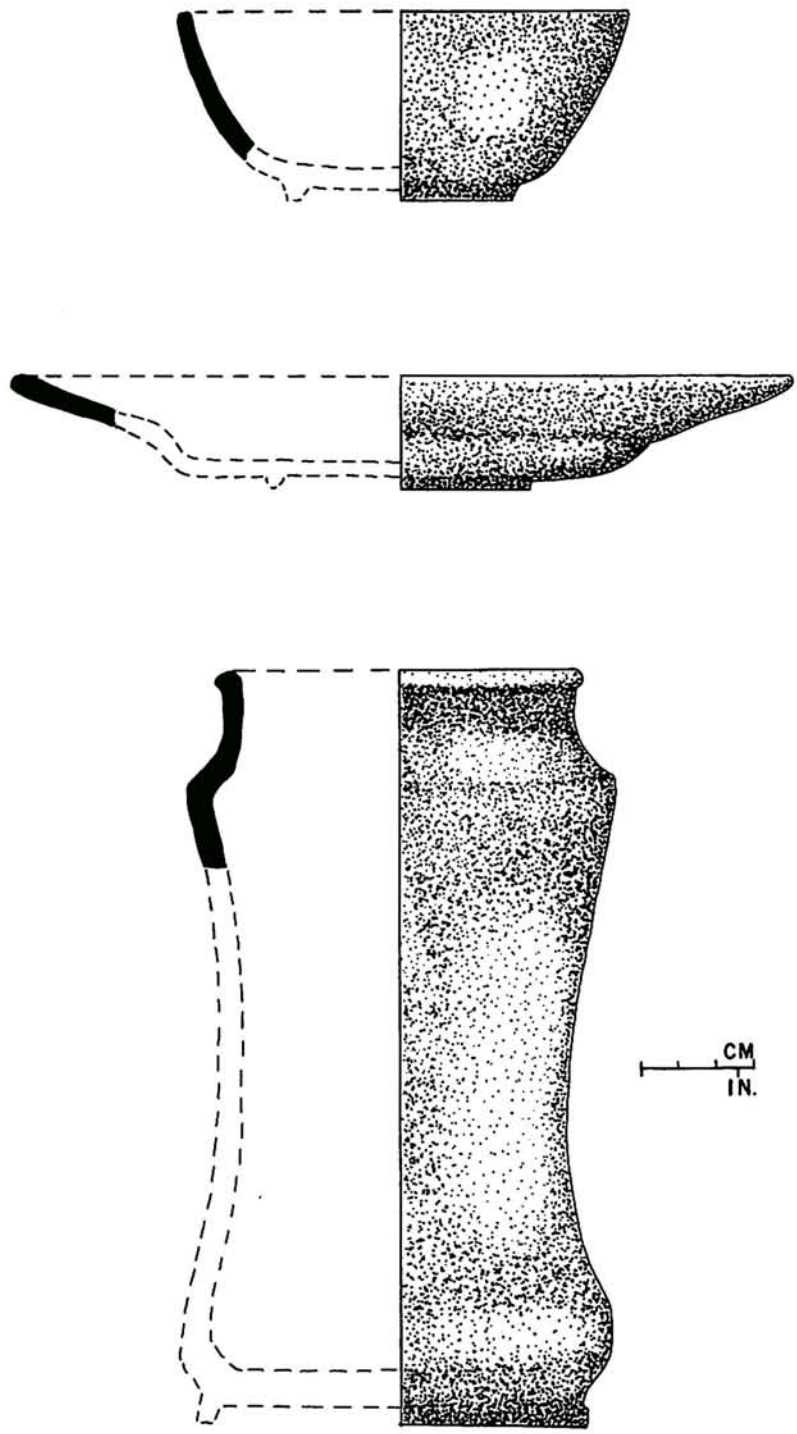


Figure 10. Italian Ligurian Blue on Blue majolica bowl form (top) and plate *(plato)* (center), and a Caparra Blue majolica drug jar form *(alberelo)* .

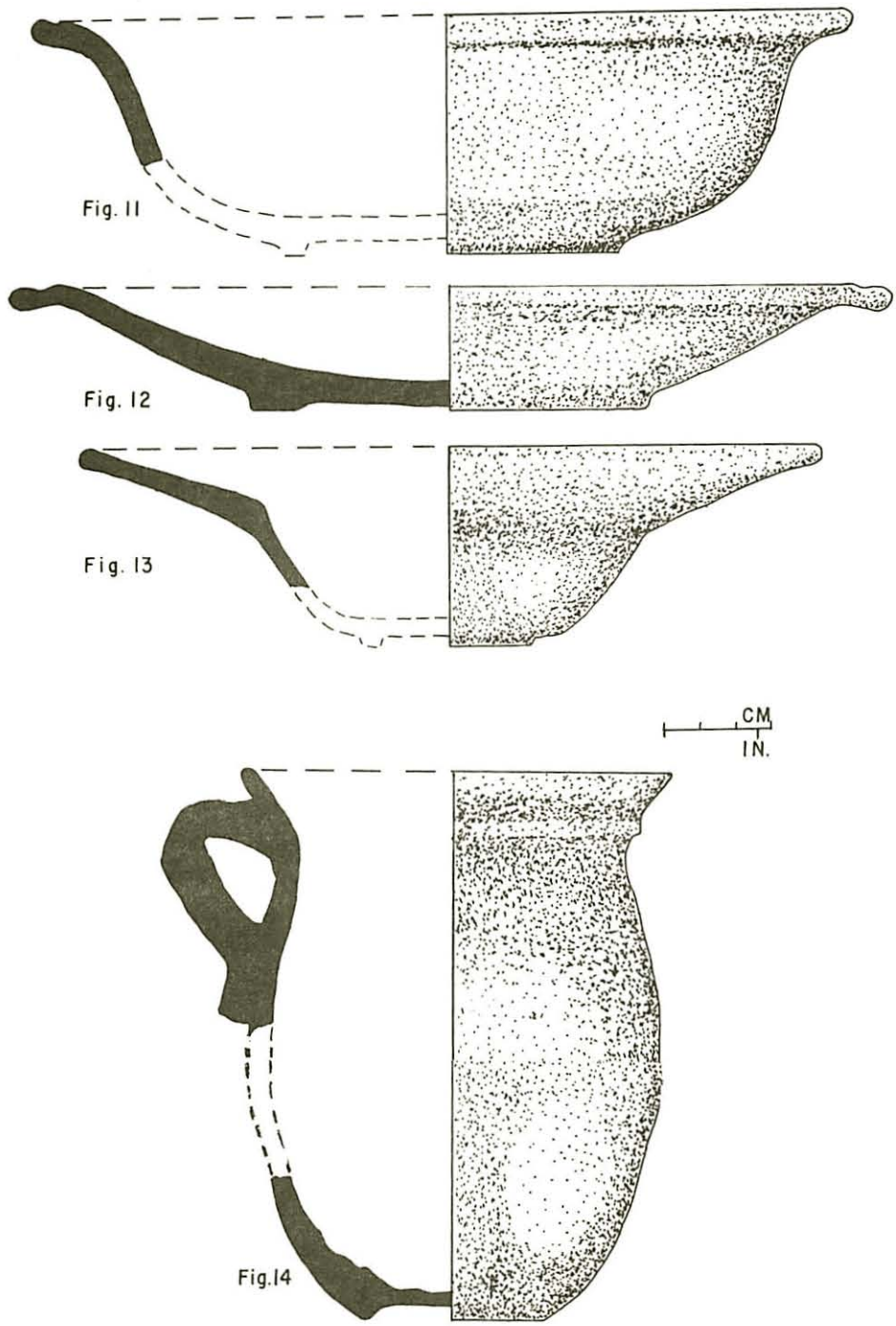


Figure 11. Italian Montelupo Blue on White majolica bowl form.
Figures 12 and 13. Italian Montelupo Polychrome majolica plate and bowl forms.
Figure 14. Santa Elena Mottled Blue on White majolica jar *(jarro)* form.

Plate 21. Sevilla White, San Felipe Green Edged, Sevilla Blue on White, and Caparra Blue majolica sherds. **Top:** Sevilla White majolica sherds. 38BU162E-44B, 162H-146C, 162H-146C. **Right:** San Felipe Green-edged majolica. 38BU162G-146B, 162G-222. **Center:** Sevilla Blue on White majolica. 38BU162G-146B, 162-66B, 162H-146G. **Bottom:** Caparra Blue *albarelo* or drug jar majolica sherds. 38BU162H-77B, 162H-89D.

Plate 22. Italian majolicas. **Top:** Ligurian Blue on Blue majolica. 38BU162H-146C glued to 162H-262 and 162G-146. Right: 38BU162C-138B. **Center:** Ligurian Blue on Blue majolica. 38BU162E-41D, 162G-146B, 162G-56A. **Bottom left and center:** Ligurian Blue on Blue majolica. 38BU162C-50B glued to 162C-105 and 117. (center) 38BU162G-1. **Bottom right:** Montelupo Blue on White majolica sherd. 38BU162E-41D.

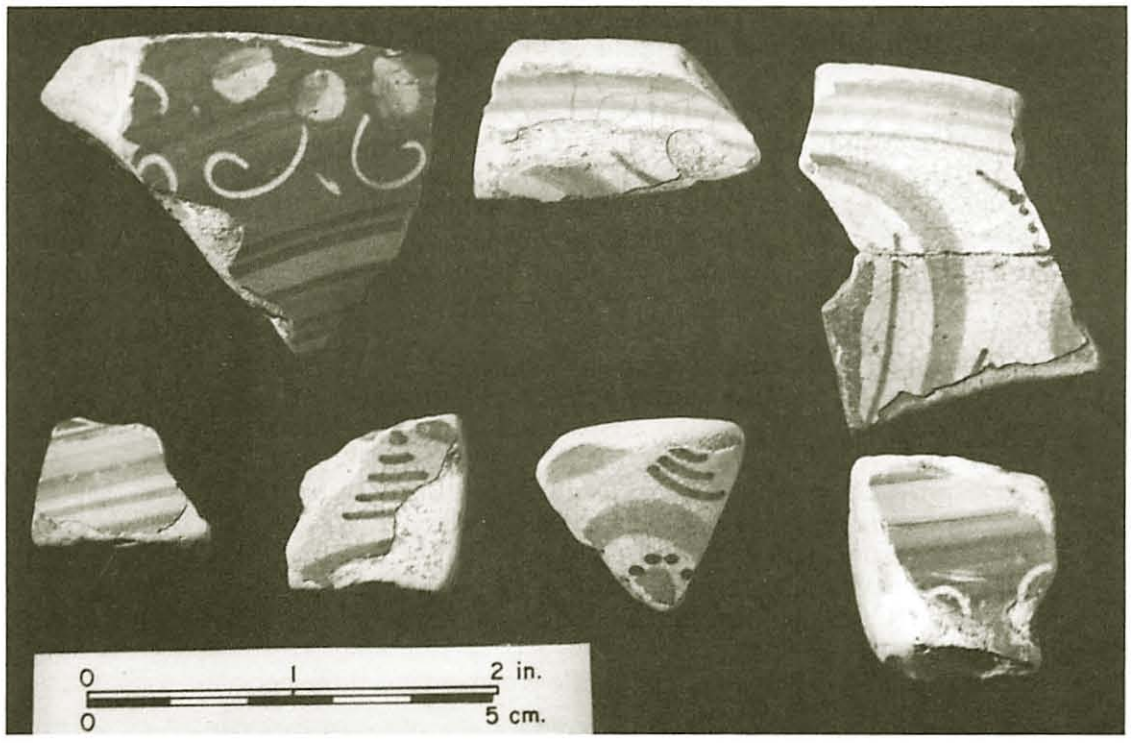


Plate 23. Italian Montelupo Polychrome majolica. **Top:** 38BU162C-257. The provenience distribution of crossmends and other sherds of this vessel is seen in Figure 1. **Bottom, top row:** 38BU162C-332B, 162D-8B, 162C-56B glued to 162-257. **Bottom row:** 38BU162-104A, 162C-50B, 162C-257, 162A-143.

Ligurian Blue on Blue

Originally published as a part of Goggin's Ichtucknee Blue-on-Blue classification (1968:135-141), which was subsequently split by the Listers (1976b: 32-33, 1982: 72-75), this Italian ware type appears at the site in the form of a broad-brimmed deep plate form on cream colored paste and a small bowl form (Figs. 10 and 13; Plate 22) which is similar to forms depicted by Goggin (1968: 138 Fig.13[1]) and the Listers (1982: 73, Fig.4.40e). Examples from Santa Elena bear characteristic edge, interior and exterior motifs (Goggin 1968: 137, Fig. 12a) of grape vines, birds and interlocking arches (Plate 22).

New Majolica Types

Santa Elena Mottled Blue on White

In 1982 (pp. 45-47) Stanley South announced the definition of a new majolica type called Santa Elena Mottled Blue on White. A formal type description follows (Fig. 14; Plate 24).

Method of Manufacture: Wheel thrown
Paste: Similar to Columbia Plain (i.e., cream to buff).
Surface Finish: Similar to Columbia Plain.
Decoration:
Technique: Sponged-painted.
Paint: Dull cobalt blue on white enamel surface. The surface is generally glossy although (possibly eroded) matte sherds are present.
Color classification: Dark blue to medium-light blue.
Designs: Randomly applied, tightly spaced, sponged blue, amorphous splotches.
Distribution: Splotches cover the entire exterior including the base. Interior is plain white.
Form:
Neck: Everted neck and rim tapers toward the lip.
Lip: Variably rounded outward or sometimes flattened.
Body: The most distinctive shape is a small handled jar*(jarro)* (Lister and Lister 1976a: 54) or pitcher form (Fig. 14).
Interior: Upper two-thirds are well smoothed. Basal area is ridged with throw marks.
Exterior: Sometimes is ridged at the neck and incised at the waist. Body is smoothed of throw marks.
Base: Concave on jar forms.
Thickness: Compared to Santo Domingo pitchers they are slightly thinner (e.g., 0.5cm) .
Appendages: Solid, applied loop handle commencing at the neck and terminating at the waist.
Parallel Type: Tlalpan Mottled, a red-pasted (possibly in imitation of the Santa Elena prototype) Valle Ware found in Mexico (Lister and Lister, personal communication to Stan South, April 19, 1982: 33, Fig. 3.33).
Comments: An intact example of a Santa Elena Mottled Blue on White pitcher with a concave base has been recovered from a burial context on St. Catherine's Island, Georgia, by David H. Thomas (Debra Peter, personal communication to Skowronek, March 3, 1986).

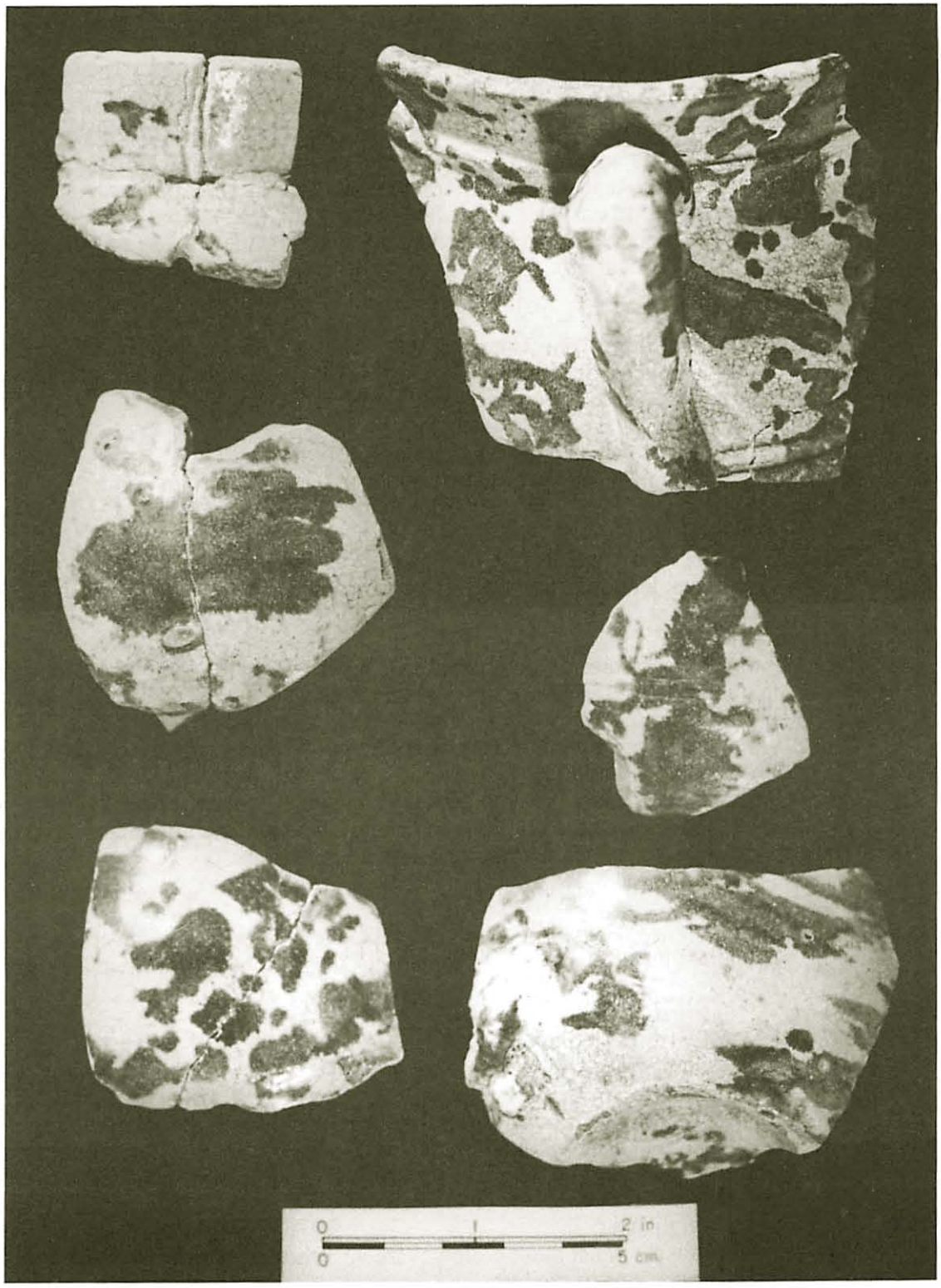


Plate 24. Santa Elena Mottled Blue on White majolica. **Top:** 38BU162C-355B, 162E-43C. **Center:** 38BU162G-65A, 162H-91A. **Bottom:** 38BU162H-79A, 162E-41D.

Santa Elena Green and White

Forms similar to this ware have been reported on other New World sixteenth century Spanish sites (e.g., Puerto Real; Charles Ewen personal communication August 27, 1985), but no formal type description has been published to our knowledge. In as much as this is the case, Santa Elena Green and White is proposed as a newly designated type of Spanish empire majolica (Fig. 15; Plates 25 and 26).

Paste:

Method of Manufacture: Wheel-thrown. Throwing marks are visible on the interior of these vessels. Exteriors are generally well-smoothed except on small bowl or cup forms, which is purposely left ridged.

Tempering: None

Texture: Compact, fine and chalky, similar to Columbia Plain

Hardness: Soft, punky, easily eroded; similar to Columbia Plain

Color: Cream to pale pink (Munsell 10YR8/2 to 5YR 7/6)

Surface Finish:

Filming: Vessel interiors are white tin-glazed. The upper third of the exterior is covered with green lead glazing. This glaze varies from matte and opaque to glossy and transluscent.

Decoration:

Technique: Uniform interior, tin enamel coating of the vessel. Painted exterior, green lead glaze with resultant drips (which should not be unexpected at a busy pottery shop/factory).

Paint: White, tin-glazed interior (often discolored grey) and green lead-glazed exterior lip, neck and shoulder.

Color Classification: Light green to dark gray-green. The green or partially green sherds all showed a color variation due to the thickness and quality of the glaze.

Design: All vessels have white interiors and green exteriors.

Marks: None noted.

Inscriptions: None noted.

Distribution: White glaze is limited to vessel interiors. Green glaze covers exterior shoulders, necks and lips and sometimes the interior rim of these jar and bowl forms.

Form:

Rim: Flattened, everted and inverted.

Lip: Rounded and squared.

Body: Forms similar to that of *orzas, morteros, albarelos, tarros, bacíns* and *tibors* - pitchers (Plates 25 and 26), chamber pots, small steep-sided bowls and mortars described by Lister and Lister (1976a: 63, 66, 83, 85) are most common.

Base: Bases are generally flat with a constricted foot in pitcher forms (Plate 26). Rolled and rounded foot-rings are also present. Bowls and chamber pots are assumed to have flat bases.

Thickness: Below the waist these hollow ware vessels tend to be almost twice as thick as the upper half of the jars.

Appendages: Simple strap handles on pitcher and *bacín* forms.

Parallel type: Possibly an olive jar paste storage vessel reported from sixteenth century St. Augustine (Deagan 1978: 35). Also, aspects of López-Cervantes' (1974: 28-30) "Tipo Vidriado Verde" are similar.

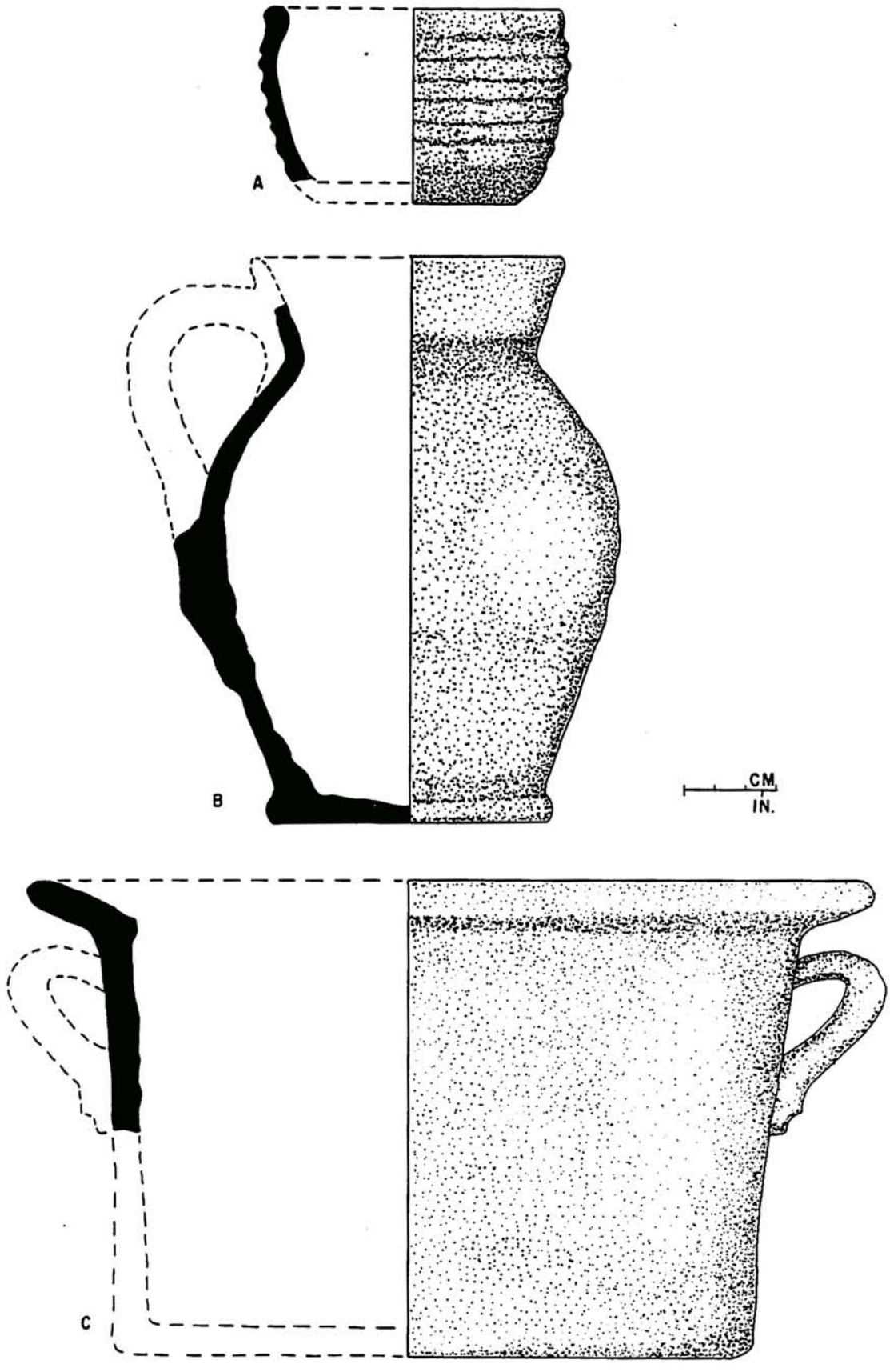


Figure 15a. Santa Elena Green and White majolica bowl, pitcher (15b) and chamber pot forms (15c).

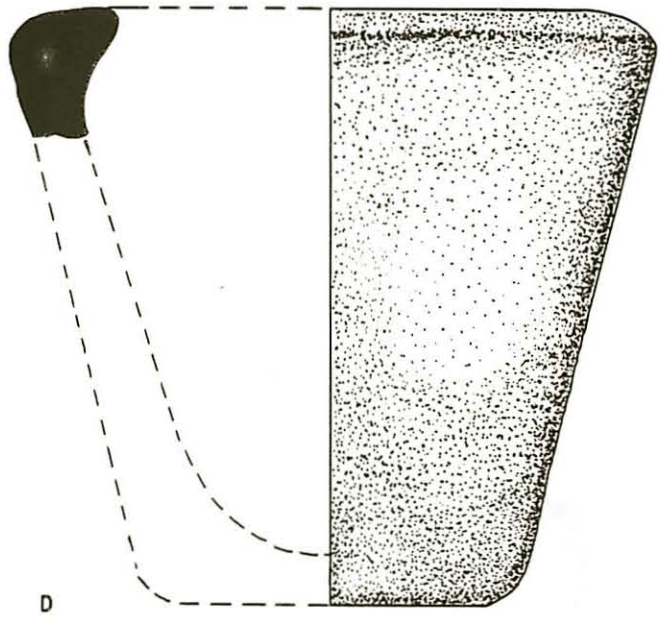
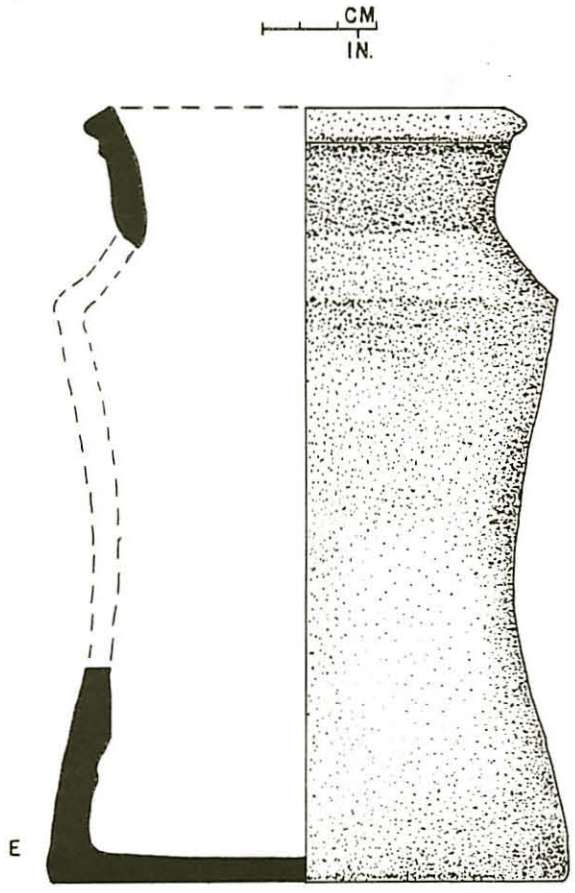


Figure 15d. Santa Elena Green and White majolica mortar *(mortero)* and a drug jar form *(albarelo)* (15e).



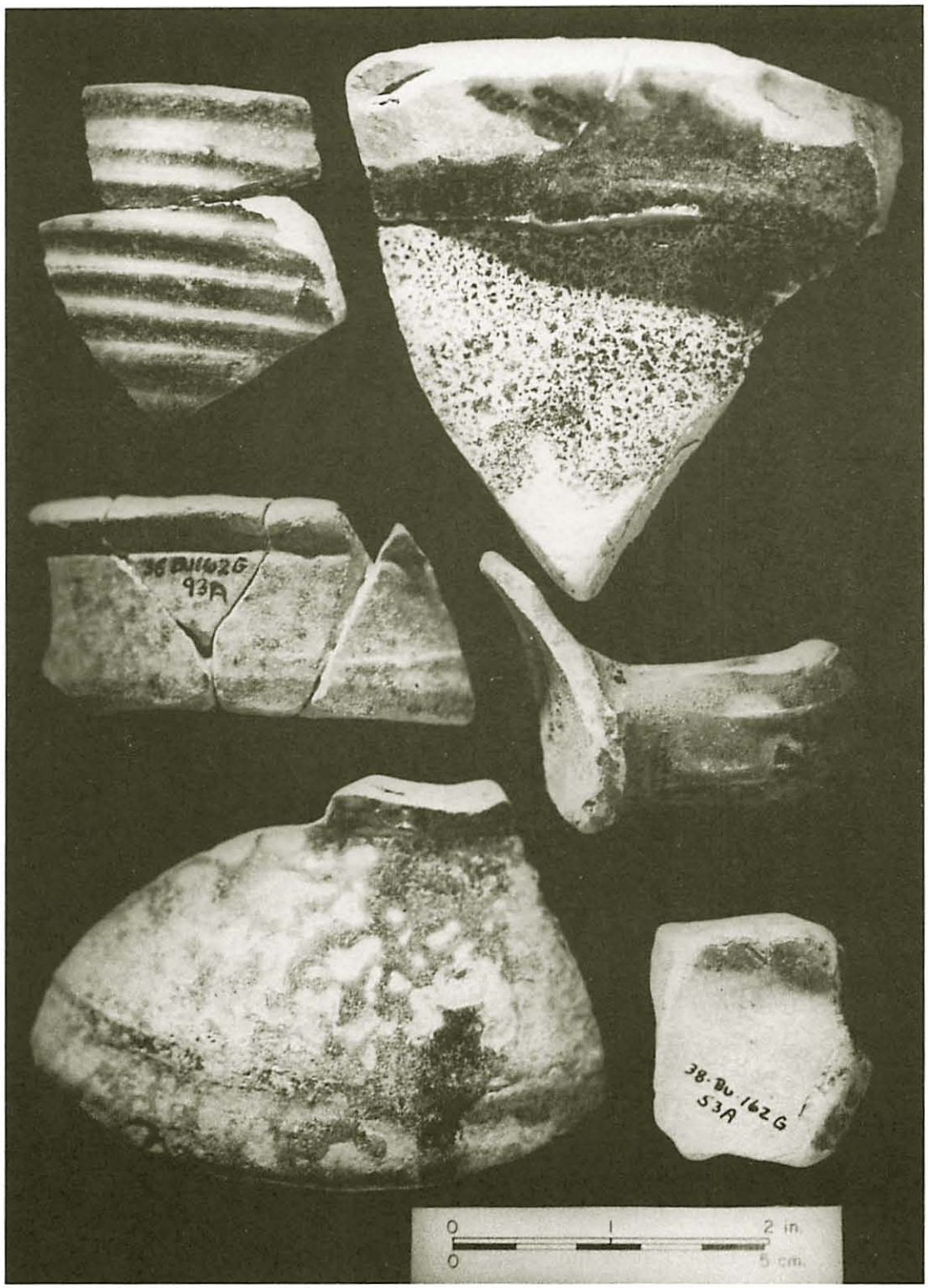


Plate 25. Santa Elena Green and White majolica. **Top:** 38BU162H-78A, 162H-333D glued to 162H-172C. **Center:** 38BU162G-93A, 162G-57A. **Bottom:** 38BU162G-146, 162G-53A.

Plate 26. Santa Elena Green and White majolica pitcher. 38BU162H-217G, H.

Comments: This ware has been referred to as "Green cylinder" in the Santa Elena reports since 1983 as a temporary title until this study could be undertaken (South 1984: 97-105). Information regarding similar hollow ware forms from other sites is needed to enhance current status of awareness regarding this ceramic type.

San Felipe Green-edged

Three sherds of a green-edged glossy white/buff paste majolica bowl were recovered from Fort San Felipe (1572-1576) at Santa Elena. Two other sherds, also from Fort San Felipe, have a pale green color to the majolica glaze and are thought to be a variant of the same type ware. The green edge bleeds into the white majolica body a distance of from .7 to 1.0cm below the rim (Plate 21). The whiteness of the three green-edged sherds is much the same as that of Sevilla Ware sherds and may well be a Sevilla Ware type. This is a common type majolica according to the Listers (personal communication to Stan South, January 9,1986), but has not been found at St. Augustine (Kathleen Deagan, personal communication to Stan South, January 9, 1986). It has not been previously described and the scarcity of sherds recovered at Fort San Felipe might suggest that assigning a type name at this time might be unwarranted. However, the extremely diagnostic attribute of green-edging on majolica has prompted us to refer to the type here by its specific location within Fort San Felipe in the town of Santa Elena as San Felipe Green-edged Majolica.

CHAPTER 11

LEAD- GLAZED EARTHENWARE

Honey-colored

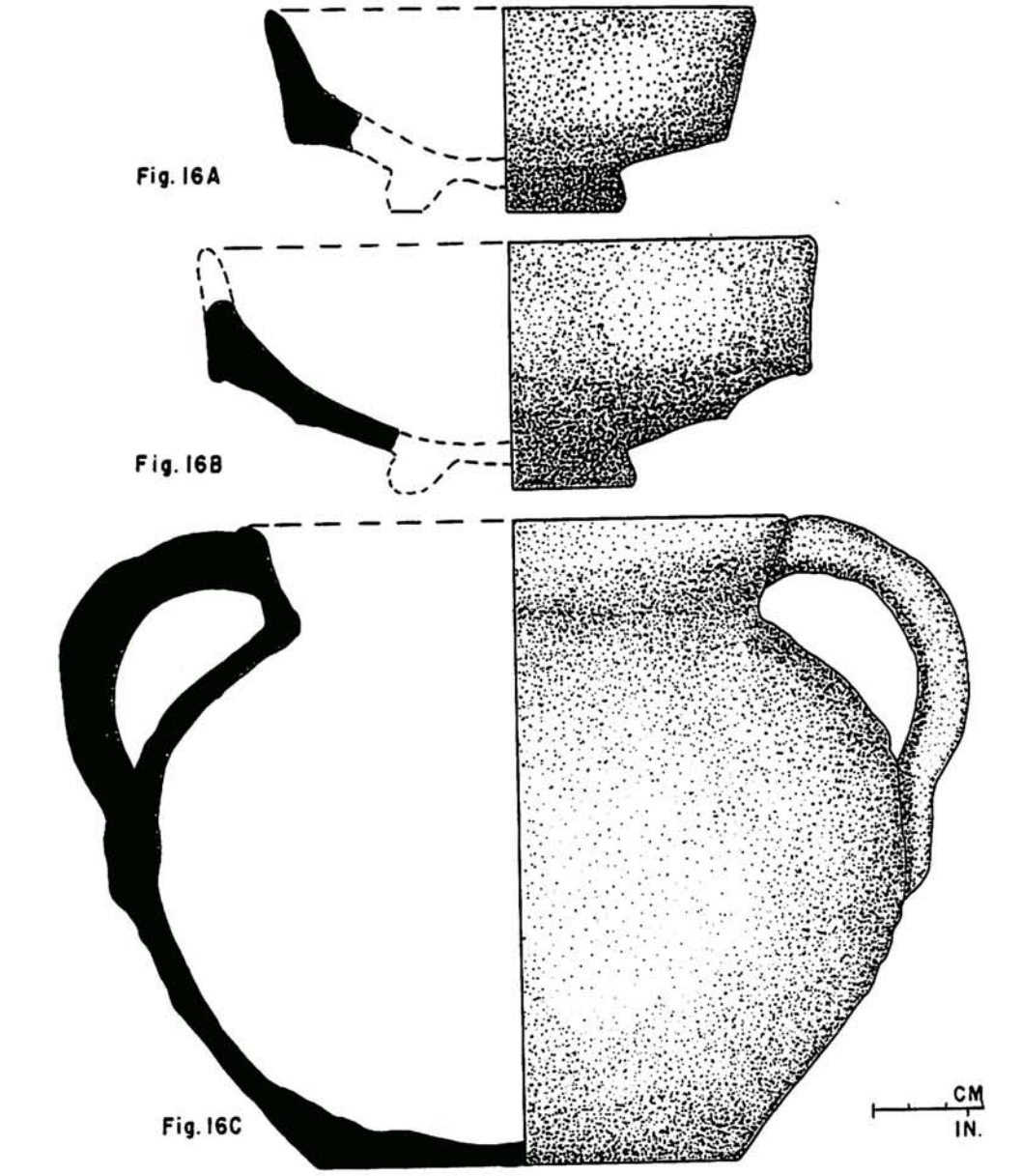
Goggin (1968: 227) initially mentioned a majolica-like, buff-colored earthenware with a clear honey-colored lead glaze. This type of ware was subsequently discussed by Fairbanks (1973: 167) and other University of Florida researchers (Council 1975: 93; Deagan 1978: 39; Willis 1976: 126, 1984: 162) as a time marker for pre-1550 contexts. Research by the Listers (1982: 22-26) indicates that similar "honey-colored," lead-glazed, majolica pasted wares are present among Mexico City wares of the common grade. A clear lead glaze on a buff paste produced these yellow lead-glazed wares. Honey-colored ware is also reported by Colin Martin from the *Santa Maria de la Rosa*. Ceramics from this Armada vessel were produced in San Sebastian (1980: 98).

Redman and Boone reported a similar manganese-painted honey-colored ware (*melado*) as the most common Spanish decorative ware in Portuguese deposits at Qsar-es-Seguir in Moroccan North Africa, dating from 1458 to 1550 (1979:33). This *melado* ware is, no doubt, related to the honey-colored ware found in *escudilla* bowl forms at Santa Elena, although none of the Santa Elena sherds are manganese-painted.

The origin of honey-colored lead-glazed, *escudilla* form ceramics at Santa Elena (Fig. 16; Plate 27) is uncertain at this time. Observed bowl forms are larger than Columbia Plain vessels of similar form at this site, displaying a 23cm diameter. If these ceramics are part of the assumed Spanish produced, Honey-colored/Seville Ware (*melado*) type tradition and are not heirlooms, it is necessary for researchers of Spanish Colonial ceramics to extend the duration of this ware beyond the 1550 end date usually assigned, at least to the abandonment of Santa Elena in 1587.

Red

Present at Santa Elena, this type is defined as a forerunner to the El Morro lead-glazed variety of the seventeenth century (Deagan 1978: 38). Paste is coarse earthenware, soft and sandy with inclusions of gritty sand. Red vessels function as utilitarian wares and are found in jar-like forms (Fig. 16c; Plate 28). These flat-based, globular bodied, constricted necked jars are wheel thrown. Rim styles run the range from inverted/squared to straight/squared to everted/flattened (Fig. 17). Paired strap handles attached at the lip and the shoulder are common. These vessels are always glazed on the entire interior surface. Usually this glaze will cover the exterior rim as well. Drips onto the body are common. The common color of glaze at Santa Elena is red to brown, although olive green and yellow occur as well. It is interesting to note that orange was the most common color for these ceramics at contemporary sixteenth century St. Augustine (Deagan 1978: 38). Throw marks are always visible on the interior of these jars while exteriors are partially smoothed. Sooting of the exteriors is common. A good example of one of these coarse wares is pictured in Velásquez' painting of "An Old Woman Cooking Eggs " (Plate 5), (Troutman 1965: Plate 4). Falling into this same red paste, lead-glazed category are olive green constricted necked jar fragments, one of which is impressed with a trilobed mark (Fig.18; Plate 29). These sherds have a clear lead-glazed interior, producing an orange-red color.



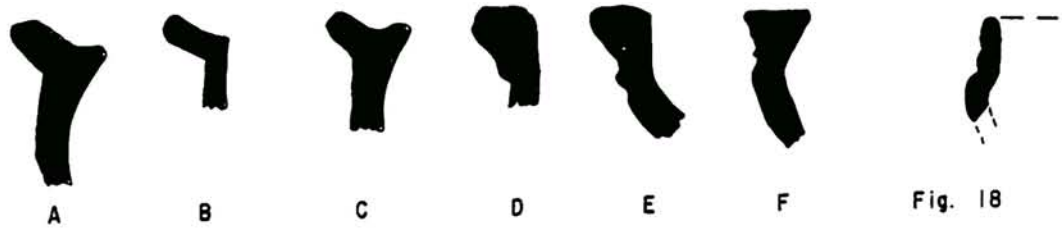


Fig. 17

Figure 16a and b. Honey-colored Lead-glazed Earthenware *escudilla* forms, and a Red Lead-Glazed Earthenware globular jar or cooking pot form (16c).
Figure 17. Rim forms of Red Lead-glazed Earthenware vessels.
Figure 18. Rim of muddy greenish Lead-glazed Earthenware vessel.

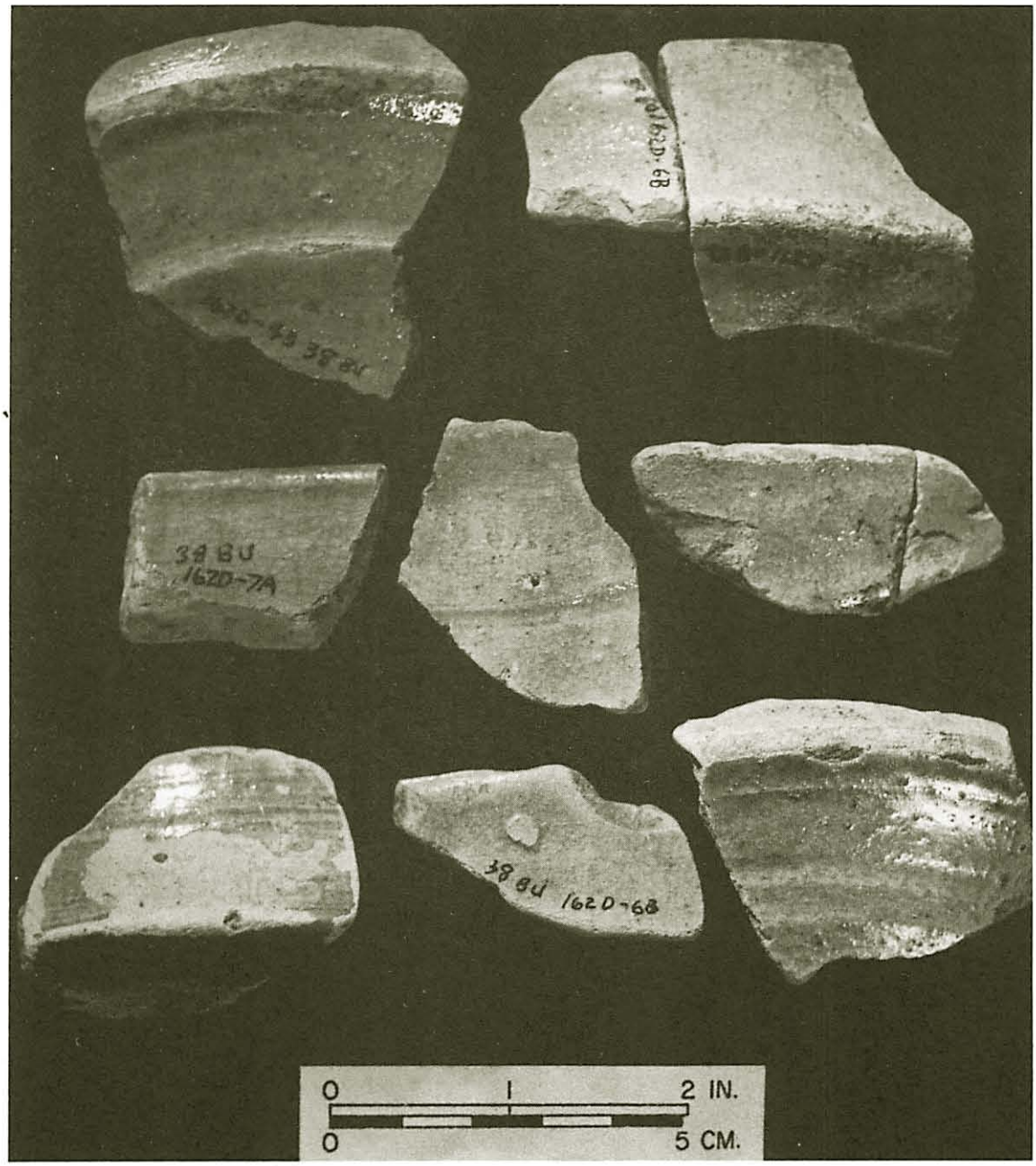
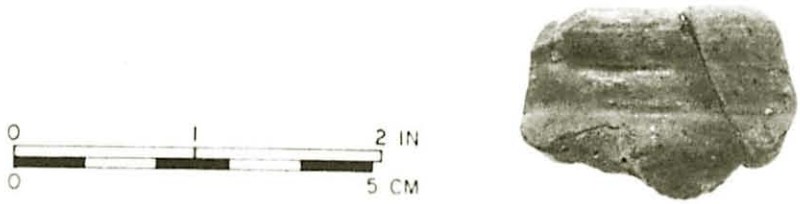


Plate 27. Honey-colored Lead-glazed Earthenware. **Top:** 38BU162D-4B, 162D-6B glued to 162D-37. **Center:** 38BU162D-7A, 162D37, 162D6A glued to 162D-4A. **Bottom:** 38BU162E-42C, 162D-68, 162D-5B.

Plate 28. Red Lead-glazed Earthenware. **Top:** 38BU162H-261, 162E-44E. **Row 2:** 38BU162G-59A glued to 162G-59B, 162G-51A, 162E-37C. **Row 3:** 38BU162G-62A, 162G-53A. **Row 4:** 38BU162G-77A, 162H-401. **Bottom:** 38BU162G-93A, 162G-52A.



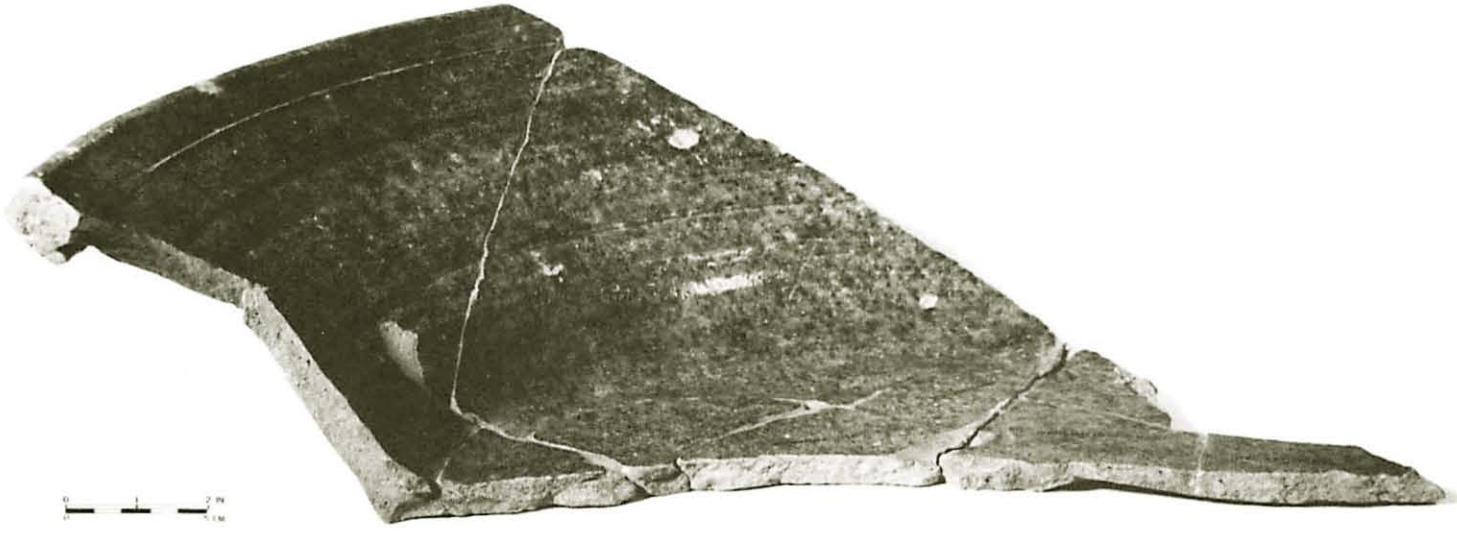


Plate 29. **Top:** Olive-green colored (higher fired) Red Lead-glazed Earthenware. 38BU162C-346B, 162D-21A (center), 162D-29A.

Plate 30. **Bottom:** Green-glazed Earthenware, the large pan shaped *"lebrillo"* form. 38BU162E-39E glued to 162E-6B, 42E, and 41D.

Green (*"lebrillo"* [basin], *"bacín"* [chamber pot], *"bacín verde"* [green chamber pot]

Goggin (1968: 226) mentions in his glossary a "steep-sided, flat-bottomed, large" green- glazed earthenware" bowl" or *lebrillo* (Lister and Lister 1976a: 56). Later researchers (Deagan 1978: 35-36; Fairbanks 1973: 165-167; Willis 1976: 125, 1984: 162-163) have mentioned the presence of this type/form with diameters of one meter (Plate 30). Examples of this heavy, thickly green, lead-glazed ware from Santa Elena range 26-40 cm. in basal diameter and 41-62 cm at the mouth (Fig. 19). All fragments of this heavy rimmed ware bear what appear to be rope or cord impressions on the upper exterior lip area of the vessel (Plate 31). Apparently the clay comprising the body walls was too weak to support the reinforced, relatively heavy rims of these vessels. Rope nooses must have been fastened about the rims until the *lebrillos* were leather hard and the glaze could be applied. Fragments recovered at Santa Elena are always glazed on the interior. Exterior glaze appears only as slops.

We call to the attention of students of ceramic research the correct name for this type, as Hispanization of its name is beginning to add confusion to its understanding. When Green-glazed Basin (with an "s") was first mentioned by Goggin in 1968 (p. 226) it was labeled such in reference to a wash basin or, in Spanish, a *lebrillo* (Lister and Lister 1976b: 56). Subsequent researchers (Willis 1976, 1984) have in formal descriptions of this ware maintained the use of basin in its English form. More recently in the literature and among students the creeping use of the Hispanicized *bacín* (with an accent on the "i") has become more common to identify the *labrillo* form. This misuse of a type name leads to confusion with the chamber pot form described by Goggin (1968: 225) as "a deep, flat-bottomed, straight-sided vessel with flat rim," and the "straight-sided, large, cylindrical chamber pot with wide horizontal brim" described by the Listers (1976b: 22) as *bacín*. Deagan (1985: 25) uses *bacín*, and sometimes *"Bacín Verde "* (Deagan, personal communication to Skowronek and Johnson 1/28/1985). Discontinuing the incorrect usage in regard to the *lebrillo* form is strongly urged in order to maintain clarity and perspective on this ceramic ware.

In Deagan's most recent work on Spanish material culture (in press), she uses the name "Green *Bacín* " and "Green *Lebrillo* " to refer to what we call here by the problem-solving name "Green Glazed Earthenware". Under her "Green *Bacín* " and "Green *Lebrillo* " heading, Deagan points out that basin and chamberpot forms are involved. She also reports that a "pie plate" form and a flat based *tinaja* (olive jar) form are also found with a green lead glaze (in press). The latter have been found at the mission site being excavated on St. Catherine's Island, Georgia, but not at Santa Elena (David H. Thomas, personal communication to South 1982). South suggests that we use the type name "Green-glazed Earthenware" to describe these various unglazed exterior/green-glazed interior earthenware *forms* on a cream - to tan - to pinkish colored paste, as we have done here. It is unfortunate when the vessel *form* is used as part of the title designating a ceramic *type* made up of a number of forms, in violation of standard archaeological taxonomic procedure based on the typological concept.

At Santa Elena the *lebrillo* pan form (Fig. 19; Plate 30), a bowl and pitcher form (Fig. 21; Plates 5 and 31), and a mortar (*mortero*) form (Fig. 33; Plate 38) are present in green-glazed earthenware with an unglazed exterior. We have discussed the *lebrillo* form above and the problem that results when this basin or pan form is confused with the chamberpot (*bacín*) form, the latter not found at Santa Elena in the green-glazed earthenware discussed here.

The pitcher form (Fig. 21) in this ware has a lighter mottled green glaze on the interior than the glaze seen on the *lebrillo* sherds. The pitcher base seems to be very similar to that seen in Santo Domingo majolica (Fig. 9).

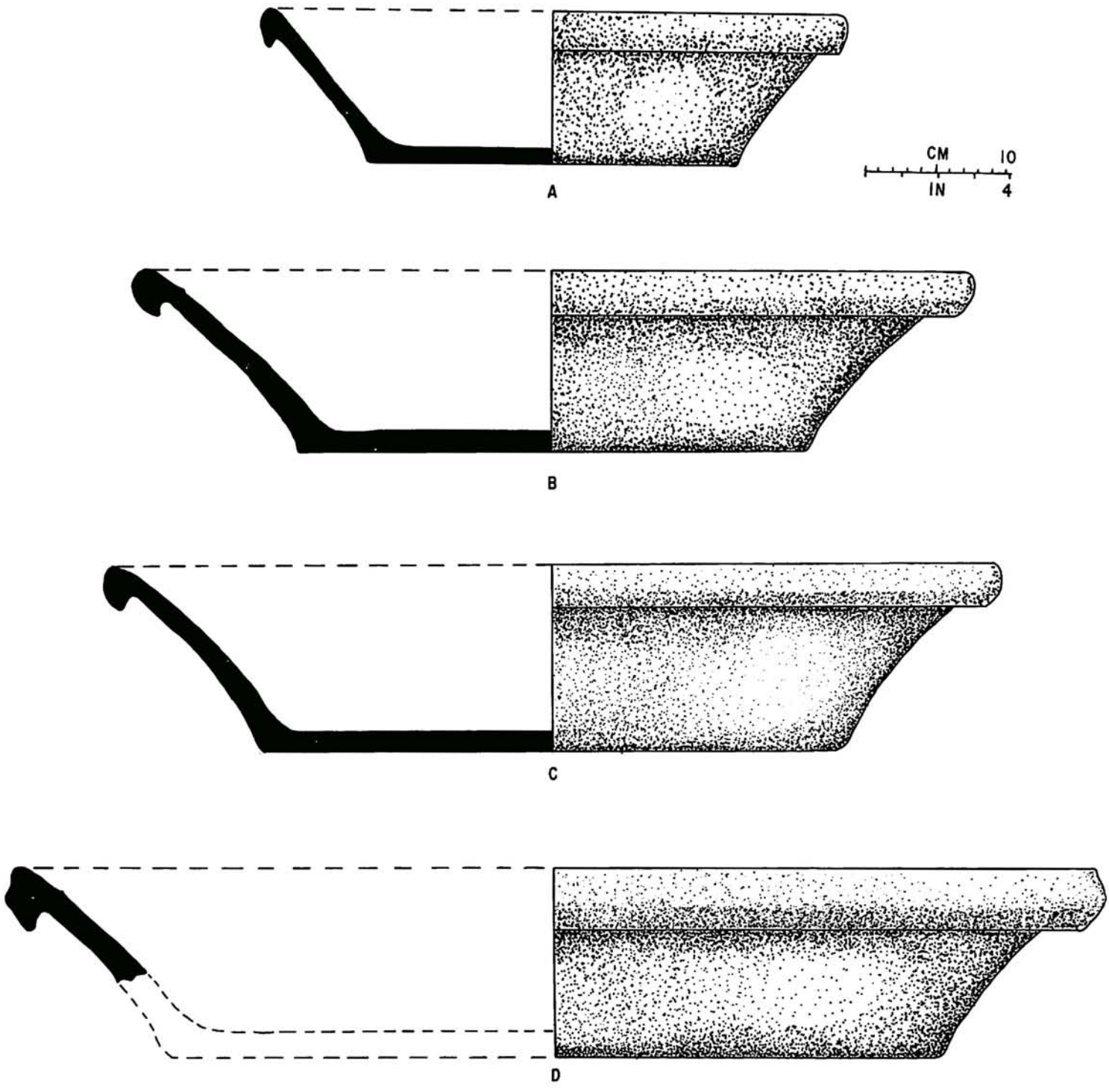


Figure 19. Green Lead-glazed Earthenware *Lebrillo* vessels.

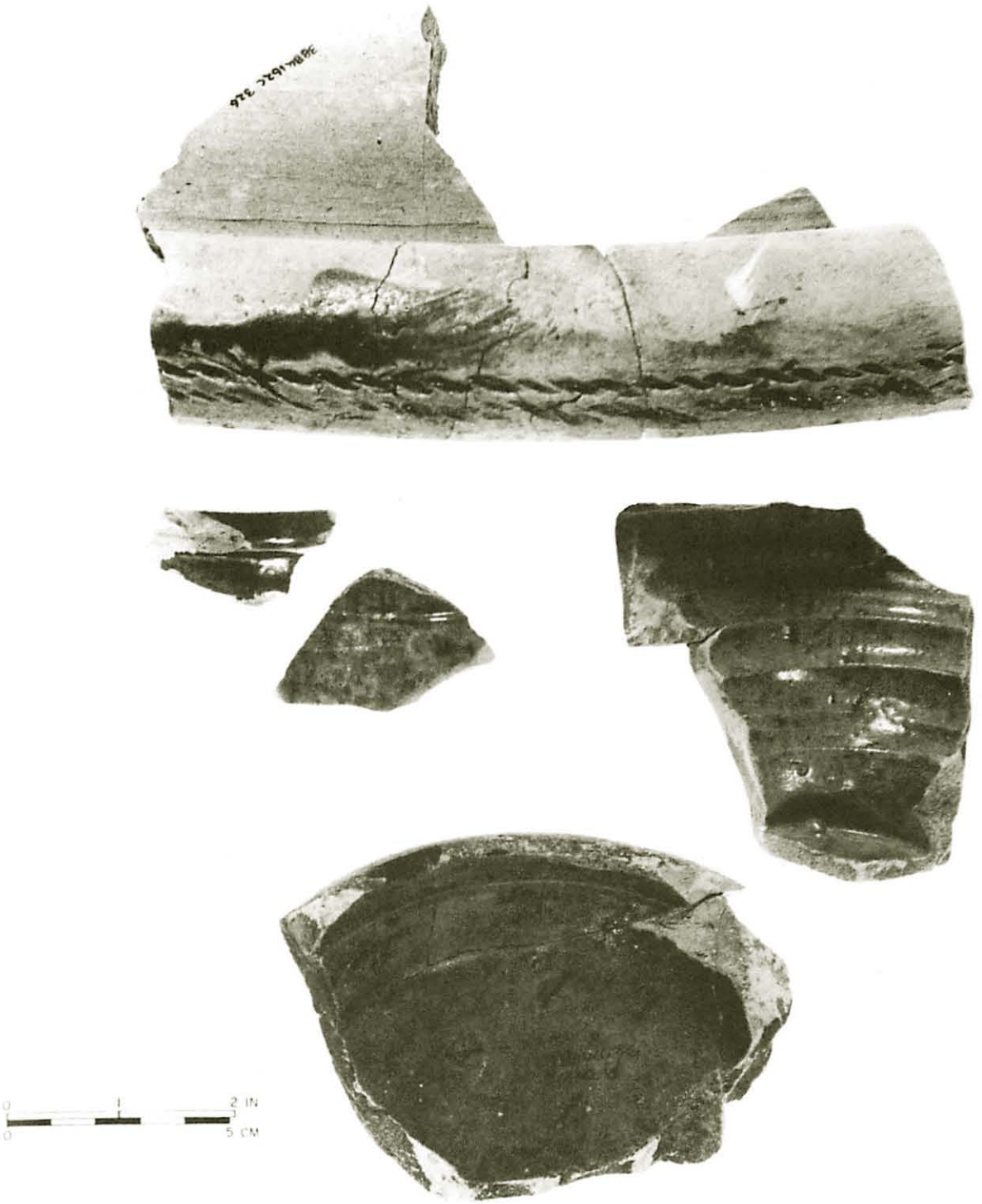


Plate 31. Green-glazed Earthenware and Orange and Green Lead-glazed Earthenware. **Top:** Green-glazed Earthenware *lebrillo* sherd showing typical cord impression around rim lip. 38BU162C-326. **Center left:** Orange and Green Lead-glazed Earthenware sherds. 38BU162E-37E, 162E-37C. **Center right:** Green-glazed Earthenware pitcher fragment. 38BU162D-49. **Bottom:** Unique Green-glazed Earthenware bowl fragment. 38BU162G-230.

The small bowl form (Fig. 21: Plate 31) is one of the most provocative seen by the researchers during the study. The small shallow bowl is unlike any other Spanish vessel form represented at Santa Elena, particularly when viewing the flat, footless base of the vessel and unusual rim treatment. Eighteenth century French ceramics are often referred to as green lead-glazed earthenware on pink and white paste (Barton 1977), entirely consistent with the attributes of the green-glazed earthenware discussed here. It may well be, as South has suggested, that the use of copper glazes on earthenware will eventually be traced to a French preference for such wares in the sixteenth century. South is concerned that French wares, that should rightfully be present on Spanish sites of the sixteenth century given the interaction of the two nations during that period in the new world, are not identified among the wares being recovered from Spanish colonial sites. More research is needed on sixteenth century French ceramics in order for us to be enlightened on this question. As this study is going to press, our attention is brought to a study being published by Alaric Faulkner on seventeenth century French ceramics from Fort Pentagoet which may help us understand more about French ceramics in relation to our Santa Elena collection (Alaric Faulkner, personal communication, March 26, 1987).

A formal description of the bowl form, as seen from two Santa Elena examples, follows.

Bowl (Figure 21; Plate 31)

Paste
Method of Manufacture: Wheel-thrown. Throwing marks are visible on the exterior. On the base circular scars resulting from wire-cutting from the wheel are seen.
Tempering: None.
Texture: Compact, fine and chalky.
Hardness: Unusually hard .
Color: Pink to terra-cotta (5YR 7/4 to 5YR 7/6).
Surface Finish:
Modifications: None.
Filming: Vessel interior is covered with green lead glaze. Glaze is matte to dull and nearly opaque. In spots there are thicker drips or runs of vitrified copper.
Decoration:
Technique: Interior and exterior rim coated with glaze. Exterior unglazed.
Glaze: Green, nearly opaque to medium green with bleeding green dots of lead glaze on buff to pink paste. Streaks are darker.
Color Classification: Dark Green similar to Green-glazed *Lebrillo*.
Design: Plain green
Marks: None noted
Inscriptions: None noted
Distribution: Glaze covers interior and exterior rim of bowl.
Form:
Rim: Rounded.
Lip : Squared/beveled on the interior.
Body: Small (16.5 cm), low (4.5cm) bowl.
Base: Flat.
Thickness: Body and rim is consistant. Center of the base thins.
Appendages: None noted.
Parallel Type: None known.
Association: Santa Elena Feature 230.
Comments: This form of bowl is not reported on contemporary sixteenth century Spanish sites, although a similar vessel fragment is present from a 1974 excavation at St. Augustine (SA 34-2, FS# 98) which has been dated to the early seventeenth century (Stan

Bond, personal communication, August 28, 1985). The Listers (personal communication to South, January 10, 1986) say this is a common Spanish earthenware type and form. The presence of pinkish paste and green lead-glaze of this form may suggest a heretofore unreported French ware associated with the sixteenth century. South has suggested since 1982 that, since later French earthenwares are characterized by green glazes, sixteenth century French earthenwares were also green, possibly representing a French tradition. The final form in the Green Glazed Earthenware type is the mortar or *mortero* (Lister and Lister 1976: 63) form (Fig. 28). As in the other forms in this type ware the interior is covered with a medium to dark green lead glaze, with only sloppings of the speckled green glaze on the exterior.

Orange and Green

From the base of the moat which surrounds the northwest bastion of Fort San Felipe, two unique thin lead-glazed, coarse earthenware fragments of a jar were recovered. This fine, hard, grey-buff paste ware has a flattened, rolled lip and extruded rim on a vertical neck. Shoulders seem to slope down into an *albarelo* drug jar form (Fig. 20). The interior of this vessel is covered with a thin, clear lead-glaze, producing an orange interior. Slopping onto the interior rim and completely covering the exterior of the vessel is a high-gloss, medium green lead-glaze (Fig. 20; Plate 31). Similar thin, fine, hard pasted, lead-glazed wares in other utilitarian forms have been observed in the collections from Portuguese Fort Jesus in Mombasa (Skowronek, personal observation, Florida State Museum, August 27, 1985; cf. Kirkman 1974). South suspects this thin orange and green lead-glazed earthenware may relate to a French tradition.

CHAPTER 12

UNGLAZED EARTHENWARE

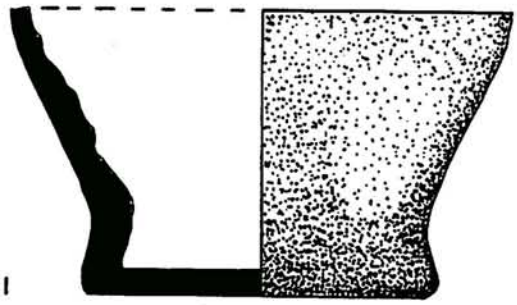
Mexican Red Painted (Aztec Red Ware)

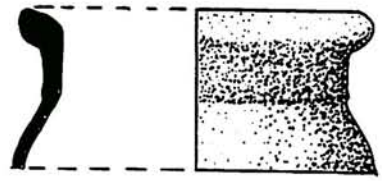
Red-painted sherds from Santa Elena are very similar to a well-known and well described category of Aztec pottery, *Aztec Red Ware* (Parsons 1966). They are mold-made, red-painted, well burnished, and *possibly* originated in the Basin of Mexico in Central Mexico (Personal communication, Thomas H. Charlton, January 31, 1986). A painted Mexican pottery was identified by Hale Smith from the Higgs site (1949: 12-13) as an earthenware of the early eighteenth century, but the Santa Elena sherds are from 150 years earlier and should not be confused with the later Higgs site material which may have, no doubt, developed from the earlier Aztec ware we call Mexican Red Painted. Because of this generic relationship there is a similarity in paste and surface treatment between our Mexican Red Painted and the painted pottery from the Higgs site. The plain undecorated, red-painted vessels include cylindrical/globular long necked jars. Vestigial solid loop handles are found on the necks. Lids are also associated with this form, as are bosses on the shoulder. A variant of this type bears an embossed feather motif. It is covered with red paint on the exterior and exhibits a smoothed buff interior (Fig. 22, Plate 32). The feather design is probably mold-made and is in an aboriginal style (Thomas Charlton, to South, January 22, 1986). It should be noted that the Mexican ceramics from the Higgs site are consistent with the eighteenth century Colonial Red Ware Complex described by Charlton (Personal communication, January 31, 1987). Joseph Mountjoy, personal communication to South , May 9, 1987) suggests that the paste and surface treatment is similar to late Post Classic, contact period Mayan wares.

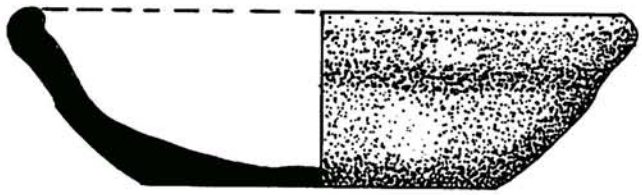
Orange Micaceous

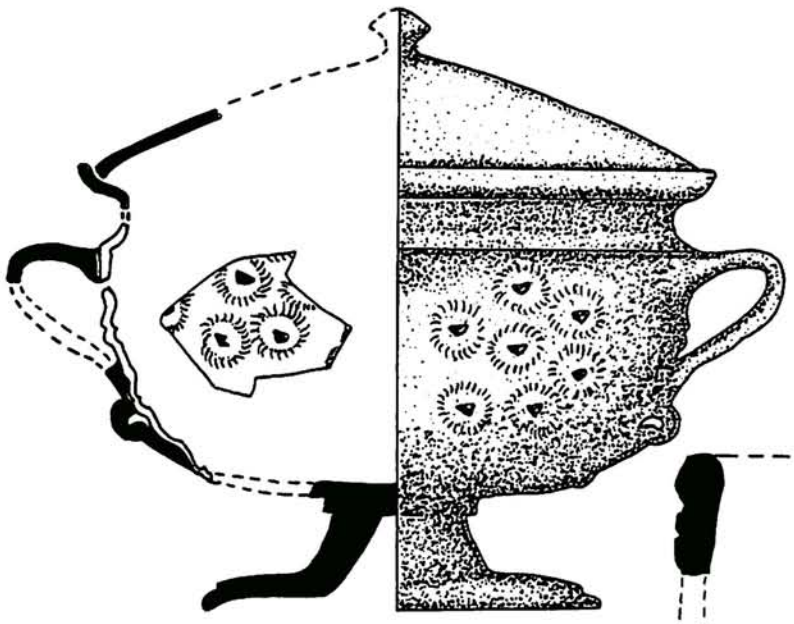
First Council (1975: 131-132) in the Dominican Republic and later Hurst (1977) in Great Britain noted the presence of extremely thin, orange, unglazed earthenwares with mica tempering (?) in post - 1500 contexts. These southern Portuguese and Spanish produced ceramics (Martin 1979: 290-291) are found in the Old World in collections from the 1588 Spanish Armada shipwrecks (Martin 1979: 289-293) and at Fort Jesus, Mombasa (Kirkman 1974: 262-265). Sixteenth century New World sites such as St. Augustine (Deagan 1978: 36), the Convento de San Francisco (Council 1975), Nueva Cadiz (Willis 1976); Puerto Real (Willis 1984), and Santa Elena (South 1980, 1982) contain fragments of this ware. At Santa Elena some sherds are from vessels that are flat-based and globular in form (Fig. 23c), probably from small bowls, while many are from pedestaled bases. Long necked jarro (Lister and Lister 1976a: 54) forms with rounded lips and out flaring rims (Fig. 23b; Plate 33) are present, while others are flat lipped with ribbed necks (Fig. 23d; Plate 33). Lid fragments of this type are absent in the Santa Elena collection. Both are similar to forms found in the Armada (Martin 1979: 293).

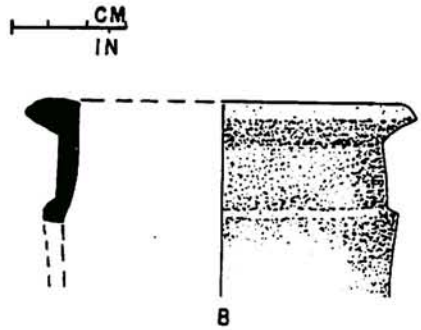
While two basal sherds reveal flat based, handled forms similar to that shown in Figure 23c, the large majority of vessel base fragments are from pedestaled forms somewhat smaller in size to the form seen in Figure 23a. The fragments of these pedestaled bases, combined with fragments of rims and body sherds, suggest a standing bowl form is represented by many of these sherds.

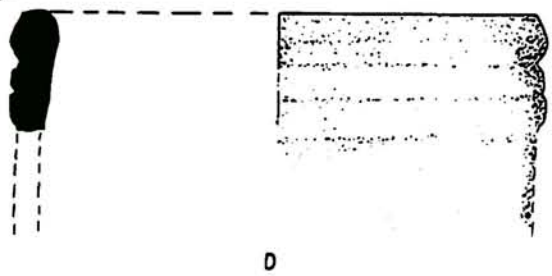












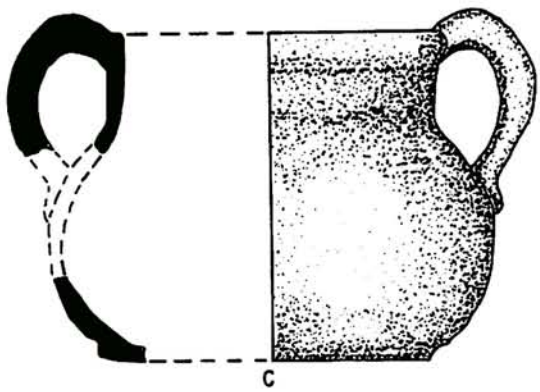


Figure 20. Orange and Green Lead-glazed Earthenware rim, probably an *albarelo* form.

Figure 21. Green Lead-glazed Earthenware pitcher and bowl forms.

Figure 22. Rim of Mexican Red Painted Aztec ware.

Figure 23a. Covered pedestaled bowl or standing tureen form of Thin Unglazed Earthenware.

23b. Orange Micaceous Unglazed Earthenware, probably an *albarelo* form.

23c. Orange Micaceous Unglazed Earthenware handled bowl form.

23d. Orange Micaceous Unglazed Earthenware straight walled vessel form.

Plate 32. Mexican Red Painted (Aztec Red Ware). **Top:** 38BU162G-71A, 162G-59B. **Row 2:** Handle fragment. 38BU162H-112A. **Row 3:** 38BU162D-115, 162H-76B glued to 162G-59A. **Row 4:** 38BU162G-59B. **Bottom:** Embossed feather motif sherds. 38BU162C-140A, 162G-93A, 162G-64A.

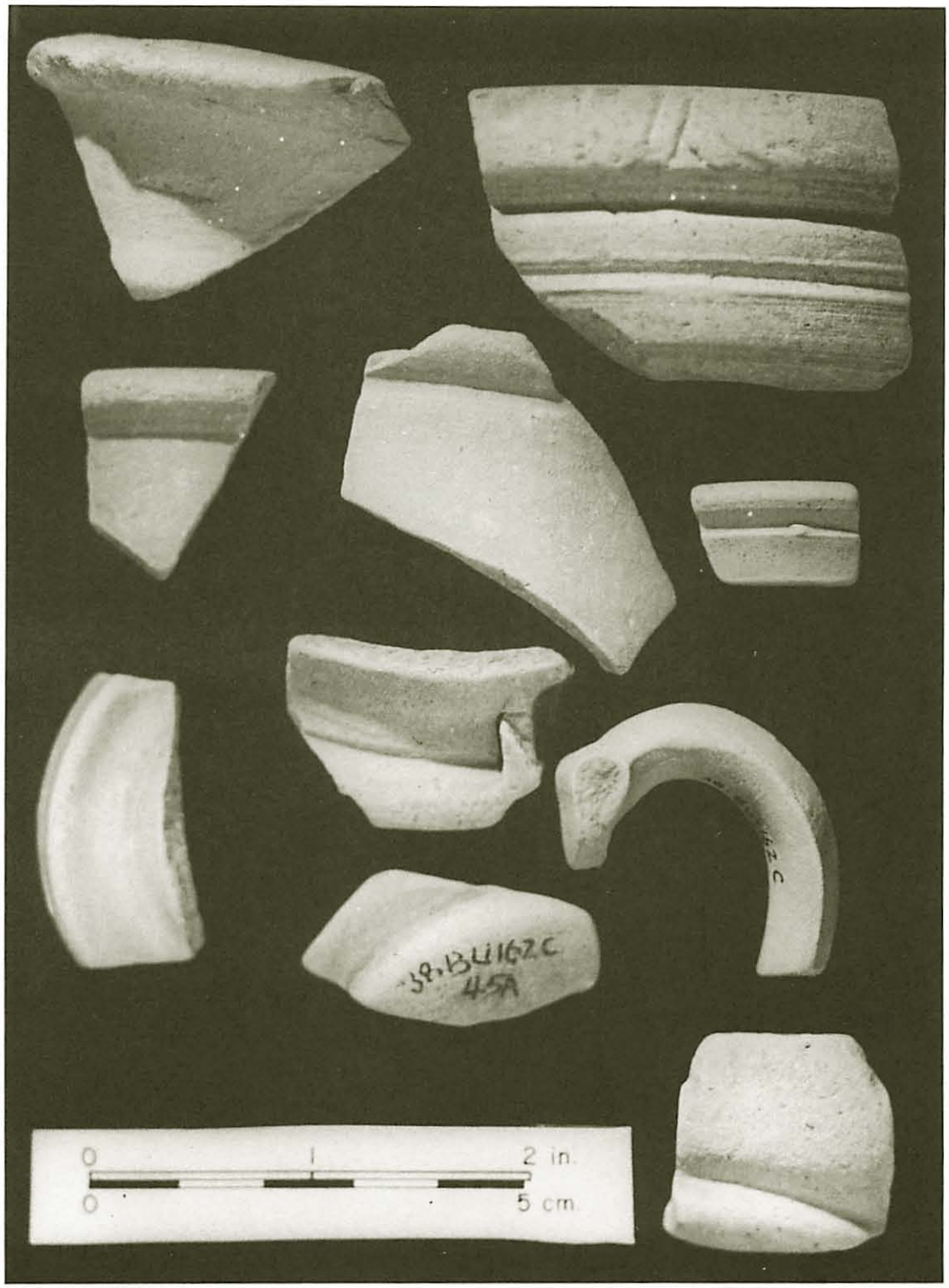


Plate 33. Orange Micaceous Ware. **Top:** 38BU162E-41C, 162-54. **Row 2:** 38BU162D-19B, 162C-346B, 162D-19B. **Row 3:** 38BU162C-76, 162C-140B, 162C-346B (handle). **Bottom:** 38BU162C-45A, 162C-43B.

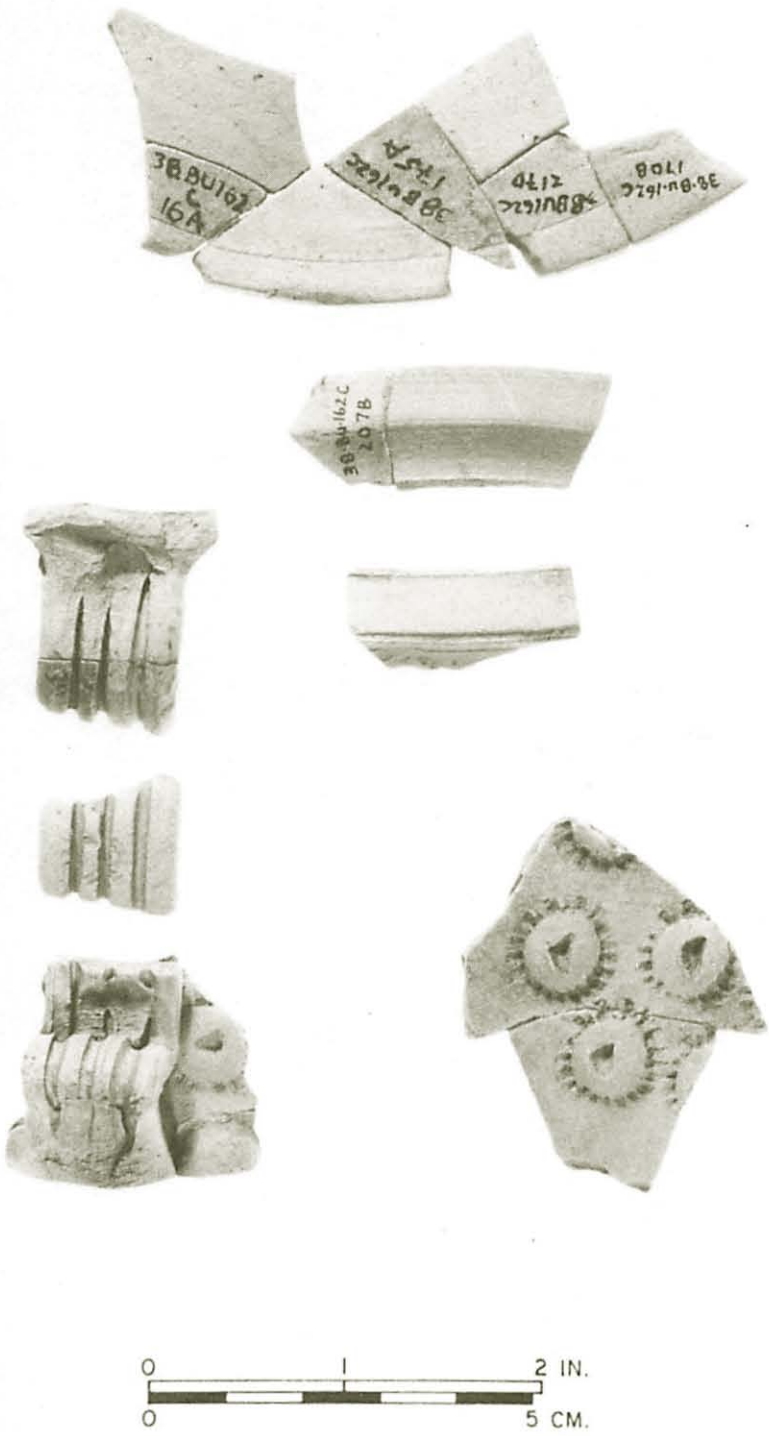


Plate 34. Thin Unglazed Earthenware. **Top:** Lid. 38BU162C-16A glued to 162C-26B, 165B, 175, 170B and 217D. **Row 2:** Rim. 38BU162C-207B glued to 162C-76. **Row 3:** Handle. 38BU162C-221A glued to 214A and 218B. Rim. 38BU162C-175. **Row 4:** Handle. 38BU162D-38. **Bottom:** Handle. 38BU162C-175. Body sherds with decorative bumps. 38BU162C-163B glued to 164B.

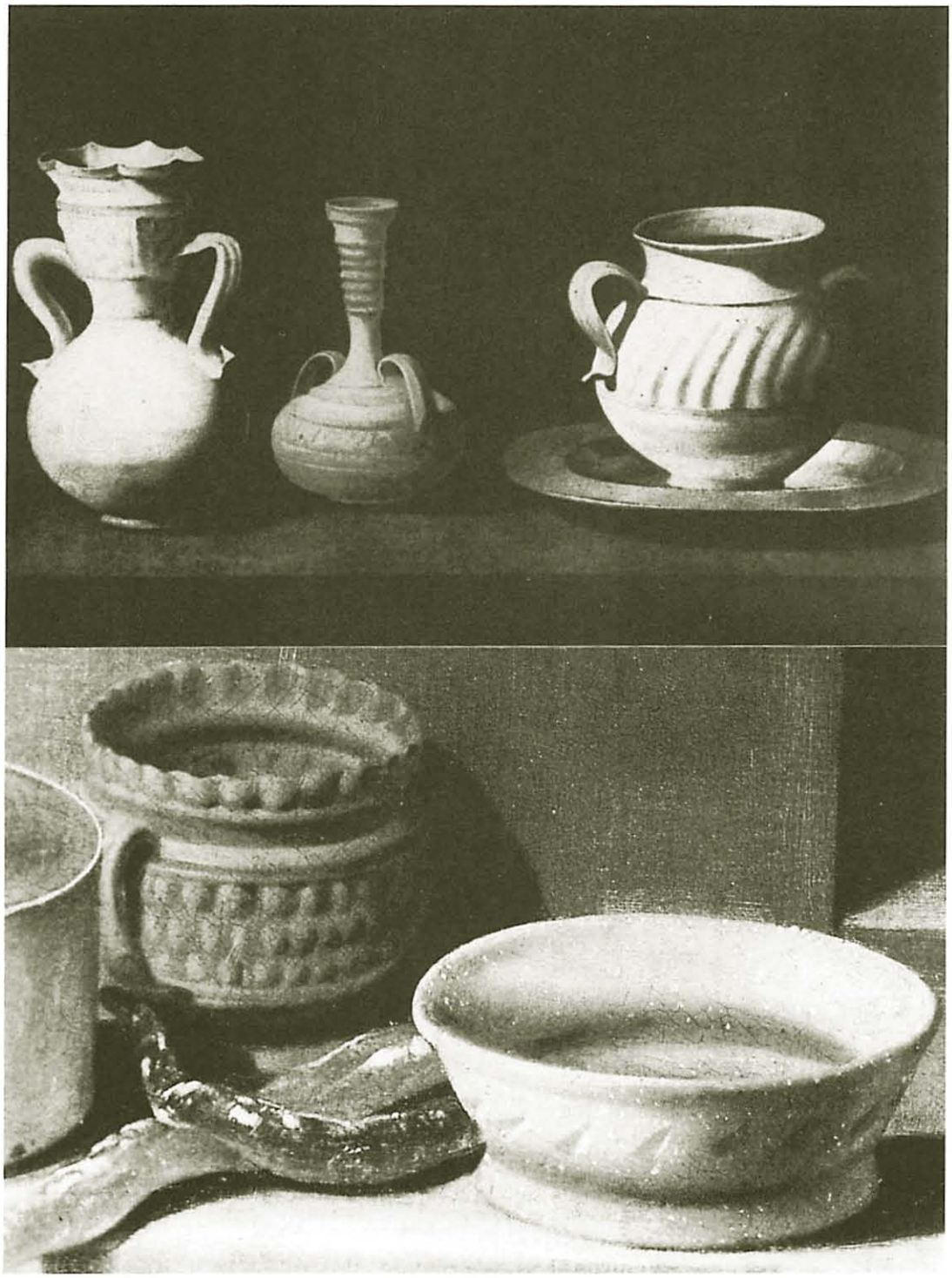


Plate 35. **Top:** Thin Unglazed Earthenware vessels from "Still Life," by Zurbarán (1598-1664). From Gállego 1977: 381. (Madrid: Prado Museum). **Bottom:** Thin Unglazed Earthenware vessel with raised decorative bumps (left) beside an Orange Micaceous Earthenware bowl glistening with the mica in the paste. Detail from "Still Life with Sweets and Pottery," by Juan van der Hamen, 1627. From dust cover of Jordan 1985.

Decoration on these vessels is limited to incised turning marks and occasional red filming. It should be remembered that Orange Micaceous is, with the exception of the related Thin Unglazed Earthenware type, one of the most elaborate and technically superior ceramic wares found on the site. The possibility that such wares are status indicators seems to remain an accurate assumption. An Orange Micaceous/Merida bowl (Plate 35a) is illustrated in the painting "Still Life with Sweets and Pottery," by Juan van der Hamen, dated 1627 (Jordan 1985: 136), and a pedestaled honey pot is seen in his 1621 "Still Life with Sweets" (Jordan, 1985: 126). In these paintings the orange color and glistening micaceous earthenware paste is clearly illustrated.

Note should be made here that in Merida, Spain, an orange micaceous ware is made (Kathleen Deagan, personal communication in reference to Hurst 1977), and that mica paste sherds have been archaeologically recovered in the highlands at Merida, Venezuela, where the same type micaceous clay is still being used (Litto 1976: 194). We refrain from referring to the Orange Micaceous ware described here from Santa Elena as "Merida Ware" for obvious reasons.

Thin

Closely related to Orange Micaceous ware, though not containing mica in the paste, is a thin, unglazed, wheel-thrown earthenware not previously described in the literature. A careless typing without reference to the mica paste would likely result in placing this thin unglazed earthenware in the Orange Micaceous category. At Santa Elena (Plate 34), these thin-bodied, unglazed, finely made ceramics are present in numerous small sherds, providing clues to their elegent form. All basal sherds are from pedestaled vessels and numerous thin lid fragments. Loop handle fragments fastened to body sherds with finger-embossed bumps surrounded by stamped rays provided the needed information for South to render a reconstructive drawing of a standing tureen form with lid (Figure 23a). This reconstruction was made from sherds from various proveniences, all apparently belonging to the same vessel. This tureen is a variant of what Lister and Lister describe as a *sopero* (1976: 81).

The body of these tureen and standing bowl forms is decorated with bosses formed by punching with the fingers from inside the vessel. The raised boss is then stamped with a circle of rays on the exterior of the vessel. The center of the rayed boss is then punctated with an instrument in such a way as to leave a triangular shaped punctation (Figure 23a). A view of a vessel decorated in this manner is seen in Juan van der Hamen's 1627 "Still Life with Sweets and Pottery" (Jordan 1985: 136), seen in Plate 35 (center). Other Thin Unglazed Earthenware type vessels are seen in Plate 35, from a still life by Zubarán (Gállego 1977: 381). It is South's opinion that these decorations, as well as the standing tureen form, are an imitation of standing glass bowl forms and pedestaled covered vase forms of the period of Santa Elena (Haynes 1948: Plates 11, 13, 15).

A word should be said here about a type called "Fine Orange Ware," from the Chikinchel Ceramic Complex (A.D. 1450-1550), from Yucatan. The verbal type name would fit this Thin Unglazed Earthenware type, but since the Fine Orange type sherds belong to large thick walled vessels the name cannot be used to describe the thin ware described here (Smith 1971: 136).

Another type with a name suggestive of this ware is "Thin Orange Ware," attaining at times almost "an eggshell delicacy," dating from around 900 A.D. at Teotihuacan, Mexico (Vaillant 1961: 73), clearly too early for Santa Elena.

Although "Fine Orange Ware" or "Thin Orange Ware" names would nicely fit the thin, unglazed earthenware involved here, it is obvious that these descriptions and time frame do not fit the Santa Elena ceramics. We have, therefore, chosen to use the descriptive "Thin Unglazed Earthenware" type name for these Spanish and Portuguese produced ceramics to prevent confusion with Mexican type names.

Feldspar-Inlaid Red

Fairbanks (1966: 430) described a red earthenware inlaid with pieces of feldspar as decoration in rows or clusters on Spanish colonial pottery. A twisted, round, ribbed handle fragment of redware with impressed feldspar fragments has been found at Santa Elena. Deagan (1978: 26, 36) has also found this type in a sixteenth century context at the Joseph de Leon site in Florida.

Incised Smoothed

A number of brick-red, relatively hard-fired earthenware sherds from thick based, thin walled vessels was found at Santa Elena (Plate 36). These are incised with individual zig-zag lines or by an instrument having a series of teeth similar to a comb, with which shallow parallel lines are incised on the surface of the vessels. Bowls and jars are apparently represented. Deep incised lines in parallel arrangements are cut into the vessel near the base and rim by means of a template or "form" and this gives these areas of the vessels a highly smoothed appearance, although the ware is not burnished in the greenware state. This ware may be what Deagan (1978: 37) calls "burnished redwares," but the Santa Elena incised redwares are not burnished and Deagan does not mention incising on her St. Augustine examples. Deagan's examples are not illustrated so no further comparison can be made.

The tooled, extruded ridges around the base and rim areas are decorated with the end of the same comb-like tool by jabbing it into the raised ridge at half-inch intervals at a 45 degree angle (Fig. 24; Plate 36), producing a dentate type stamped impression. Thomas Charlton suggests that, "None of these pieces appear to be Spanish in origin or Basin of Mexico in origin." Rather he suspects they may be from the Caribbean Basin. (Personal communication to South, January 22, 1986).

Plain Sandy

A dozen or so smoothed, sandy paste, porous, unglazed orange to red colored earthenware sherds were found in Fort San Felipe and in the Santa Elena village areas (Fig. 25 and 26; Plate 37). The fragments gave hints to flat based jars with shouldered, flat-lipped, everted rims and pedestal-based bowls. The vessels are wheel thrown with the thickness of sherds ranging from 0.5 -1.5cm..

No description of similar types have been reported elsewhere in the extant literature on sixteenth century sites (Deagan 1978; Singleton 1977). Thomas Charlton suggests a Caribbean or Mexican Gulf Coast origin for them (Personal communication to South, January 22, 1986). Unfortunately, not enough diagnostic sherds are available to formally define the types and variants represented.

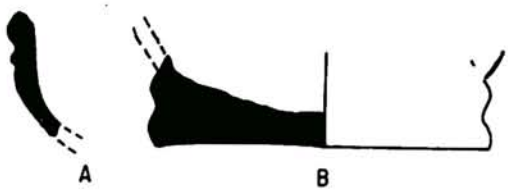


Fig. 24

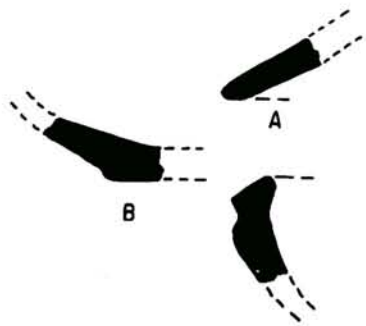


Fig. 25

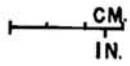
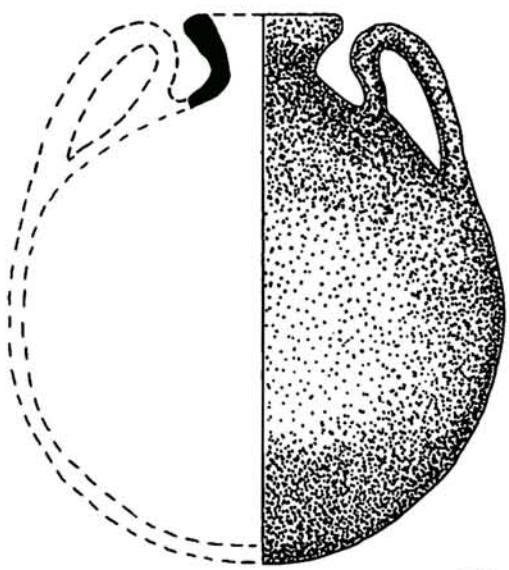


Fig. 26



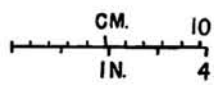


Fig. 27

Figure 24. Incised Smooth Earthenware rim and base fragment profiles.
Figures 25 and 26. Plain Sandy Earthenware sherd profiles.
Figure 27. Early Style Olive Jar rim profile and form.

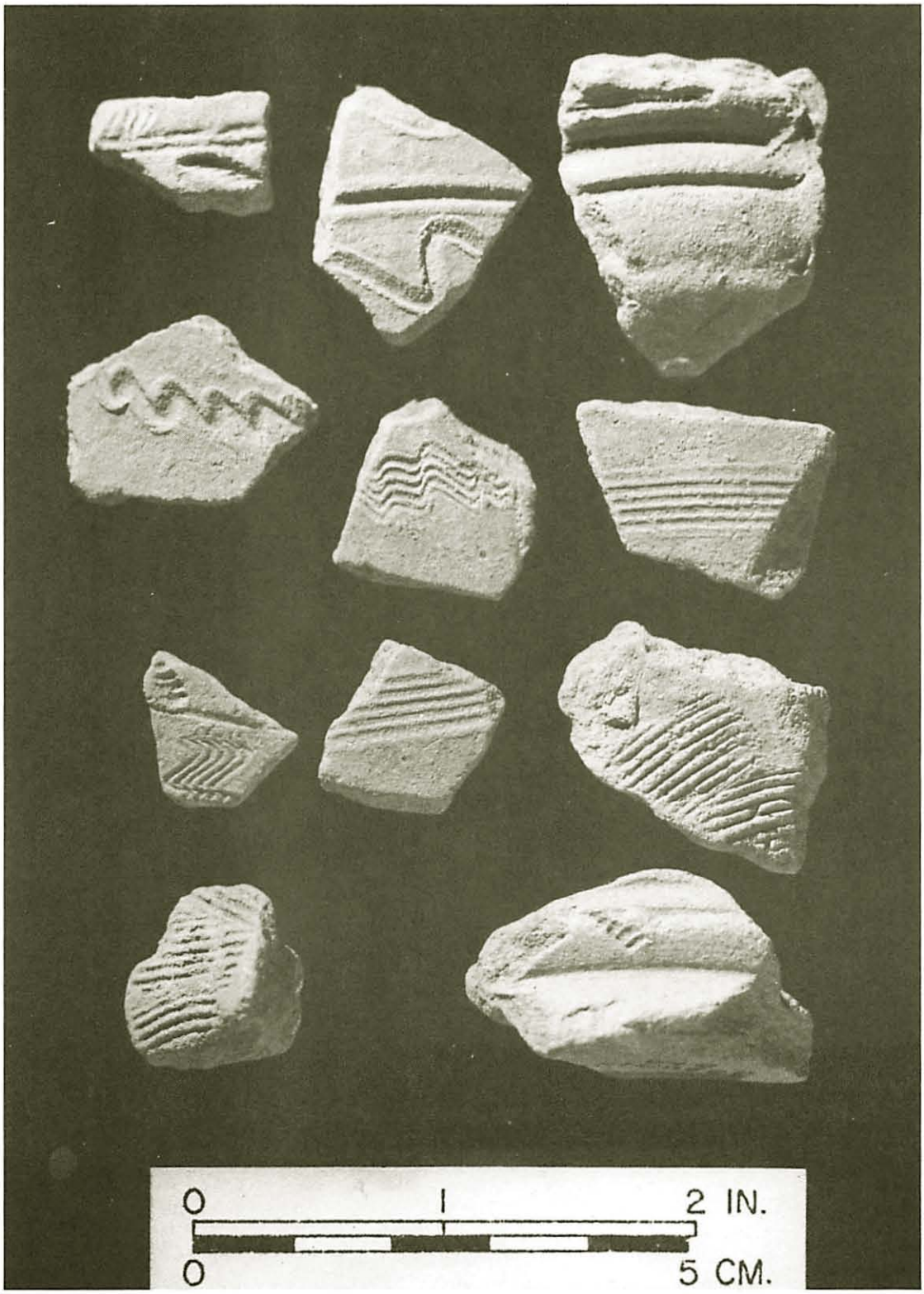


Plate 36. Incised Smoothed Earthenware. **Top:** 38BU162H-87B, 162H-111A, 162H-96A. **Row 2:** 38BU162H-305, 162H-76A, 162H-76A. **Row 3:** 38BU162H-76A, 162G-77A, 162H-305. **Bottom:** 38BU162E-71A, 162H-87A.

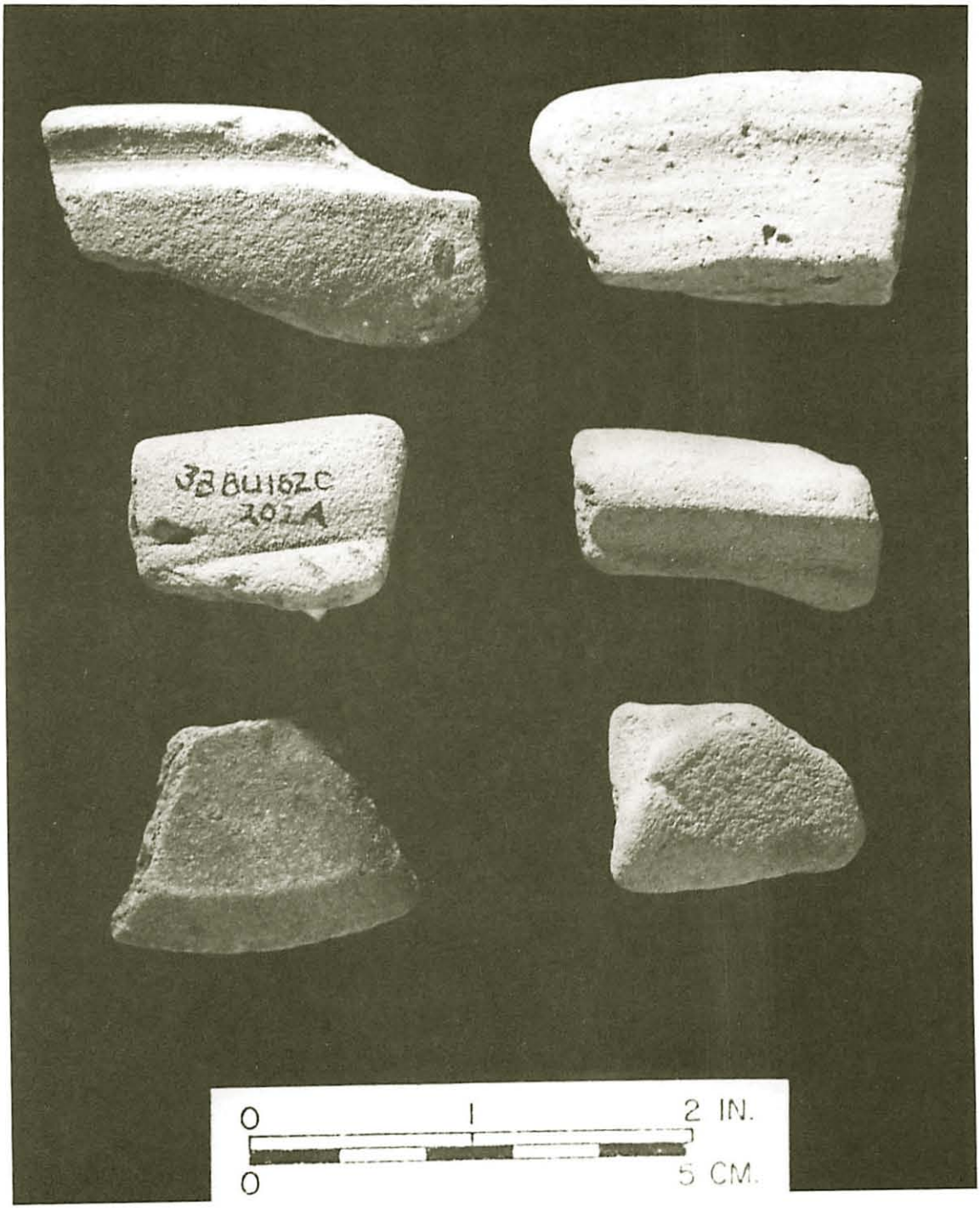


Plate 37. Plain Sandy Earthenware. **Top:** 38BU162C-141B, 162D-21A. **Center:** 38BU162C-202A, 162C-141B. **Bottom:** (left is Incised Smoothed Earthenware shown for comparison) 38BU162H-88A, 162C-18B.

CHAPTER 13

OTHER CERAMICS

Mortars (*mortero*)

The Santa Elena collections contain fragments (rims, sherds and bases) of large, thick, soft (majolica-like) pink-pasted truncated cone shaped mortar or *mortero* fragments. These are unlike the form illustrated by the Listers (1976: 63) in that they are more conical and have no handles. Surface treatment of these vessels varies widely (Plate 38). Some are unglazed on the exterior with a white tin ash glaze on the interior, while others have a thick dark green glazed interior. Another type is green lead-glazed on the exterior and white tin-glazed on the interior (Santa Elena Green and White, Fig. 15). Bases are flat. The rims have a shape that turns inward, allowing the contents of the mortar to remain inside during the process of grinding rather than being forced out of the mortar by the pestle (Figs. 15 and 33).

South has drafted reconstructions of these functional vessels from a number of fragments, some of which reveal that grinding of seeds, corn meal or other food items in these mortars has resulted in not only the removal of the tin-ash glaze, but a portion of the body of the ware as well (Fig. 33). These sherds have been included by some in what has been termed a storage or drug jar form, but their thick diagnostic, inward-pointed rim, battered all along the interior of the vessel from blows from the pestle, make them easily identifiable once the researcher is aware of the form. The battered bottom of the vessel is also a diagnostic attribute. South's reconstructive drawing in Figure 33 illustrates an iron pestle form, though pottery, wooden, and/or brass pestles were also likely used. A brass pestle with mortar is illustrated in Plates 5, 7-9 from early seventeenth century paintings.

In regard to the number of mortar fragments from different mortars recovered from Santa Elena, it is interesting to note that in 1574 at St. Augustine, "half of every day is occupied in grinding corn which is to be eaten that day, for it cannot be kept ground or cooked for the next day, and it is a great and constant labor to grind it by hand" (54-2-2 Audiencia de Santo Domingo, Folder 28, No. 1. Georgia Department of Archives and History, Mary Letitia Ross Papers). It is not surprising, therefore, that a number of mortars were broken at Santa Elena in the process of food preparation. A number of conical shaped mortars are seen in an illustration published in 1556, along with a pestle hanging on the wall in a shop where metal ores are being processed (Plate 39) (Hoover and Hoover 1950: 484).

We have discussed the mortar form here as a *form* rather than under the various ceramic types and wares since, to our knowledge, no mention has been reported from a St. Augustine context and we would like to emphasize its presence in the sixteenth century Spanish colonial context.

Storage Vessels

Olive Jar

Ubiquitous to Santa Elena as well as to the rest of the Spanish empire was the round bottomed storage container commonly called Olive Jar. There is still some confusion regarding the proper Spanish name for these amphorae-like vessels known for over eighty years as olive jars. Some researchers (Goggin 1960: 4; Fairbanks 1973: 144) feel that *botija* is proper

Plate 38. Mortar (*mortero)* fragments. **Top:** Green-glazed Earthenware mortar fragment. 38BU162E-43D. **Center:** Left, unglazed mortar fragment. 38BU162G-173. Right, Santa Elena Green and White majolica mortar fragment. 38BU162B-45. **Bottom:** Majolica-glazed interior mortar base fragment. Note worn and battered base where grinding took place. 38BU162C-172.

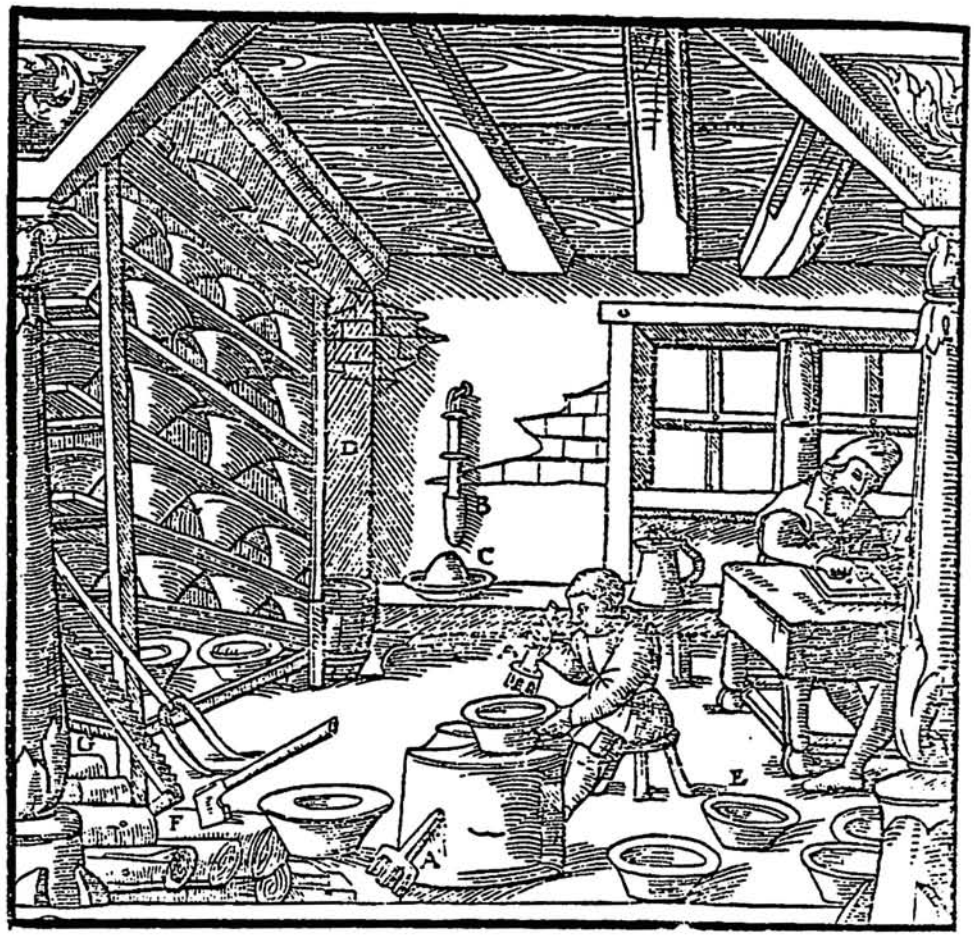


Plate 39. Conical mortars on shelves (D) being used to process metal ores. From *De Re Metalica* by Georgius Agricola, published in 1556 (Hoover and Hoover 1950: 484). Note the pestle hanging on the wall (B).

while others (Lister and Lister 1976a: 26, 85) suggest the term *tinaja*. Nonetheless, the Santa Elena collection has yielded Olive Jar of both the Early and Middle Styles as proposed by Goggin (1960). The presence of Early Style forms in the collection has been defined on the basis of simple flaring necks in the assemblage exhibiting standard olive jar paste and surface treatment (Fig. 27; Plate 40). Early Style necks were rare in the assemblage, suggesting that Goggin's terminal date of 1580 (1960: 23) was likely very close. It is interesting to note that in the Spanish Armada collections, only a single neck of this style was identified (Martin 1979: 282), demonstrating the viability of this date as a possible *terminus post quem*.

Middle Style Olive Jars, as demonstrated by the distinctive presence of "donut-shaped" mouths and necks, dominate the Santa Elena utilitarian wares (Plate 41). The distinctive thickened "donut-shaped" mouth and neck as viewed in cross-section, reveal the construction technique used to form these orifices. The Early Style necks would simply be turned up and an additional ring of clay applied around the neck. The protruding elements of the Early Style neck would then be drawn and smoothed down over the ring. It is interesting to note that changes in this most common Spanish storage vessel are contemporary with major shifts in the lines of seagoing vessels. By the mid-sixteenth century, contrary winds and currents made the medieval style caravels of Europe obsolete. In order to sail into the wind, longer, narrower ships were needed. Perhaps it can be speculated that, if it was difficult for ships to weather the Atlantic crossing, it was also difficult to store and seal the "Early" round forms on ships where space was at a premium. The presence of a neck-ring would provide a more secure point for tying down a cork stopper (Goggin 1960: 13) as in a modern champagne bottle.

Reconstructed vessels have fallen into Goggin's (1960: 29) Middle A and B styles (Figs. 28 and 29; Plates 42 and 43) and Martin's sizes found on the Armada (1979: 283). Glazing with clear and pale green lead-glaze is common, as are unglazed vessels. It should be noted that some glazed Olive Jar sherds were found which had been discolored grey due to chemical conditions in the soil. None of the dark green glazed olive jars, such as seen on *lebrillo* basins, and found at St. Catherine's Island by David Hurst Thomas (Personal communication to Stan South, 1982), have been found at Santa Elena.

Only two Olive Jar fragments, a Middle Style neck and a body sherd, are marked. The former has stamped into the rim (Fig. 30; Plate 44) the initials "A g" which are similar to marks pictured by Goggin (1960: 16-17), while the latter has engraved into it an "A I"(?). Goggin (1960: 15) suggests that stamped marks were maker's or factory marks while engravings may have been additions by later users.

Flat-based (tibor) - (Figs. 31 and 32)

On display at the Beaufort County Museum in Beaufort, South Carolina, are three intact flat-based vessels (Fig. 31) reportedly excavated by Major Osterhout from the moat of Fort San Marcos in 1923 (Jean Berry, personal communication August 10,1985).

Method of manufacture: All examples are wheel-thrown, well-fired and protected showing no traces of firing clouds.
Vessel Form:
Shape: Globular egg-shaped Middle Style Olive Jar form.
Mouth: Variant 1, everted Early style Olive Jar . Variant 2, a thickened ring similar to Middle Style Olive Jar forms.
Base: flat.

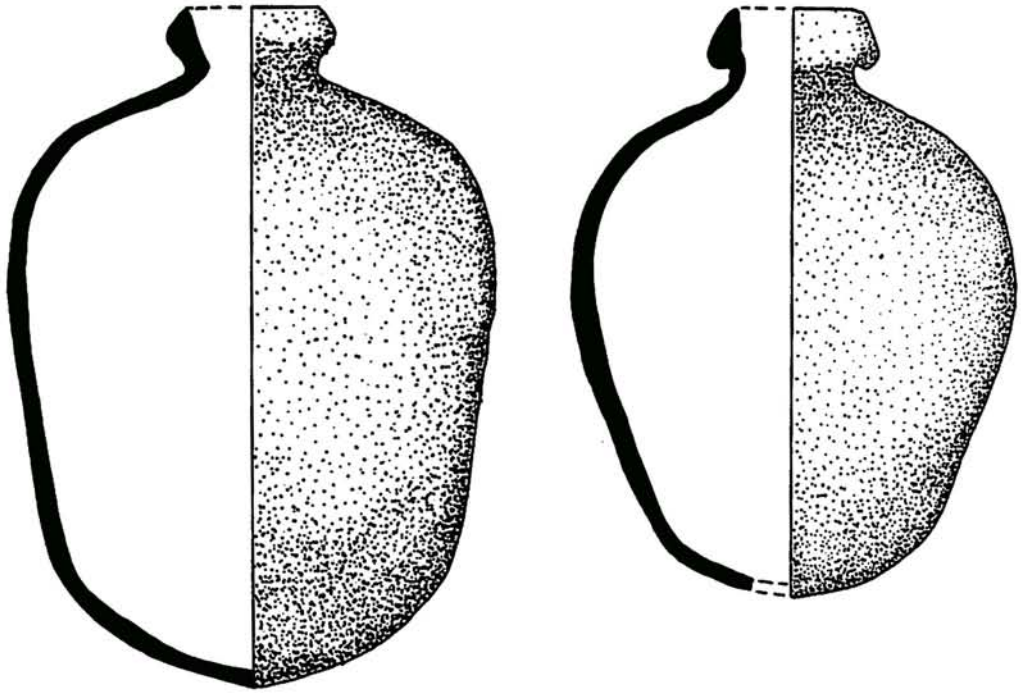


Fig. 28

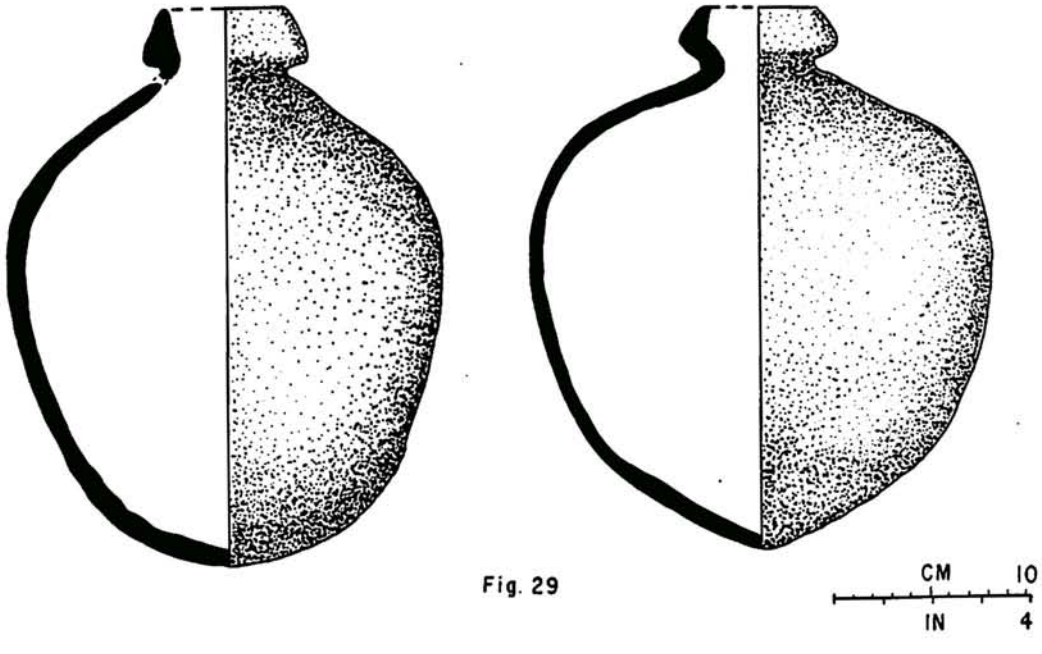
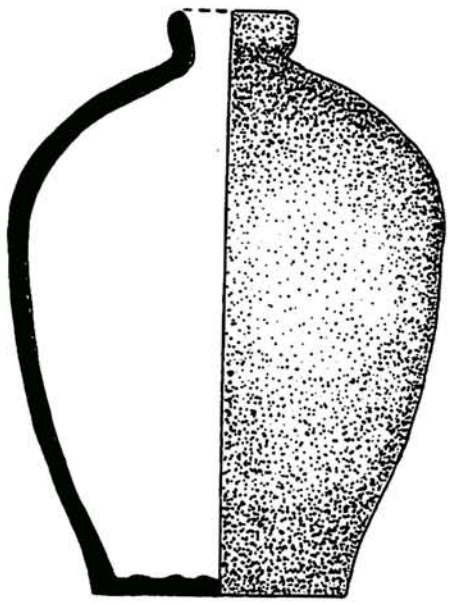


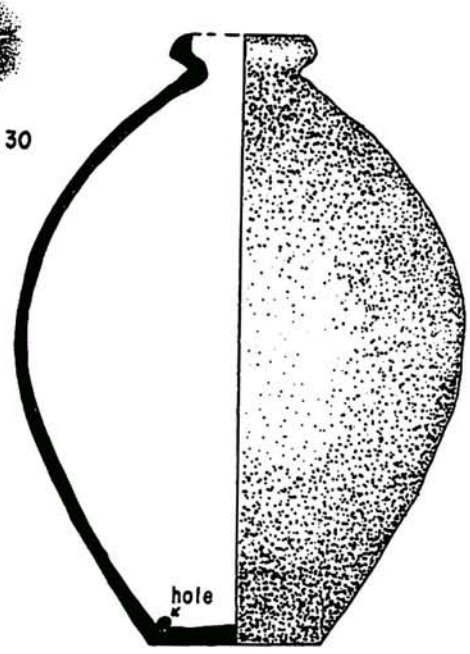
Fig. 29

Figures 28 and 29. Middle Style Olive Jars.

Fig. 30



A



B

Fig. 31

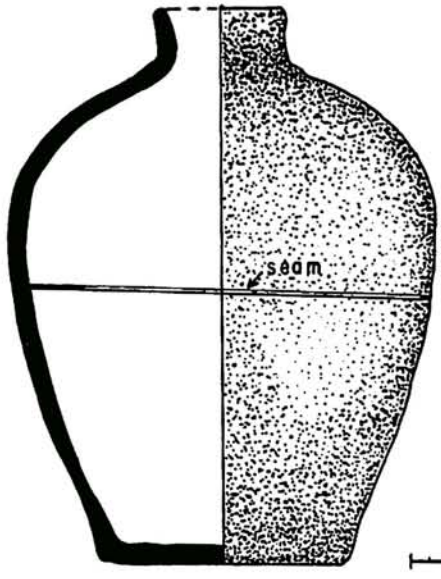


Fig. 31C

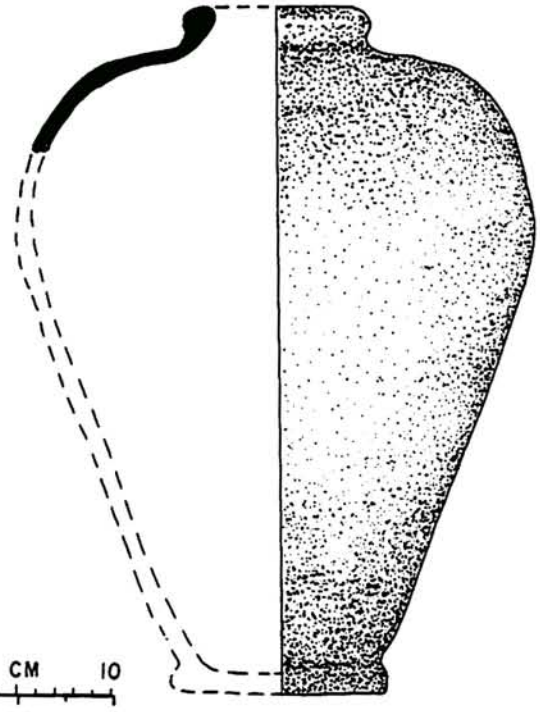


Fig. 32

Figure 30. Impressed "A g" mark on olive jar rim.

Figure 31a - 31c. Flat-based Storage Jars *(tibor)* on display at the Beaufort County Museum, said to have been excavated by Major Osterhout from Fort San Marcos at Santa Elena.

Figure 32. Flat-based Storage Jar *(tibor)* form interpreted from a rim sherd, being the only evidence for a flat-based vessel such as this found during excavations at Fort San Felipe and Santa Elena.

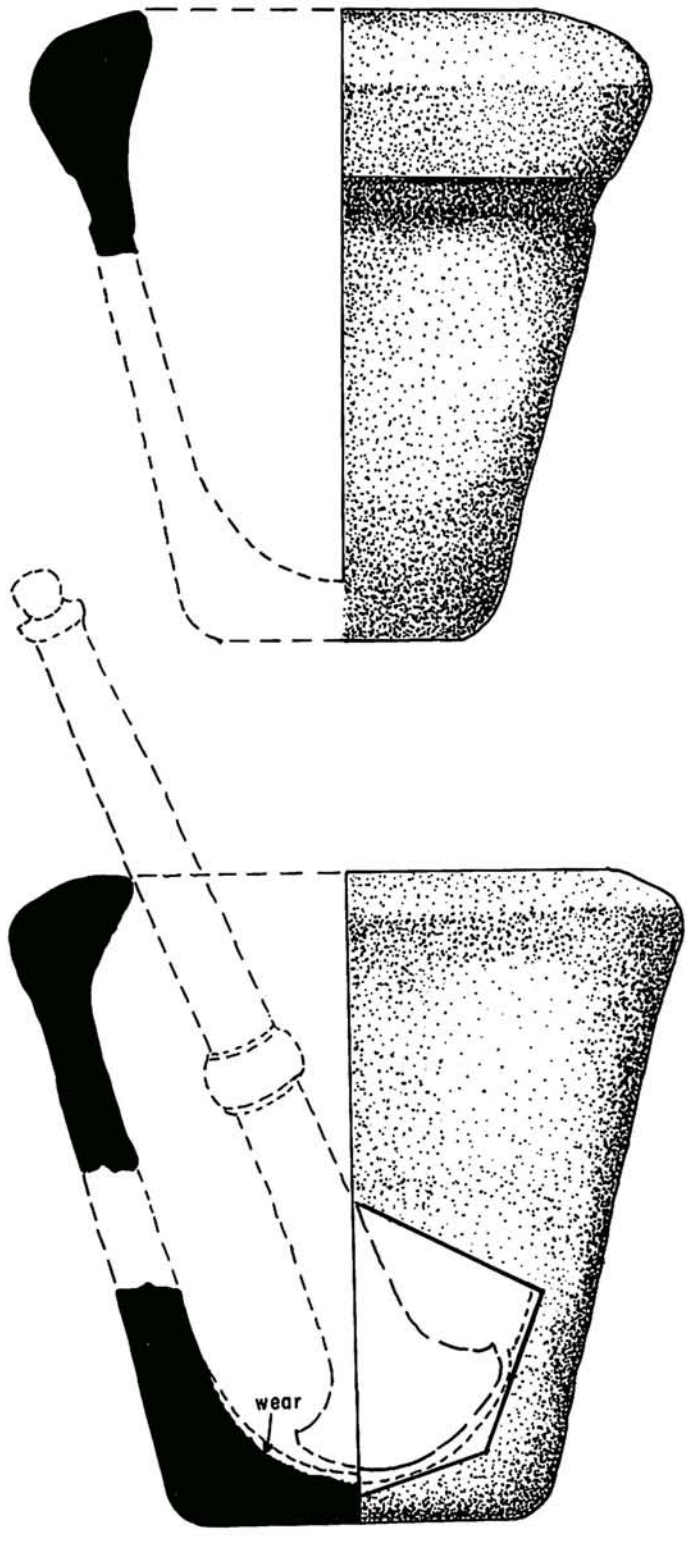


Figure 33. Mortar *Mortero* forms reconstructed from sherds.

Plate 40. Early Style Olive Jar rims. **Top:** 38BU162H-299. **Center:** 38BU162E-40D, 162E-39E. **Bottom:** 38BU162E-43D.

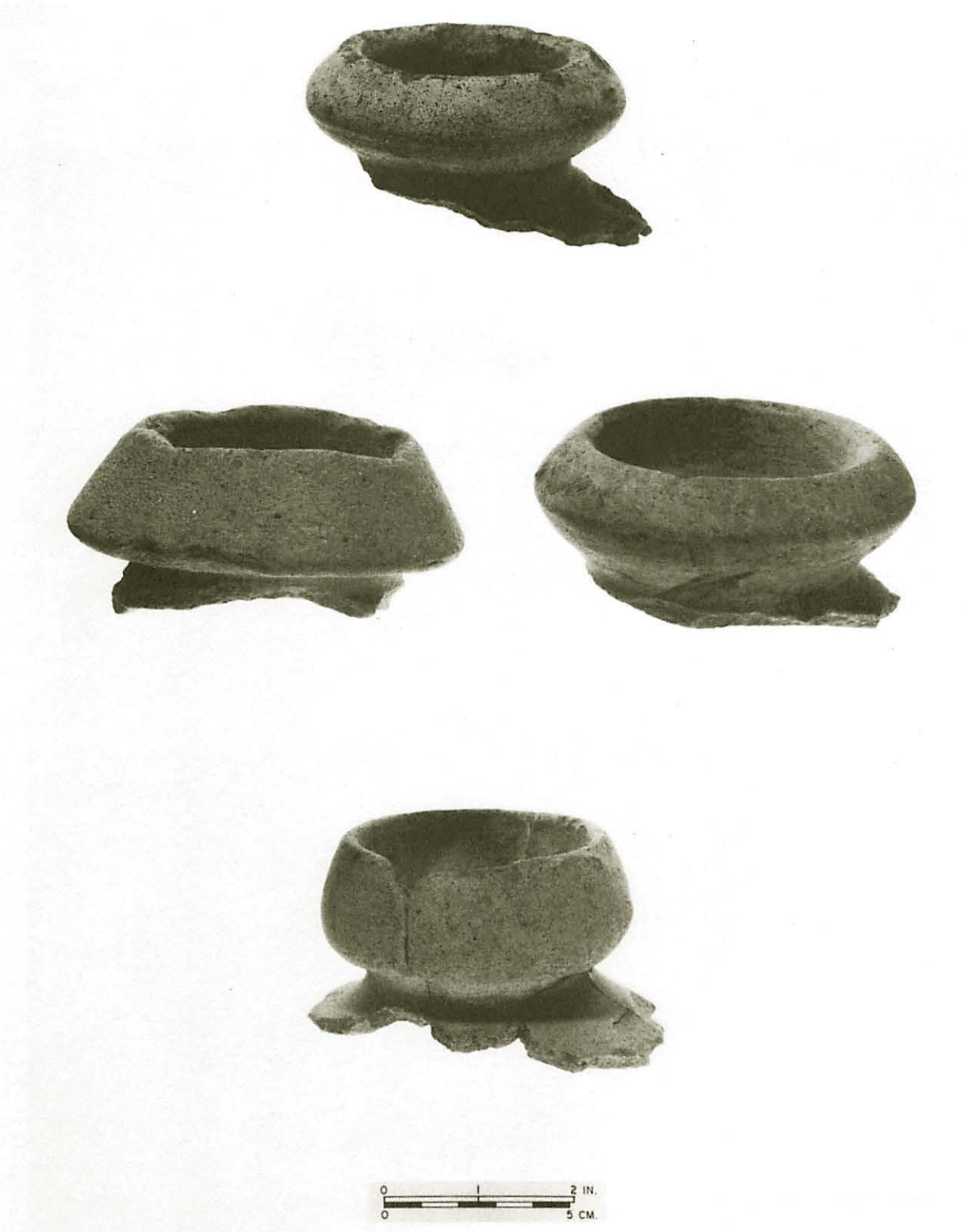


Plate 41. Middle Style Olive Jar rims. **Top:** 38BU162H-172G. **Center:** Left, red paste, possibly French? 38BU162C-231. Right, 38BU162E-38C. **Bottom:** 38BU162C-268.

Plate 42. Middle Style Olive Jar from the H level in Well 217 in Fort San Felipe, with a lamp black glazed interior. 38BU162H-217H.

Plate 43. Middle Style Olive Jar from the H level of Well 172 inside Fort San Felipe, with a thin, pale green glazed interior.

Plate 44. **Top left:** Middle Style Olive Jar rim with stamped "Ag" mark. 38BU162C-275. **Top right:** Engraved mark on olive jar body sherd. 38BU162D-2B. **Bottom:** Rim sherd from the moat fill at Fort San Felipe, thought to be from a Flat-based Storage Jar *(tibor)* form. (See Fig. 32). 38BU162E-39D.

Paste
Texture: Compact and fine to medium in coarseness. Temper ranges (when observable) from medium-coarse sand and chalk (?) particles to almost none.
Color: Color ranges from pink-white/buff to terra-cotta/brick red.
Vessel Thickness: Variant 1, everted necks are nearly identical in size to Early Style Olive Jar necks. Variant 2, ring necks are gracile versions of Middle Style Olive Jar necks.
Surface Treatment
Finish: The surface is well smoothed, leaving throwing marks readily apparent on the interior surfaces.
Slip: A thin white slip is present on one example.
Glazing: All three vessels are lead-glazed on the interior and over the neck. Colors range from a mottle tan/green to tortoise shell.
Comments: The lack of more adequate provenience data casts doubt on these vessels as sixteenth century forms. However, such flat based storage jars have been found on a sixteenth century shipwreck (Stephen Robert James, Jr. personal communication, March 1987). The brick-red paste with white inclusions also place the statue of these vessels as "Olive Jar" in doubt. Within the same collection is included a sword dating to the late eighteenth - early nineteenth century which is also purported to be an element of the Major George Osterhout collection of materials recovered during his excavations at Parris Island (Santa Elena) conducted in 1923. Although the artifact may have been recovered by Osterhout, it has incorrectly been associated with the sixteenth century materials. Needless to say, the sword's inclusion in the collection and labeled as sixteenth century in date casts even more doubt on the three vessels and their diagnosis as sixteenth century. The association in local lore of these vessels with sixteenth century Santa Elena requires that the researchers address their status. To avoid confusion in future research, type description and profile drawings of the vessels are included as a part of this report with the hope that someone may be able to more correctly place these vessels within their proper context. The form is similar to that of the *tibor* described by Lister and Lister (1976a: 85). An example of this latter form is illustrated in Figure 32, based on an Olive Jar-like unglazed sherd from the moat fill at Fort San Felipe, the only sherd of this form yet excavated at Santa Elena or her forts beyond those attributed to Osterhout (Plate 44).

Incised

Rather anomalous to the collection and lacking clear classification are eight incised storage jar sherds (Plate 45). This soft (again majolica-like) buff paste ware bears combed, incised, horizontal bands, wavy vertical combed/incised bands and wavy, interlocked or chained combed-incised bands. This unusual surface decoration and the large storage jar vessel suggested by extant body sherds is the limit of our knowledge of this form. A stoneware Martavans storage jar found in the 1613 wreck of the Witte Leeuw (Plate 45) may best capture the spirit of this vessel (Pijl-Ketel 1982: 230-231).

Porcelain

Within a decade of the establishment of Santa Elena, the Spanish empire had grown to include the Philippine archipelago in Southeast Asia (López Cervantes 1977: 71). Shortly after the foundation of this colony, Spanish merchants, with the aid of overseas Chinese entrepreneurs, began to supply the Spanish empire with the produce of China and the Orient in exchange for New World silver (López Cervantes: 1977: 68). These goods flowed via the Manila galleon across the Pacific Ocean to Acapulco where they were packed overland to Veracruz and from there carried throughout the "Spanish Lake" colonies of the Gulf and on to the Hapsburg motherland and its European possessions (Martin 1980: 99). Santa Elena, as part of this world system, received its share of these materials which included Chinese export porcelain.

The sherds and forms found at Santa Elena appear to be export wares of the Wan Li (1573-1619) period of the Ming dynasty (Lion-Goldschmidt 978: 54; Pijl-Ketel 1982). All are hand-painted, underglazed blue on both interior and exterior surfaces with no apparent hint of overglazing. The overall surface glaze is bluish tinted and has a milky appearance with strong, cobalt blue design elements, generally identifiable as naturalistic and architectural motifs. Identifiable forms include: cups, bowls, plates, ginger jars and wine ewers.

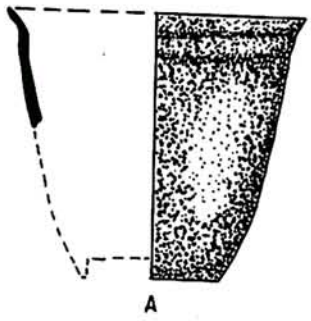
A number of wine or tea cups with flattened rims have been identified on the basis of rim and body form. The exterior surface of these vessels bears what appears to be a floral motif (Fig. 34a; Plate 46). Similar forms have been found on the Witte Leeuw, an early seventeenth century Dutch vessel lost off the coast of Africa with a load of export quality Wan Li porcelain (Pijl-Ketel 1982: 141-144, 160). The nature of this shipwreck site and the resulting report make the utility of this ceramic type more clear-cut than similar art / pottery books on the subject of porcelain (Lion-Goldschmidt 1978).

Small bowls with straight rims and high V-shaped foot-rings are also present in the Santa Elena collections (Fig. 34c). The interior rims of these vessels are bordered with double blue striping. The center flat is off-set within a medallion comprised of a double circle of concentric blue rings. Within this cartouche, naturalistically painted floral motifs similar to those pictured by Pijl-Ketel (1982: 151) are generally found. Exterior rims of these vessels exhibit double-banded borders as well as the double-banded, partially unglazed foot-rings. Decorative motifs include floral designs of morning glories, peonys, lotus pods (Pijl-Ketele 1982: 277-278) and anthropomorphic representations. Fragments of one plain white bowl similar in size to fine white cups found on the Witte Leeuw are also present (Plate 47) (Pijl-Ketel 1982: 144).

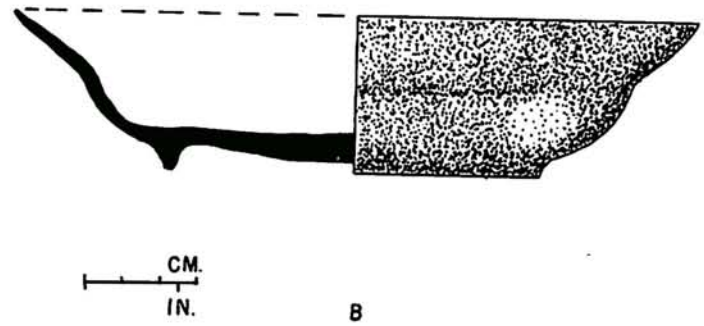
Plates with flattened rims and inward slanting foot-rings are also found in the collection (Fig. 34b; Plate 46) . The marly is set off from the lip and cavetto by a single circling blue band. Marlies are decorated with ribbons, picture or roll paintings and peach motifs, emblems of marriage and symbols of immortalty (Pijl-Ketel 1982: 187, 278, 281). The cavetto is blank. Center flats are bordered by two or three concentric bands. Within the single pair variety or within the first pair of triple bands, a spiral motif is always present (Pijl-Ketel 1982: 187). Central design elements include a phoenix and what could be a shrimp, dragon or Qilin motif (Pijl-Ketel 1982: 274, 278, 280). On the exterior, the marly is again off-set with a single encircling blue band on the cavetto and lip. Within this banded area are intertwined vines of leaves and lotus flowers. This floral motif continues on the cavetto (Pijl-Ketel 1982: 276). Foot-rings generally bear two concentric bands and are partially unglazed, suggesting the relative coarseness of these export wares (Pijl-Ketel 1982: 212-214).

A spout from a wine ewer was located in an a midden filled well feature within Fort San Felipe (Plate 47) . Without location of more fragments from this vessel, a completely accurate reconstruction is impossible. Figure 35b, based on a ewer portrayed in Lion-Goldschmidt (1978: 147, 150, 151), is conjectural and is only one possible and elaborate form for these vessels. We suggest the Wan Li export porcelains from the Witte Leeuw be consulted for other, more simplified contemporary forms (Fig. 35a), (Pijl-Ketel 1982: 177-178). The two illustrations should demonstrate the possible range (from elaborate to simple) of these vessels, with the more simplified form perhaps representing the more common export form.

A ginger jar with a vertical-squared lip-rim and partially unglazed neck is present in the collection. The single fragment of this vessel has an undecorated interior and a blue underglazed floral (?) motif on the shoulder (Fig. 36; Plate 47). The height and exact form of this vessel is unclear, but it might be similar to other forms represented in the Witte Leeuw collection (Pijl-Ketel 1982: 168-169).

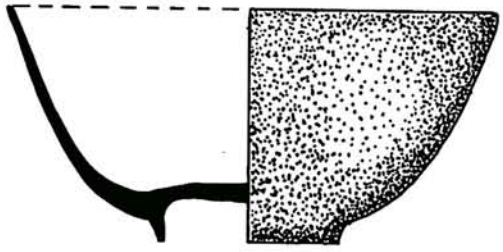


A



B

Fig. 34



C

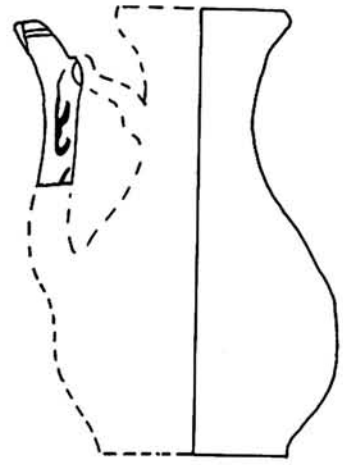
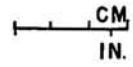


Fig. 35A

Fig. 35B



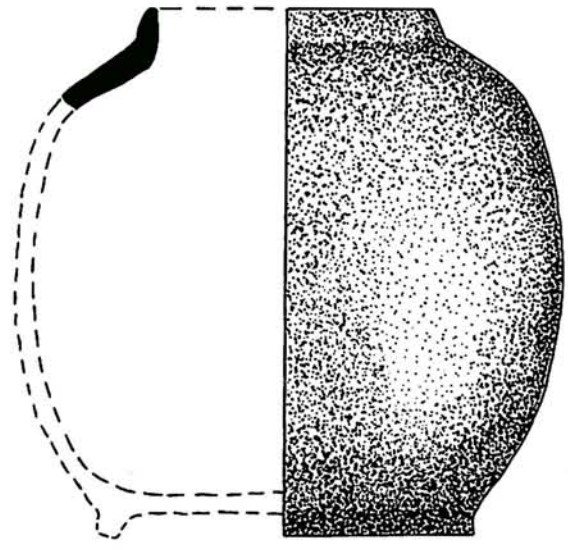
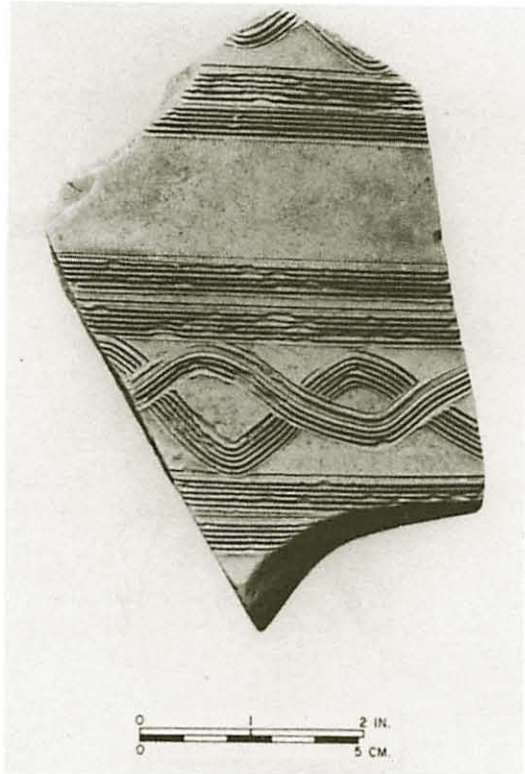


Fig. 36

Figures 34 through 36. Chinese porcelain of the Wan Li Period of the Ming Dynasty, being cup, bowl, plate, ewer and ginger jar forms.



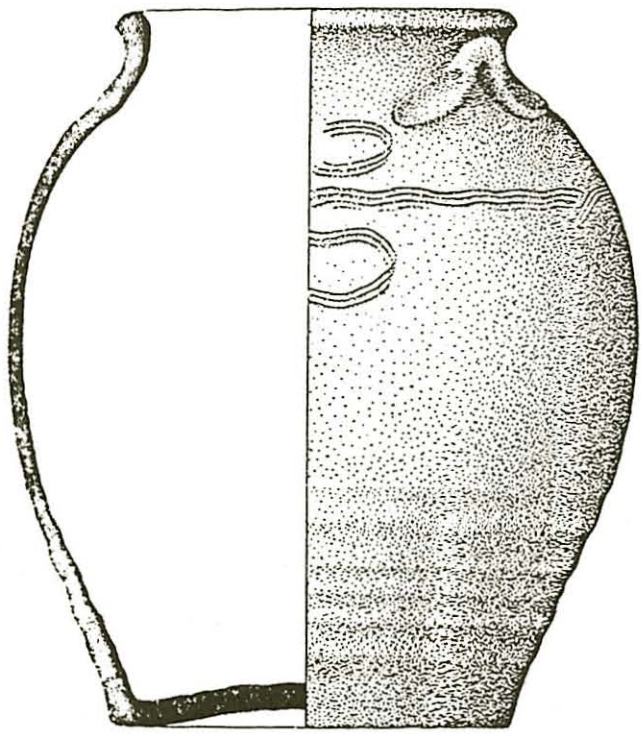


Plate 45. Incised Storage Jar. **Top:** Incised Storage Jar sherd. 38BU162A-159. **Bottom:** A stoneware Martavans storage jar from the 1613 wreck of the Witte Leeuw may be a parallel form (Pijl-Ketel 1982: 230-231).

Plate 46. Wan Li Period Ming Porcelain. **Top row:** 38BU162G-59A, 162D-58, 162D-233, 162C-20A, 162E-16A. **Cup:** 38BU162D-2A glued to 3B, 4B, 5B, 8A. **Plate:** 38BU162A-148. **Above plate:** 38BU162D-8A glued to 162C-170B. **Left:** 38BU162D-23A. **Bottom left:** 38BU162D-23A. **Right:** 38BU162A-152. **Bottom right:** 38BU162D-23A glued to 23B.

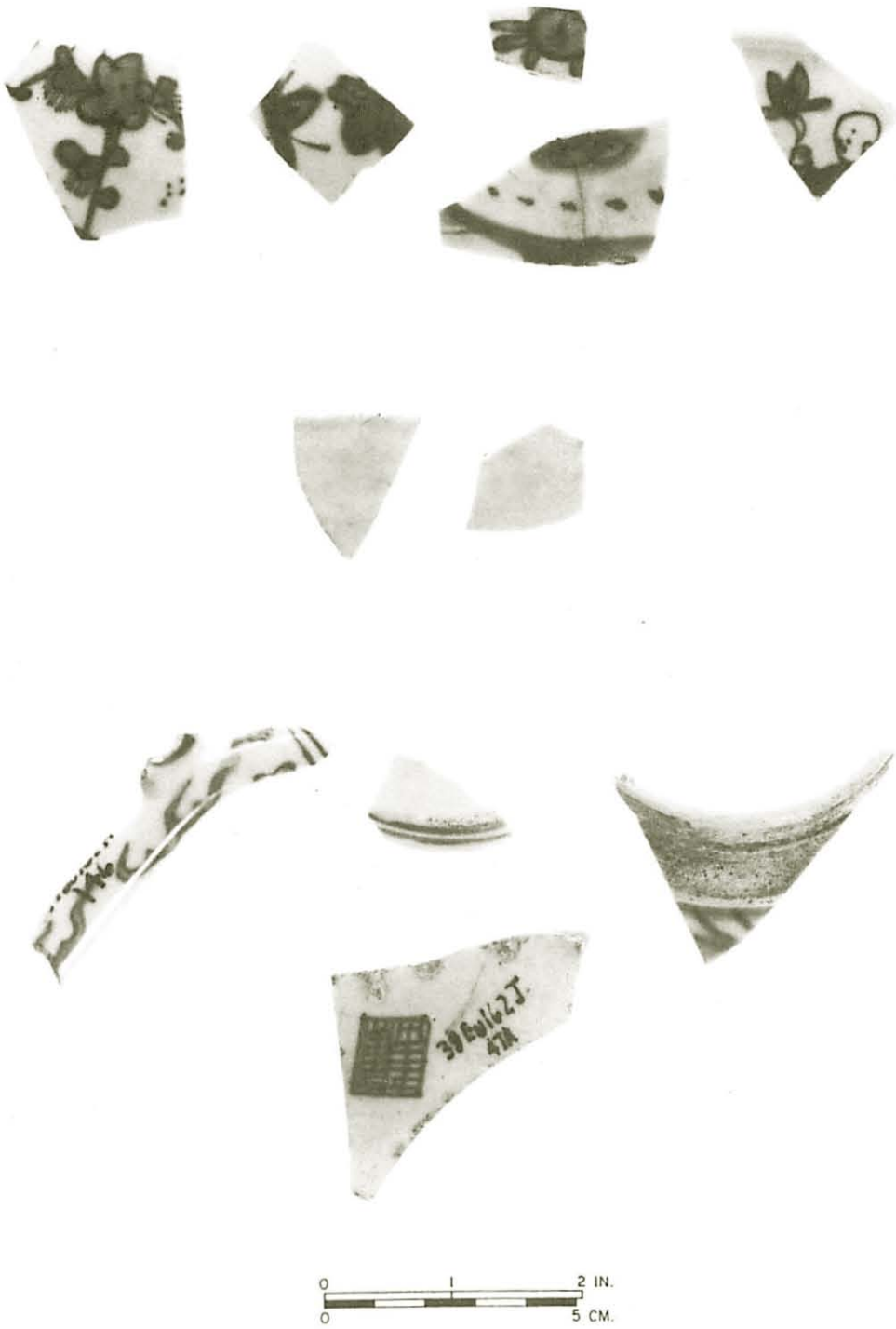


Plate 47. Wan Li Period Ming Porcelain. **Top row:** 38BU162C-100, 162C-57B, 162D-68 (above), 162C-361 glued to 162C-346B (below), 162D-18B. **Row 2:** Plain white porcelain. 162C-165A, 162C-162B. **Bottom:** Spout. 38BU162H-146. Lid (above), 38BU162G-46A. Base (below), 38BU162J-47A. Ginger jar rim. 38BU162G-72A.

The last identifiable porcelain fragment (from a lid) is also from Fort San Felipe (Plate 47) . This lid had a vertical, rounded lip-rim and was glazed on both surfaces. The interior is undecorated but the exterior rim bears two crudely painted concentric blue bands. Lids similar to this might have covered bowls, jars, teapots or ewers (Pijl-Ketel 1982 : 128-129, 158-159, 166-169).

Square chop marks appear on fragments of four vessels (two bowls and two flat-rimmed plates). Painted in underglazed blue on a plate fragment appears to be "fu kuei jia ji (or chi)" which means "fine vase for the rich and honourable" (Pijl-Ketel 1982: 187, 189; Burton and Hobson 1929: 146; Plate 47), a highly appropriate statement since such wares were owned by the elite at Santa Elena, perhaps Pedro Menéndez or a member of the Menéndez associated families in America.

Conclusions

Spanish empire ceramics from Santa Elena are a diverse sample representative of the great dominion of the Spanish crown in the sixteenth century. In real numbers this collection probably represents no more than three hundred vessels in table-utilitarian and storage wares. The vast majority appear to be plain, undecorated Morisco wares, similar to contemporary sixteenth century historic accounts for the goods and supplies of Pedro Menéndez and Santa Elena. For example, one account for the "Goods of Pedro Menéndez and the Royal Supply of Santa Elena" dated 1576 lists 110 *botijas* (olive jar) of oil, 156 dozen plates (Morisco ware platos ? such as Columbia Plain), 135 dozen bowls (Columbia Plain escudillas?), eight dozen ollas (lead glazed red earthenware?), 39 dozen pitchers (Santo Domingo and Santa Elena Green and White?), and one dozen large earthenware tubs (Green glazed *Lebrillo* Basin?- AGI EC 153-A, No. 1, fol. 2 vol. 4, courtesy, Paul Hoffman). Storage and utilitarian forms are rare in this area while Oriental and Italian imports make up even a smaller percentage of the total count. For example, even though Olive Jar sherds make up the majority of the recovered sixteenth century artifacts, thus deserving the rubric "ubiquitous," there are probably not more than thirty vessels represented in the assemblage. Ware types are present from the plain and assumedly cheap types to expensive porcelains and elaborate thin Unglazed Earthenware forms, reflecting the wide status differences present at Santa Elena in the town and forts. Deagan has pointed out the similarity between Santa Elena and the highest economic status site in St. Augustine (1985: 30) and suggests that "a generally more affluent and demographically normal occupation appears to be reflected in the assemblage recovered" at Santa Elena.

The Spanish Empire ceramic collection from Santa Elena represents more than a simple fraction of the sixteenth century material culture as it serves to define the rate of expansion and depth of penetration of the first modern world capitalist empire. Studies such as this may therefore be the first descriptive building blocks for the examination of acculturation and assimilation processes on the cosmopolitan frontier. Short-lived sites like Santa Elena provide not only time-capsule dating of artifacts for intra- and inter-site analyses but can, when combined with data from other sites of different size and function, begin to explain the hierarchies associated with expansion into the frontier (Skowronek 1985).

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APPENDIX I

MATERIAL CULTURE INVENTORIES

(Provided by Paul Hoffman and Eugene Lyon)

APPENDIX I

A PARTIAL LIST OF OBJECTS OF MATERIAL CULTURE IN FLORIDA 1565-1569

Accounts of Juan de Junco, Factor, St. Augustine. AGI: CD 941

no mark = not found in the archaeological record
* = found in the archaeological record
** = not likely to be found in the arch. record

<u>Weapons - Artillery</u>	
Falconetes	
Pasamuros	
Versos	
*Balls for above	
Powder for above	
Ramrods	*Cargadores*
Ramrods	*Atacadores*
Ball Screws	*Sacapelotas*
Boxes	*Cajas*
Wheel sets	*Rodelas*
*Spikes	*Pernos*
Pullies	*Poleas*
*Gun carriages	*Cunas*
Iron plates for same	*Chapas de Hierro*
Artillery spoons	*Cachucheros*
Gun aprons	*Planchadas*
<u>Weapons - Small Arms</u>	
**Arcabuzes*	
Quilted body armour	*Escaupiles*
*Crossbows	*Ballestas*
	Arcas
Flasks for Arcabuzes	*Frascos*
	Carecaxes
*Hooks for crossbows	*Gafas*
**Crossbow cord	*Cuerda*
*Pikes	*Picas*
**Arcabuz* balls	*Balas de arcabuz*
*Lead	*Plomo*
*Match cord	*Cuerda*
Bucklers	*Rodelas*
Helmets	*Cascos*
*Molds for bullets	*Moldes*
Scrapers	*Rascadores*

Cloth	
**London woolen stuff	*Pano de Londres*
	Carisea
**Linen of Rouen type	*Roan*
**Blankets	*Mantas* (Prob.Am. Indian)
	Brite
**Fine Brittany linen	*Bretana*
**Linen canvas	*Lienzo crea*
**Linen Presilla	*Angelo Camana*
Clothing	
**Shirts or chemises of Rouen linen	
**Shirts of *Presilla* linen	
**Doublets	*Ropillas*
	Caraquelles
**Half stockings?	*Medias Calceas*
	Fragadas
**Hats	*Sombreros*
*Sword belts	*Talabartes*
**Shoes	*Zapatos*
**Fiber sandals	*Alpargatas*
Cooking Utensils	
*Pots	*Calderas*
*Ollas	*Ollas*
*Large earthen jars	*Zalona*
Weights and Measures	
Measures	*Medidas*
Steelyard	*Romana*
Balance	*Balancas*
Weights	*Pesas*
	Galesta

*Nails	*Clavos de Costado*
	Clavos Palmar
	Clavos Gemal
	Clavos de Escora
	Clavos Pernos
	Clavos Barrote
	Clavos Tillado
	Clavos Candados
	Clavos de Hierro
	Medios Clavo
Tools	
Crowbars	*Pies de Cabra*
	Valderres
	Palmas
Grates or Plowshares	*Rejas*
Hoes	*Azadon*
	Pecacadores
Shovels	*Pala*
Axe	*Acha*
Adze	*Azuelas*
*Chisel	*Escoplo*
Saws	*Sierras*
*Augers	*Barzenas*
Equitation Equipment	
Saddles	*Sillas*
Bridles	*Frenos*
Headstall of Halter	*Jaquimas*
**Reins	*Riendas*
Girth or Cinch	*Cincha*
Stirrup	*Estribos*
Spurs, Rowels	*Espuela*
Horseshoes	*Herraduras*
Horseshoe nails	*Clavos*
Lighting Equipment and Materials	*Cera por labrar*
Workable wax	*Achas de Cero*
Candles	*Velas*
Tallow candles	*Velas de Sebo*
Lanterns	*Lanternas*
Binnacle Lamps	*Lantias*

Containers	
*Pipes	*Pipas*
*Barrels	*Barriles*
*Iron hoops	*Arcos de Hierro*
*Round, short-necked jars	*Botijas*
**Hampers	*Serones*
**Mats	*Esteras*
Boxes (strong boxes)	*Cajas*
**Sacks	*Costales*
**Game bags?	*Zurrones*
**Ropes, cords	*Sogas* (for esparto mats)
Boat Fittings	
**Sails	*Velas*
**Awnings	*Toldos*
**Hawsers	*Guindalesas*
**Small tackle	*Xarcia*
**Cordage for Tackle	*Beta*
**Stream cables	*Calabrotes*
Pitch	*Brea*
	Arpcos
*Anchors	*Anclas*
*Chains	*Cadenas*
	Curhares?
Prison Equipment	
Fetters	*Grillos*
Stocks	*Cepo*
Misc.	
Millstones	*Piedras*
Grindstones ?	*Muelas*
**Hides	*Cueros*
**Bellows	*Fuelles*
**Cotton thread	*Hilo de Algodon*
**Boards	*Tablas*
**Plates	*Platas*
*Bungs, Plugs, Wads	*Tacos*
*Fishing Equipment (nets), [weights]	
Small dragnets	*Chinchorros*
Casting nets	*Atarraya*

Foods	
*Beef	*Carne*
*Wine [vineyard ditches]	*Vino*
**Cheese	*Queso*
Rice	*Arroz*
Chick peas	*Hava*
Garbanza [chick peas]	*Garbanzas*
*Squash, Gourds	*Calabazas*
*Oil (olive)	*Azeite*
**Vinegar	*Vinagre*
**Honey	*Miel*
**Salt	*Sal*
**Ship biscuit	*Vizcocho*
*Flour	*Harina*
*Corn	*Maize*
String beans	*Frisol*
***Cacabe* bread	*Cacabe*
*Chickens	*Gallinas*
*Fish	*Pescado*

APPENDIX I

GOODS OF PEDRO MENÉNDEZ AND 652 ROYAL SUPPLY AT SANTA ELENA
1576
AGI EC 153-A, NO.1, FOLIO 2VO-4

List of goods (property of Pedro Menéndez de Avilés), in the keeping of Captain Solís, and turned over to Bartolomé Martín. (Evidently a sale for 2,679 pesos 3 reals, the proceeds being kept in a chest belonging to Martín in Santa Elena.)

100 pipes of flour, merchant size, in good condition
**111 sacks of flour, weighed by a balance (*romana*) weighed 475 *arrobas* of flour (each sack about 107 lb. -- E. Lyon).
15 pipes of wine, merchant size, in good condition
2 pipes of vinegar, merchant size, in good condition
308 *varas* of coarse canvas (*cañamazo*), (214 *varas* in one bale and 94 in a *pueza* ?)
*110 *botijas* of oil
2 sets of equipment for mills (*molinos*) *uñas* (hooks)
19 medium-sized grapnels (*rasones*) of 5 and 6 *ancletas* (hooks)
5 large grapnels of 5 hooks
*156 dozen plates (*platos*)
*135 dozen bowls (*escudillas)*
*8 dozen pots (*ollas*)
*6 dozen open stewpots, ceramic (*casullas*)
*39 dozen pitchers (*jarros*)
*1 dozen large glazed earthenware tubs (*lebrillos*)
*1 dozen close-stools (*servicios*), (chamber-pots)
100 Vizcayan axes (*hachas*)
46 machetes with their sheaths
**54 lb. of sail thread
98 pickaxes (*azadones de peto*), (possibly mattocks - E. Lyon)
*10 sacks of nails and pins
*30 barrels of all sorts of nails
42 (*pasanquetas?*)
74 iron bars (?), (*cabos de hierro*); some of which , being doubled, should be counted as two
*Also, they unloaded the spikes *(pernos)* found in the ship *San Anton´*
3 kegs *(pipotes)* of pitch *(brea)*

(At Ft. San Felipe, Santa Elena, May 1,1576)

There follows, about four months later, another list of items received by Bartolomé Martín in the fort of San Felipe from Captain Alonso de Solís for the account of the Adelantado.

** 27 pairs of cordoban boots
** 39 *sombreros,* to be lined
** 7 short cloaks *(ferreruelos)* of black cloth
**120 jackets of cheap light woolen stuff *(telilla basta)*
**101 pair of breeches of cloth; red and blue
**113 jackets *(ropillas)* of blue cloth
** 4 pairs of Kersey socks and 7 pair of socks of red cloth
**16 coarse canvas jackets *(ropillas de cañamazo)*
**8 pair of coarse canvas breeches *(calzones de cañamazo)*

APPENDIX I

OBJECTS OF MATERIAL CULTURE
1586 - 1588

A Partial List Based on the Account of Factor Rodrigo de Junco
AGI, CD 942

<u>Raw Materials</u>	
Lead bars	*Plomo*
Steel	*Acero*
Copper sheets	*Cobre*
Bronze	*Bronze*
Iron	*Fierro*
<u>Artillery</u>	
Iron artillery	
Bronze artillery	
Salvajes	
Falcones	
Sacres	
Half sacres	
Culebrinas	
Rasps	*Rascadores*
Bulletscrews	*Sacapelotas*
Ramrods	*Atacadores*
*Iron balls	(specified by weight)
Grape shot	*Dados*
<u>Small Arms</u>	
**Arcabuzes*	
**Mosquetes*	
*Lead balls	
<u>Munitions</u>	
Powder	*Polvora*
*Hemp cord	*Cuerda de Canamo*
**Palm cord	*Cuerda de Palmache*

Tools	
Copper knives	
*Iron knives	
Bellows	*Fuelles*
Whetstone-grindstone	*Muelas*
Carpenter's planes	*Cepillos*
Anvil	*Ayunques*
	Vigornia
Adze	*Azuelas*
File	*Limas*
Joining planes	*Junteras*
Hammers, claw?	*Martillos*
*Drill, auger	*Barrenas*
Axes	*Hachas*
Hoe, spade	*Azadas*
Saw	*Sierras*
*Hooks	*Ganchos*
Hardware Items	
*Nails	*Amcales*
	Barrotes
	Tachuelas
	Pernos
	Cadenas
Padlock	*Candades*
*Door locks	*Cerradores*
Screws	*Tornillos*
Screw eyes	*Armellas*
Containers	
*Copper caldrons	*Calderas de Cobre*
Iron Caldrons	*Calderas de Acofar*
**Sacks	*Costales*
**Hampers	*Serones*
Boxes	*Caxas*
Misc.	
Stirrup	*Estribos*
*Bells	*Campanas*
**Paper	*Papel*
**Medicines	*Medicinas*
**Sleeping mats	*Petates*
	Olonas
	Recados para Torta
**Blank books	*Libros blancos*
**Ribbons	*Cinta*
**Large cloths	*Panones*
	Xeringas
	Almureces?

Nautical Gear	
Pump irons	*fierro de bomba*
Cat head	*Gatas*
Pumps	*Bombas*
Bands, hoops, ferrule	*Zunchos*
Salute Guns?	*Morteretes*
Boats	*Navios*
Frigates	*Fragatas*
Launches	*Lanchas*
Barks	*Barcas*
Skifs	*Barquillas*
Rowboat?	*Batel*
Tackle	*Xarcia*
Esparto tackle	*Betas de Esparto*
**Oakrum	*Estopa*
**Hemp cables	*Cables*
**Pendants	*Coronas*
**Running rigging ropes	*Amantes*
**Tack rope of sail	*Amuras*
**Sheet lines	*Escotas*
	Vitagas
**Stays	*Estays*
**Parrel track	*Trozas*
**Short running ropes	*Amantillos*
Misc.	
**Dressed sheep skins	*Badanas*
**Raw hides	*Cueros*
**Wine skin	*Pellejos*

APPENDIX I

PRELIMINARY LISTING OF MATERIAL CULTURE FROM SPANISH FLORIDA COMPILED FROM VARIOUS SOURCES

by

PAUL HOFFMAN

**fishing nets
*lead weights
**biscuit
*wine *(botijas)*
**oil
**vinegar
rice
**raisins from Constantinople
**caps - velvet
**paper
almonds
dates
white figs
*hazel nuts
*olives
capers
dark figs
**malaga raisins, black sundried
herring
dark olives
cod fish
**preserved quince pulp
anise seed
**tuna
walnuts
*ollas & cazuelas of earthenware
*white earthenware, vasos
*tile vessels or labrillos - pots
iron bars
small iron chests
**jackets & headpieces of canvas
*copper kettles
*ornamental braid for shirts
**silk ribbons
**white thread
**atawxia* buttons
**red cloth
**canvas
figs
**Baize cloth
**Rouen cloth
**silk
**scrub brushes
*chests with 2 knives in each
clay flask bottles
**lard
combs
oil lamps
sail needles
***Vihuela* strings
**quills
hazelnuts
**Anglo cloth
**soap
Malaga raisins
**short boots for women
**hats
**Flemish readymade shirts
**cloth stockings
**slippers
**Toledo bonnets, red
**hand cloths
**velvet dress shirt
**English wool cloth
**Tedilla from Flanders
*Paris trumpets
**red tamete cloth, Milan
**linen stockings
**Dutch linen cloth, Holland
**twilled wool cloth
**marzipan
**jams and tuna
*earthenware vasos
codfish
saws
*matchcord
**sailcloth
**oakum
**hemp rigging line
**cordova leather boots
**shoes
**goatskin leathers
**felt hats
**hair sieves
**linen, raw
*wire thread
*hooks & eyes
**card thread
*pins
**blue English wool
grindstones

APPENDIX I (Continued)

MATERIAL CULTURE LIST (Continued)
*Flemish pitchers
*mirrors, round
sand glasses
**jerked pork
** image of Sta. Clara
guilded iron
*live chickens
**palm mats
**bacon
**pepper
**cloves
**cinnamon
**saffron
**cumin seed
mares
*live cows - calves
**cassava
machetes
*beans
*small anchors
grapnel anchors
pickaxes
candles
white wax
**syrup

1568 TRADE GOODS LIST
lintels
**salt
*nails
*cinch straps with bells
tin plates
*iron fittings for cinch
spades
hoes
armarde Poufano [armadura profano?, (lay armor?)]
*pikes
*crossbows
shields
door locks and keys
small bars of steel
vergazon iron
steelyards with pilon
sulfur
**raisins from Almioneca 1577
**sugar (1577)
*augers (1577)
*chisels (1577)
**dressed sheepskin for bellows
**blankets (1578)
**fustan cloth --brown & black
charcoal made locally (1579)
spoon for melting and casting lead
goats (1580)

APPENDIX II

SPANISH GLASS TABULATION

APPENDIX II: SANTA ELENA GLASS FROM LEVELS

SITE PROV.NO.	RIBBED mm	STRIPED mm	THIN CLEAR mm	THIN GREEN mm	COMMENT
38BU162-					
14A	1.25				
36B				1.00	
88B				1.15	
90A	2.00				
93B			1.35		
93B			1.35		
112B			1.20		
118B			0.60		
38BU162A-					
67				1.00	
95					melted blob
38BU162B-					
36B			0.80		
38BU162C-					
3B			0.55		
4B		3.50(red & w)			
4B			1.25		
9A			1.20		
20B	1.10				
26B		0.80			
27B		0.90			
30B	1.00 (clear)				
38B	2.90				
39B			1.40		
46A			1.50		
46A		0.65			
71B	1.00 (clear)				
77B	1.20				
136B			2.00		
139B	1.50				
142B	1.40 (clear)		0.60		
143B					
146A		1.85 (clear)			
147A				1.60	
158B			1.05		
158B			0.90		
163B			1.00		
177A		1.35 (clear)		1.10	
178B					
181B		1.00			
181B		0.90			
182B		1.35 (clear)			
251A			1.50		

APPENDIX II: SANTA ELENA GLASS FROM LEVELS

SITE PROV. NO.	RIBBED mm	STRIPED mm	THIN CLEAR mm	THIN GREEN mm	COMMENT
38BU162C-					
251B			1.35		
355A			2.00		
355A			2.00		
355A				1.10	
38BU162D					
2B		2.15 (clear)			
5B		1.10 (clear)			
10A		1.15 (clear)			
19B	1.70				
21A		2.70 (clear)			
21B		3.25 (clear)			
70		1.20 (clear)			
38BU162J					
30B				2.00	
36B			0.90		
100B					handle 5.70

APPENDIX II: SANTA ELENA GLASS FROM FEATURES

SITE PROV. NO.	RIBBED mm	STRIPED mm	THIN CLEAR mm	THIN GREEN mm
38BU1262C-				
75			2.25	
105				1.50
151			0.85	
151			1.00	
268		2.00		
268	1.15			
268	0.80			
268	1.25			
268	1.10			
268	1.00			
268	0.80			
268				0.90
268				0.60
268				0.55
268				0.75
268				0.55
268				0.65
268				0.40
268				0.65
268				0.60
38BU162D-				
SANTA ELENA				
Features				
67			1.20	
67		1.15		
67				0.60
67				0.00
68				1.10
70		1.10		
98	0.80			
124	1.65			

APPENDIX II: FT. SAN FELIPE GLASS FROM LEVELS

SITE PROV.	RIBBED mm	STRIPED mm	THIN CLEAR mm	THIN GREEN mm	COMMENT
38BU162G					
30A				1.20	+ melted blob
30B			0.70		
38A	1.50				green
40A					mirror 5.70
46A	1.25				green
47A		1.35			
50A	1.30				
52A				1.55	
53B					melted blob
54A	1.10				
57A	1.90				
57A	1.85				
57B				1.25	
64B				0.90	
65B				0.90	
69A				2.30	dk.green,l9c?
69A				3.00	dk.green,l9c?
69A				2.50	dk.green,l9c?
69A				1.60	dk.green,l9c?
69A				1.60	dk.green,l9c?
69A				2.50	dk.green,l9c?
77A				0.90	dk.green,l9c?
162H-75A	1.55				
76A	1.75				
86B	0.65				
87B	1.25				
88B	1.00				
89A	2.35				
90A				1.50	
97A	1.15				
99B	1.40				
99B	1.00				
100A	1.90				
100A	2.15				
100B	1.25				
101A	0.70				
101A	1.50				
108A			1.70		
108A	1.70				
112A	1.15				
113A	2.10				
113B	1.75				
117A				0.80	+ melted blob
119A	2.00				

APPENDIX II: FT. SAN FELIPE GLASS FROM FEATURES

SITE PROV. NUMBER	RIBBED mm	STRIPED mm	THIN CLEAR mm	THIN GREEN mm	COMMENT
38BUI62E-					
38C			0.70		
38C			0.60		
38D			1.10		
40D			1.10		
40D			1.40		
40D			1.15		
40D			1.05		
40D			1.25		
40D			1.65		
40D			1.35		
40D			1.25		
42D				0.80	
43C				1.00	
44C				0.85	
44C				0.70	
44C				0.65	
44C				1.50	
44C				1.30	
44C	1.20				
44C	1.15				
44C				0.65	
44C	1.85				
96			1.60		
96			1.40		
96			1.00		
96			1.00		

APPENDIX II: FT. SAN FELIPE GLASS FROM FEATURES

SITE PROV. NUMBER	RIBBED mm	STRIPED mm	THIN CLEAR mm	THIN GREEN mm	COMMENT
38BUI62G-					
159	2.00				
159	2.10				
159			1.30		
146A	1.40				
147				1.00	
172				0.85	
172			1.00		
220				1.55	
268	1.00				
268				0.60	
268				0.70	
268				0.70	
268				0.65	
268				0.50	
268				0.60	
268				0.55	
38BUI62H-					
172C					blue 1.35
172E				1.05	
172H		1.40			
172H		1.10			
172H		0.95			
217E			1.50		
276				0.80	
276			1.10		dempled
276			1.10		dempled
276			0.90		dempled
305	1.15				
305	1.60				

APPENDIX III

TOWARDS A TYPOLOGY OF SPANISH COLONIAL NAILS

by

Eugene Lyon

APPENDIX III

TOWARDS A TYPOLOGY OF SPANISH COLONIAL NAILS

by

Eugene Lyon

October 17, 1979

The development of a typology of Spanish colonial nails and fastenings might be useful for both land and marine archaeology; it might, in fact, be one way in which the two areas might inter-relate profitably.

Spanish Florida was a wood-oriented economy. Small craft and up to *fregata* -size ships were built there (up to 90 tons). Forts, churches, storerooms and houses were continually in the process of construction or rebuilding. As many of the service records show, the carpenters were sought after, paid well and in demand. Such an economy needed and used quantities of nails. Although nails were made at smithies at St. Augustine, San Mateo, and Santa Elena during the years 1565-1580, they were also imported in some quantity in the years1565, 1566, 1568, and 1578. During the preparation of the data base for St. Augustine Restoration Foundation, Inc., Paul E. Hoffman reproduced supply lists which included nails and fastenings. He also furnished materials from Vizcaya about the weight and nomenclature of nails made there in the late 15th and into the 16th centuries (see SARFI files and AGI CD 312, No. 2, data, 72: 2-3; AGI CD 941 lists, et al.).

During four years of excavation at St. Augustine, Kathleen Deagan and her associates carried out extensive investigation in 16th century materials (see Deagan, "The Material Assemblage of 16th Century Spanish Florida," *Historical Archaeology*, Vol. 12, 1979.) In the course of these excavations 194 nails, spikes and tacks were found. Of 23 of these, the most frequent sizes were:

Square-Headed	Round-Headed
1 3/16"	2 spikes, 4 1/8"
2 3/16"	5 7/8"
3 1/8"	tacks 3/4"

While working on the reconstruction of a 16th century Spanish ship, this writer noted that there exist in Spanish archives ship construction contracts and associated material inventories which describe fastenings of differing types. He also located material in the *Museo Naval* in Madrid and the *Archivo General de Indias* in Seville which pictured and described nails and other fastenings in terms of size and use. Some of these materials are attached to this report.

Whether made in Florida or in Spain, the colonial nails were categorized into well-known types by size, weight and use. A major division appears to have been between nails used by a ship's carpenter (*carpintero de ribera),* and a joiner *(carpintero de blanco*). Generally, nails used in joining were flat-headed or had a lower rounded head profile than ship nails, even though they might be known by the same name or be of approximately the same length (see attached scale drawing, AGI *Mapas y Planos, Ingenios y Muestras,* 34).

APPENDIX III (Continued)

In shipbuilding, the major spikes and nails (not bolts, called *pernos* nor treenails, called *cabillas)*, used for reinforcing major joined pieces and connecting heavy members such as beams or wales, were named *clavos de peso*. These included:

Encolamiento mayor (over 2')
Encolamiento
Cinta Mayor
Cinta
Media Cinta
Costado Mayor
Costado
Medio Costado
Escora Mayor
Escora
Media Escora (ca. 4")

(from Navarro, Juan José [El Marqués de la Victoria], *Diccionario demostrativo con la configuración o anatomia de toda la arquitectura naval. 1719-1756*. Rare book: Museo Naval, Madrid. Cliché No. 51, appended).

In Florida fastenings of such size would have been needed in the joining of the heaviest members of the fort or other major structure. In 1578, when new fort construction had been authorized and was underway, nails of *escora* and *medio costado* were sent (AGI CD 312, *op. cit.*).f

A variety of smaller nails and fastenings were used for other specific construction purposes. Among those sent to Florida were *Barrotes* and *tillados*. Since the word *tillado* refers to flooring, thus this nail may have been used for that purpose. (see AGI CD 462, No. 9--1578)

When the 1566 succor fleet came to Florida, the ships' holds were lined with matting fastened in place with short tacks with round wide heads.These were called *estoperoles*. Since the mats and some of the wood from which the temporary holds had been made remained in Florida, it is likely that some of the tacks did as well (see AGI CD 442, No. 2, fo. 71vo.).

Apart from ceramic jars, the most important goods containers for materials shipped into Spanish Florida were wooden casks of a variety of sizes and names: *toneles, botas, pipas, barriles, cuartos,* etc. It is known that these were present in large numbers, that many were torn down for iron, and that many were used to make wells (some of which have been excavated). It follows, therefore, that the peculiar types of nails used in fastening the barrel ends and the hoops can be expected to be found in excavations in Spanish Florida sites datable to the 16th century. (These, called *clavos de pipas* in AGI CD 442, No. 2, fol. 72, should have been present in numbers, since 21,000 were purchased for the 1566 fleet.)

Although only rough correspondence between the finds in St. Augustine and the materials discussed and illustrated in this report can be made, it appears that there is some correspondence. It further appears that continuing excavation in St. Augustine and in Santa Elena can widen the context of materials. It is urged that other deposits of nail material be made available for study. Ms. Claudia Linzee is preparing an analysis of the nails and fastenings found in the vessel *Nuestra Señora de Atocha,* sunk in 1622 west of the Marquesas Keys, for further comparisons.

APPENDIX III (Continued)

NOTES

1513

GUIARD, LA INDUSTRIA NAVAL, P. 56
Note regarding decree of the city council of Bilbao, 1513.

1000 barrote nails to weigh no more than 90 lbs.
1000 *tillado* nails to weigh no more than 25 lbs.

half *barrote* and half *tillado* accordingly, per 1000

1578

AGI CD 312, No. 2, Data 72:2-3

Factor buys nails for Florida from Gaspar de Cabrejas.

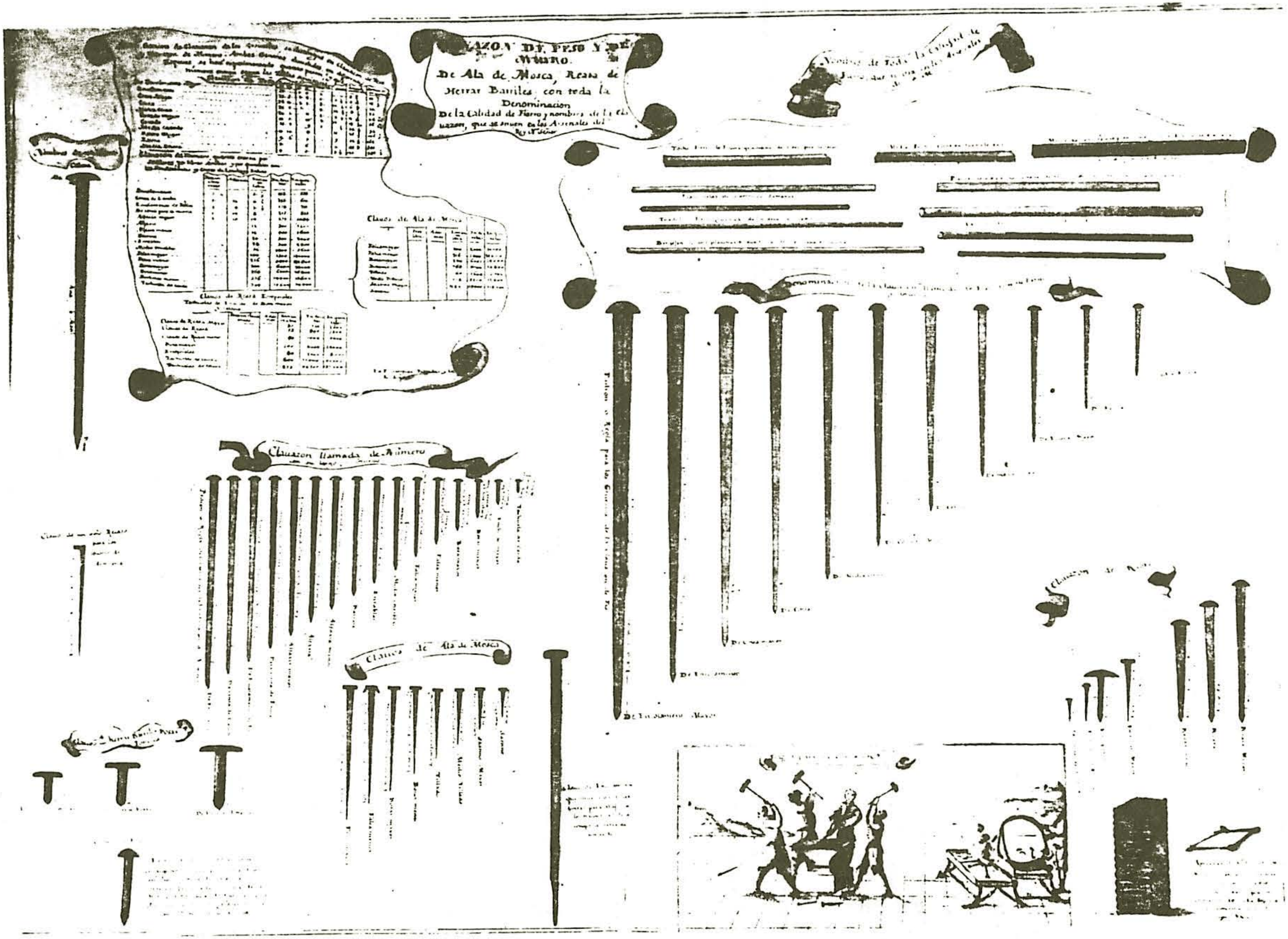
1 *Barrica de Brea* @ 2,856 per 100 : 6 cwt.
2,000 *Estoperoles* @ 14 *reales* 1000
1/2 cwt of *Cabros de escoria, medio costado, palma* @4 duc/cwt
400 *clavos de Barrote* @ 4 *reales* per 100
200 *clavos de tillado* @ 3 *reales* per 100

The following list was found by Eugene Lyon and added to the previous information in 1986. It does not concur with weights from sixteenth century sources. It is presented here primarily as an addendum to the previous study. (S. South)

ARCHIVIO DE LOS CONDES DE REVILLAGIGEDO (ACR) TESORO ARNSTICO 73 1740-1747. Supplies for 94 ships to be built for the crown.

NAILS

TYPE	INCHES *(PULGADAS)*	TWELFTHS OF INCHES *(LINEAS)*	POUNDS (PER 1000)	PRICE IN *REALES* (PER 1000)
Aljafia Major	5	6	72	84
Aljafia	4	10	64	74
Aljafia Menor	4	5	53 1/2	64
Barrote	4	0	42 1/2	36
De Entablar	3	6	25	39
Medio de Entablar	3	2	15	23
Tillado	1	6	6 1/2	16
Medio Tillado	1	1	2 1/4	6
Falca Mayor	2	9	15	23
Falca Menor	2	4	12	21
Estoperoles Mayores	1	9	14	28
Estoperoles Menores	0	9	10	21


AZON DE PESO Y DE
MURO.
De Ala de Mosca, Rexa de
Herrar Barriles con toda la
Denominacion
De la Calidad de Fierro y nombres de la Cla
uazon, que se hazen en los Arsenales del
Clauazon llamada de Numero
Clauos de Ala de Mosca

SHIP CARPENTER'S NAILS

Clavos para Carpinteros de Navios.

Media Barrote.

Barrote.

Mirasia.

Media Escoa.

Escoza.

JOINER'S NAILS

Clavos para Carpinteros de Retablos.

Quarto de Barrote.

Medio Barrote.

Barrote.

Mirasia.

Media Escoa.

Escoza.

APPENDIX IV

SPANISH NAIL TABULATION

APPENDIX IV: SANTA ELENA NAILS FROM THE HUT 1979

SITE PROV. NUMBER	NAIL TYPES (2-10) & NAIL HEAD CODE (Rose, T, or L) Length (mm)	CLINCHED (C) OR BENT NAIL, HEAD TO BEND (mm)	NAIL FRAGMENT COUNT WITH NAIL HEAD CODE Point (-),R,T,L
38BU162A-			
1	7R 91		
4A			1R
5B	6R 75	35	
9A	6R 70		
13B	6R 70		
14B	6R 68		1R
17B			1 -
18	7T 106		1R
18	6R 84		
19	7R 115	78C	
20			1 -
21			1 -
27			1 -
29	6R 72		
32			1 -
34			1R
38	6R 63		
40			1 -
41			1R
42	4R 41	30C	
43	4R 43		
44			1R
46	5T 58	23	
49	6R 87	55	
52			1R
53	7R 108	70	
54B	8R 165	70C	
60	6R 74		
61			1 -
62			1 -
63			1 -
64	7R 90+		1 -
73	6R 87		3 -
73	7R 95	65	
80	8T 155		
91			1R
95	6R 72		2R
95	7T 103		
101			1 -
102			1 -
106B			1R
108	6R 70	30	

APPENDIX IV: SANTA ELENA NAILS FROM THE HUT 1979

SITE PROV. NUMBER	NAIL TYPES (2-10) & NAIL HEAD CODE (Rose, T, or L) Length (mm)	CLINCHED (C) OR BENT NAIL, HEAD TO BEND (mm)	NAIL FRAGMENT COUNT WITH NAIL HEAD CODE Point (-),R,T,L
38BU162A-			
110	6R 72	40C	1R
111			1R
114			1R
115	5R 59		
118			1R
118			1T
122			1R
127	6R 63+	45C	
127	7R 100		
127	6R 85		
127	7R 96		
130			1 -
132			1 -
134			1T
135	6R 83		
137			1 -
145	4R 41		
147	6R 67		
148			1 -
149			1R
150	6T 70	35	
151			1 -
153			1R
154	6R 74		
155	2R 20+		
156			1 -
158			1R
181			1R
185	7T 109	35	
188			1R
190	7R 95		
191	7T 120		
191	6R 89		
194	5R 52		

APPENDIX IV: SANTA ELENA NAILS FROM SAMPLE FRAMES 1979

SITE PROV. NUMBER	NAIL TYPES (2-10) & NAIL HEAD CODE (Rose, T, or L) Length (mm)	CLINCHED (C) OR BENT NAIL, HEAD TO BEND (mm)	NAIL FRAGMENT COUNT WITH NAIL HEAD CODE Point, R,T,L
38BU162-			
3B	5R 61		
8C			1R
10A	5R 56		
13B	7R 92		
15B			1 -
15C			2 -
16B	5R 59		1R
16B	6R 73		
17C	6T 76		
31A	7R 96		
44	7R 113	28	
44	6T 63		
47A	7R 91	50	
57	6R 65		
60	8L 180		
66D	8T 176	100	
66E	7R 110		
80B			2 -
82C			1 -
84B	5R 55		
87A			1R
87B	4R 45		
88B	7T 121		1-, 1R
94B			1 -
101B	5R 60		3 -
103	6R 70	42	
103	6R 78		
104B	5R 55		3R
104B	5R 55		
104B	5R 57	30	
104B	2R 27		
104B	3R 36		
106B			1 -
108B			1-, 1R
110B			1R
118B			1-, 1R
119B	7R 95		

APPENDIX IV: SANTA ELENA NAILS FROM SAMPLE FRAMES 1979

SITE PROV. NUMBER	NAIL TYPES (2-10) & NAIL HEAD CODE (Rose, T, or L) Length (mm)	CLINCHED (C) OR BENT NAIL, HEAD TO BEND (mm)	NAIL FRAGMENT COUNT WITH NAIL HEAD CODE Point (-),R,T,L
38BU162-			
120B			2 -
121B	6R 81		
123B	4R 48		1 -
123B	6R 81		
124B			1R
131B	7R 99		1R
132	7R 94		
132	5R 61	21C	
132B	7R 92	40C	1 -
133	6R 68		2-, 2R
134			1R
135B			2-, 1R
139			1R
141A	7T 100		
38BU162B-			
7B	4R 42		
16B	5R 61		
18A			1T
24C			1T
45	6T 82		
45	4R 41		
48	7R 105		
55A	8R 150+	105C	

APPENDIX IV: SANTA ELENA NAILS FROM LEVELS 1981

SITE PROV. NUMBER	NAIL TYPES (2-10) & NAIL HEAD CODE (Rose, T, or L Length (mm)	CLINCHED (C) OR BENT NAIL, HEAD TO BEND (mm)	NAIL FRAGMENT COUNT WITH NAIL HEAD CODE Point (-),R,T,L
38BU162C-			
2B	9R 187+		1-, 1R
3A			1-, 2R
3B	7R 96+		1R
4B	8R 152+		1-, 1R
5A			2 -
5B	7R 123		
5B	4R 44		4R
5B	8R 176	80C	
7B			1-, 1T
8A			1 -
8B	7R 99+		
8B	6R 72		
9B			1-, 1R
10A			2 -
14A			1-, 1R
14B	6R 63+		
14B	5T 50+		
14B	6L 65		1-, 1R
15B	89 139+		
15B	5T 62		
16A	5R 50+		
16B	7R 100		
16B	5R 55		
17B	6R 82		
17B	6R 88		1R
19B			1R
20A			1R
20B	7R 111		
20B	7R 92+		
20B	6R 73		
23B	5R 55	20	4 -
26A			2R
26B	7R 98		2R
26B	5R 60		
27A			1 -
27B	8R 165		1 -
27B	6R 79+		
27B	5R 58+		
27B	3T 37+		
28A			2 -
28B	6L 69		2-, 1R
28B	6T 67+		

APPENDIX IV: SANTA ELENA NAILS FROM LEVELS 1981

SITE PROV. NUMBER	NAIL TYPES (2-10) & NAIL HEAD CODE (Rose, T, or L) Length (mm)	CLINCHED (C) OR BENT NAIL, HEAD TO BEND (mm)	NAIL FRAGMENT COUNT WITH NAIL HEAD CODE Point (-),R,T,L
38BU162C-			
28B	6R 80+		
28B	6R 87	57	
30A			1 -
30B			3R
32B	9R 225	35	
33A	4R 49		
33B	7R 124		
34B	7R 108		
35A	7L 122+		1R
35B	7R 129		
38A	4R 41		
38B	6R 82		2 -
38B	3R 35+		
41A			1T, 1R
42B			2 -
43B	6R 70		2 -
45A			1 -
45B	5T 52+		1R
46B	6T 72+		2R
47A			1 -
47B	7R 118+		
50B	7R 115+		2-, 1R
50B	5R 50+		
50B	6R 75+	55	
50B	8R 140	100C	
51A			1R
51B	6R 75+		1-, 9R
52A			2-, 1R
52B	5R 56		2 -
52B	5R 52		1-, 1R
54B	6R 80		
55B		25C	
57B	7T 97		
57B	4R 43		
58A	7R 93		1 -
58B			1 -
59A	7R 115		
59B			1 -
62B	4R 41		1L, 1R
62B	6T 72+		
62B	5R 56+		
63B	6R 68+		1-, 1R

APPENDIX IV: SANTA ELENA NAILS FROM LEVELS 1981

SITE PROV. NUMBER	NAIL TYPES (2-10) & NAIL HEAD CODE (Rose, T, or L) Length (mm)	CLINCHED (C) OR BENT NAIL, HEAD TO BEND (mm)	NAIL FRAGMENT COUNT WITH NAIL HEAD CODE Point (-),R,T,L
38BU162C			
63B	8T 155+		
64B	7R 110		
64B	6R 64		1R
65A	2T 24		
66A			1R
68A	4R 40+		1 -
68B	7R 128		
70A			1R
70B			1 -
71B			1T
132B			6R
133A			4R
133B	7R 115+		4-, 1R
134A	5R 50+	35C	2R
134B			
135A			1 -
136B			1T, 3R
137B	6R 85+		4-, 1R
138A			1-, 1T, 1R
138B	6R 73		
138B	6R 80	53C	2-, 5R
139A			3R
139B	6T 70+		
139B	6R 70+		
139B	6R 72		2-, 2R
140B	3R 35+		
141A			1 -
141B	8R 135+		5-, 5R
141B	6R 87+		
141B	4R 42		
141B	6R 63+		
142A			1-, 1R
142B	4R 45		2-, 2R
142B	6R 74		
143A			2-, 1R
143B	7R 91+		1R
143B	8R 148+		
144B			3-, 6R
144B	7R 105		
144B	8T 150		
144B	7R 108		
145A			3-, 1R

APPENDIX IV: SANTA ELENA NAILS FROM LEVELS 1981

SITE PROV. NUMBER	NAIL TYPES (2-10) & NAIL HEAD CODE (Rose, T, or L) Length (mm)	CLINCHED (C) OR BENT NAIL, HEAD TO BEND (mm)	NAIL FRAGMENT COUNT WITH NAIL HEAD CODE Point (-),R,T,L
38BU162C-			
145B			1R
146A	5T 58		1R
147B	6R 70	27C	6 -
147B	8T 182	160C	
147B	6T 84		
148A			2R
148B	7R 97+		1-, 1R
149A	6T 64		
149B	7R 105	35	2-, 2R
153B			3-, 1R
154B			2-, 2R
156B	6R 74		2-, 3R
158B			1R
159B			6-, 1R
159B	3R 34	20C	
162B	4T 41		1-, 2R
163B	6R 80	50C	2-, 4R
164B			4-, 1R
165B			2-, 3R
166A			1R
166B	7R 96		3-, 1R
167A	7T 115		2-, 2R
168A	7R 92+		
168A	6R 87	25C	
168B	6T 74		3-, 4R
168B	6R 80+		
168B	6R 79	60	
169A			1R
169B			
169B	6R 65		1 -
169B	6R 81+		
170B	6R 72		1-, 3R
177A			1R
177B	5R 59		2-, 2R
177B	4R 45		
179A			1T
179B	6R 70	20C	2-, 2R
180A			1R
180B	2R 24		1R
182A	7R 95+		
195A	6R 65+		
195B			1 -

APPENDIX IV: SANTA ELENA NAILS FROM LEVELS 1981

SITE PROV. NUMBER	NAIL TYPES (2-10) & NAIL HEAD CODE (Rose, T, or L) Length (mm)	CLINCHED (C) OR BENT NAIL, HEAD TO BEND (mm)	NAIL FRAGMENT COUNT WITH NAIL HEAD CODE Point (-), R,L,T
38BU162C-			
196B	4R 40+		4-, 5R
196B	7R 105+		
196B	6R 75		
197A			2R
197B	7R 92+		
197B	7R 101+		5-, 6R
198A			1-, 3R
198B	4R 44+		1-, 2R
198B	4R 48+		
199A	4R 42+		
199B			1R
200A	6R 65+		1-, 1R
200B	10R 234	140C	3-, 4R
201A			2R
201B	5R 57+	20C	1R
202A			2-, 2T
202B			2R
203B	7R 93+		3R
203B	7R 125		
203B	7R 97+		
204A			5R
204B			2-, 2R
205A	4T 45+	18	
205B			2 -
206B	6R 81		
207A	6R 75		1 -
207B			1-, 5R
208A			1-, 1R
208B			3-, 1R
214A			2 -
214B			2 -
217A			2R
217B	8R 170		
217B	6R 80+		4-, 1R
220B			1-, 1R
221A			2 -
221B			1 -
331A	6R 67+		1-, 1R
331B	8R 160+		
331B	7R 92+		5-, 2T, 3R
332B	6R 70		
332B	7R 120		

APPENDIX IV: SANTA ELENA NAILS FROM LEVELS 1981

SITE PROV. NUMBER	NAIL TYPES (2-10) & NAIL HEAD CODE (Rose, T, or L) Length (mm)	CLINCHED (C) OR BENT NAIL, HEAD TO BEND (mm)	NAIL FRAGMENT COUNT WITH NAIL HEAD CODE Point (-),R,T,L
38BU162C-			
332B	7T 100	20C	4 -
346B	7R 105	30C	
346B	8T 170	35C	1-, 1R
346B	7T 115	20C	3-, 1R
350B	6R 72		
351B			6-, 1R
353B	6R 64		1-, 1R
354A	7R 114		
354B			1R
355B	7R 116		
355B	7R 105+		
358B	6R 80	40	1-, 1R
361	7R 132		1-, 1R
361	7R 99		
361	6R 72		
361	6R 70		
362			2R

APPENDIX IV: SANTA ELENA NAILS FROM FEATURES 1981

SITE PROV. NUMBER	NAIL TYPES (2-10) & NAIL HEAD CODE (Rose, T, or L) Length (mm)	CLINCHED (C) OR BENT NAIL, HEAD TO BEND (mm)	NAIL FRAGMENT COUNT WITH NAIL HEAD CODE Point (-),R,T,L
38BU162C-			
74	7T 132		4 -
74	6R 84		
74	6R 70		
75			15 -
76	2R 27	15	6-, 2R
76	2R 29		
76	4R 45		
76	6R 66		
76	7R 104		
77B	8R 145+		
79			79
84	6R 84		
86			1 -
94	7R 100+		3-,2R
100			3-,2R
117	8T 140	50C	9-,11R
117	7R 112	40C	
117	6R 80	25	
117	6R 69+		
117	6R 66+	25	
117	4R 41	15	
117	6T 80		
117	6R 80		
117	7R 110+	97C	
117	7R 106		
117	7L 93		
117	6R 79		
117	6R 76		
117	7R 95+		
117	7R 100+		
118	5R 53		
119	8R 145		1R
123			3 -
126			2 -
171	7R 90+		6-, 1R
171	8R 152		
171	5R 61		
171	7R 104+		
172	6R 70	35C	2-, 4R
172	7R 105		
172	6R 86		
172	6R 65		
172	7R 110	40	
172	7R 105	80C	

APPENDIX IV: SANTA ELENA NAILS FROM FEATURES 1981

SITE PROV. NUMBER	NAIL TYPES (2-10) & NAIL HEAD CODE (Rose, T, or L) Length (mm)	CLINCHED (C) OR BENT NAIL, HEAD TO BEND (mm)	NAIL FRAGMENT COUNT WITH NAIL HEAD CODE Point (-),R,T,L
38BU162C-			
172	6R 65+		
172	6R 70	55C	
173			1-, 1R
174			1R
175A			1-, 3R, 2T
175	3R 37		4-, 5R
175	2R 29		
175	3R 39		
175	7T 108	40	
175	6R 67		
176	9R 209+		
176	9R 225	170C	
176	8R 149+		
176	6R 69		1-, 2
231			1 -
236			6-, 12R
236	8R 163	25	
236	7T 107	45	
236	6R 88		
236	6R 73	60	
236	3R 39		
236	6R 74		
236	6R 78		
236	6R 72+		
238			2 -
257	7R 104 (ship's carp.)	30	15-, 12R
265	7R 115		6-, 4R
265	6R 75		
265	6R 67		
268	7T 96+		2-, 2R, 1T
268	7T 130	55	
275	6R 80	40C	1-,3R
278			1R
287			1R
288			5-, 1T
288	7R 123		
288	7R 123		
288	7R 124	90	
291	2R 29	18	
291	7R 105+		
291	6R 78+		
292	7R 90+	60	2 -
292	5R 60		
293	6R 80		4-, 4R

APPENDIX IV: SANTA ELENA NAILS FROM FEATURES 1981

SITE PROV. NUMBER	NAIL TYPES (2-10) & NAIL HEAD CODE (Rose, T, or L) Length (mm)	CLINCHED (C) OR BENT NAIL, HEAD TO BEND (mm)	NAIL FRAGMENT COUNT WITH NAIL HEAD CODE Point (-),R,T,L
38BU162C-			
294	6R 74		
295	5R 50+		
296	6T 70	40C	
296	6T 84	40C	
298			2-, 1R
301	7R 110		6-, 6R
305			1 -
307			2-, 1R, 1T
313B			3 -
316	9R 200		2 -
316	6R 73	35C	
316	6T 89		
316	5R 52+		
316	2R 27		
326	7R 100		2R
333			1R
334			1 -
338	6R 82		
352	6R 87		
357	6R 75		5 -
357	7R 116		
357	7R 117		
357	6R 80		
357	4T 43+		
359			3 -

APPENDIX IV: SANTA ELENA NAILS FROM LEVELS 1982

SITE PROV. NUMBER	NAIL TYPES (2-10) & NAIL HEAD CODE (Rose, T, or L) Length (mm)	CLINCHED (C) OR BENT NAIL, HEAD TO BEND (mm)	NAIL FRAGMENT COUNT WITH NAIL HEAD CODE Point (-), R,T,L
38BU162D-			
2A			2 -
2B	5R 55		2-, 1L, 2T, 3R
2B	7T 108		
2B	6R 80+		
2B	6R 75		
2B	7T 105+		
3A	6R 75		
3B	4R 40+		1R
3B	3R 38	10C	
3B	3R 32		
3B	6R 66		
3B	6R 64		1R, 1-
4A	6T 80+		
4A	4T 43		1 -
4B			
4B			
4B			
4B	6R 77	30	7-, 3R
4B	7R 91	65	
4B	7R 108	65	
4B	7T 10		
4B	7R 120		
4B	6T 87		
5A			1 -
5B	7R 100		4-, 5R
5B	6T 75		
5B	6R 69		
6A			1R, 2-
6B	3R 32	18C	
6B	7R 94+		
6B	6R 80		
7A			1R, 1T
7A	5R 54		
7A	5R 53		
7B	5R 56		
8A	6R 67		1R
8B			1R
9A			2R
9B			3R
10A			3R, 1-
10B			1 -
11A	6R 87		1T, 1L, 1R
18B	6R 87		2R
19B			1 -

APPENDIX IV: SANTA ELENA NAILS FROM LEVELS 1982

SITE PROV. NUMBER	NAIL TYPES (2-10) & NAIL HEAD CODE (Rose, T, or L) Length (mm)	CLINCHED (C) OR BENT NAIL, HEAD TO BEND (mm)	NAIL FRAGMENT COUNT WITH NAIL HEAD CODE Point (-), R,T,L
38BU162D-			
20A			2-,1R
20B			3-, 1R
21A			5R
21B			2-, 1R
22A	6R 70		
22A	5R 58		
22A	6R 81+		1R, 2-
22B	6R 70+		
22B	6R 75+		1 -
23A	6R 82+		
23A	6R 77	40	
23A	5R 53		2 -
23B	7R 109		1R,1-
24A	5R 61		2 -
24B			7-, 1R
25A			2R, 1-
25B			3 -
26B			7 -
27B			4 -
28B			1-, 1R
29A	9(no head) 220+		
29B			6 -

APPENDIX IV: SANTA ELENA NAILS FROM FEATURES 1982

SITE PROV. NUMBER	NAIL TYPES (2-10) & NAIL HEAD CODE (Rose, T, or L) Length (mm)	CLINCHED (C) OR BENT NAIL, HEAD TO BEND (mm)	NAIL FRAGMENT COUNT WITH NAIL HEAD CODE Point (-),R,T,L
38BU162D-			
31			2 -
32	77R 104	45	2 -
35			1-, 1R
37	4R 48		
37	6R 77		2-, 1R
38	6R 78		
38	4R 42		
38	3R 38		
38	4R 41		
38	3R 33		
42			4-, 4R
44	5R 51	32	
50	6T 79		5 -
51			4 -
54			1 -
57			1-, 1R
63			1-, 1R
66	7T 91	50	3-, 4R
66	7R 111		
66	7R 91	30	
66	6R 80		
67	2R 25+		5R, 3-
67	9R 210+		
67	8R 160+	110C	
67	9L 189+		
67	8R 145+	100C	
67	8T 151+		
67	7R 100	30C	
67	7R 112	70	
67	7R 116	60	
67	7R 100		
67	6R 82		
67	7R 91		
67	6R 67		
67	5R 62		
67	5R 57		
68	6R 87		3-, 3R
69			2 -
70	7T 115		4-, 2R
70	6R 70+		
70	6R 80+		
70	6R 70+		
70	5R 52	32	
70	3R 32		

APPENDIX IV: SANTA ELENA NAILS FROM FEATURES 1982

SITE PROV. NUMBER	NAIL TYPES (2-10) & NAIL HEAD CODE (Rose, T, or L) Length (mm)	CLINCHED (C) OR BENT NAIL, HEAD TO BEND (mm)	NAIL FRAGMENT COUNT WITH NAIL HEAD CODE Point (-),R,T,L
38BU1652D-			
70	2R 25		
71			2-, 3R
72	9T 187		
72	4R 44		3-, 3R
72	4R 44		
72	4R 40+		
76	6R 72	22	1 -
89			1R
90	7R 115		4-, 1T, 3R
95			1R, 1-
102	7R 94+		
102	7R 94+		1 -
103	3R 33		
115			8 -
116			1R
118	7R 98+		
118	7R 108+		
118	3R 34		
118	4R 43+		2-, 1R
123	4R 41	20C	
124	6R 89	40C	2R, 2-

APPENDIX IV: SANTA ELENA NAILS FROM SAMPLE SQUARES 1985

SITE PROV. NUMBER	NAIL TYPES (2-10) & NAIL HEAD CODE (Rose, T, or L) Length (mm)	CLINCHED (C) OR BENT NAIL, HEAD TO BEND(mm)	NAIL FRAGMENT COUNT WITH NAIL HEAD CODE Point (-),R,T, L
38BU162J			
1B			1 -
2B	6T 75	40	
3B			2R, 1T
7B			1R
13B			2 -
17A	7R 92+		
31A			1R
51B	6R 84+		
58B	6R 75+		
58B	6R 76		
58B	6R 75	35	
58B	6R 85	45C	1 -
73B	7T 127		1R
79B			1R
82A	5R 58		
108B			1T
118	4T 48		
122A	7R 97		1R
124B	3R 31+		
124B	2R 28		
133A	7R 99+		
135	8T 140	100C	1R
143			1-, 1T
144B	7R 114		
38BU126K-			
1A	5R 58+		
1A	5R 60+	20	1 -
1B	7R 95+		
2B	7R 90+		3 -
6B	6R 80+		
9B	6R 80+		
32	6R 66+		

APPENDIX IV: FT. SAN FELIPE NAILS FROM LEVELS AND FEATURES

SITE PROV. NUMBER	NAIL TYPES (2-10) & NAIL HEAD CODE (Rose, T, or L) Length (mm)	CLINCHED (C) OR BENT NAIL, HEAD TO BEND(mm)	NAIL FRAGMENT COUNT WITH NAIL HEAD CODE Point (-),R,T,L
38BU162E-			
Levels			
6B	8R 162		
9A			1R
12A			1 -
12B	6L 68		
18B	6R 67		
18B	7T 114		
Features			
55	5T 58+		2R
55	8T 145		
55	7R 108		
57	6R 70		1 -
94	7R 129		
94	6R 72		
94	7R 91		
96			2R
96	6R 67	35	
96	8T 140		
96	8R 146		
96	10R 249	80C	
96	8T 135+		
96	6R 88		
96	7R 92		
96	6R 88		
96	6R 75		
98	10R 258		
98	7T 117	54C	
98	7R 115		
98	8T 171		
98	8T 155		
98	8T 168		
98	8T 165		
98	8T 148		
98	7R 115		
98	7T 132		
98	6T 88	54C	
98	7R 114	65C	
98	7R 112	60C	
98	7R 93		1R
109	6R 84	64C	
109	7R 112	40C	
109	7R 122		
109	8R 166		
109	8R 170		1 -

APPENDIX IV: FT. SAN FELIPE NAILS FROM LEVELS AND FEATURES

SITE PROV. NUMBER 38BU162E-	NAIL TYPES (2-10) & NAIL HEAD CODE (Rose, T, or L) Length (mm)	CLINCHED (C) OR BENT NAIL, HEAD TO BEND(mm)	NAIL FRAGMENT COUNT WITH NAIL HEAD CODE Point (-),R,T,L
119	9R 212	(not added in analysis)	
120	9T 196		
120	9T 216		
120	10R 242		
120	9T 229		
120	9T 192		
120	8R 170		
120	8T 147		
120	8T 140		
120	8T I62		
120	6R 87		
120	6R 88		1 -
124			1 -
136	6R 64		

APPENDIX IV: FT. SAN FELIPE MOAT NAILS 1982

SITE PROV. NUMBER	NAIL TYPES (2-10) & NAIL HEAD CODE (Rose, T, or L) Length (mm)	CLINCHED (C) OR BENT NAIL, HEAD TO BEND (mm)	NAIL FRAGMENT COUNT WITH NAIL HEAD CODE Point (-),R,T,L
38BU162E-			
37C	7T 101	58C	
37C	6R 75		1R, 3-
37C	6R 87		
37D	5R 52(ship's c.nail)		
37D	9R 201		
37D	7R 130+		
37D	7R 106+		
37D	7R 104		
37D	6R 80+		
37D	4R 40+		3R, 1-
37E			3R, 4-
38C	7T 107	54C	
38C	7R 91		
38C	7R 91		
38C	6R 76		
38C	6R 75		1R, 1T, 1-
38D	9R 215	150	2R, 2-
38D	7T 108	55	
38D	7R 134		
38D	8T 146		
38D	8T 137		
38D	7R 122		
38D	7R 120		
38D	7T 123		
38D	7R 93		
38D	7R 92		
38D	6R 72		
38D	6R 73		
38D	6R 71		
38D	6R 81		
38D	4R 49		
38E	8R 141		3 -
38E	7R 100		
39C			1R
39D	8R 149		2-, 3R
39D	6R 78		
39D	5R 55	20	
39D	4R 45		
39D	6R 63+		
39E			6 -
40C	6R 76		6-, 1T
40D			6-, 4R
40D	8T 152		
40E			1 -

APPENDIX IV: FT. SAN FELIPE MOAT NAILS 1982

SITE PROV. NUMBER	NAIL TYPES (2-10) & NAIL HEAD CODE (Rose, T, or L) Length (mm)	CLINCHED (C) OR BENT NAIL, HEAD TO BEND (mm)	NAIL FRAGMENT COUNT WITH NAIL HEAD CODE Point (-), R,T,L
38BU162E-			
41C	8R 142		
41C	6R 75		
41C	6R 77		2 -
41D	9R 186	70C	10-, 2R
42D	6R 71		
42D	6R 72+		5 -
42D	7R 115	60C	
43C	10R 245	110	
43C	8R 139		1R
43C	7R 128	75	
43C	7R 117		
43C	6R 84		
43C	7R 110		
43C	6R 85		
43C	6R 83	45	
43C	6R 75		
43C	5R 54+		
43C	5R 52+		
43D	10T 240		
43D	8T 143	55	
43D	7R 130		
43D	8R 165		
43D	7R 104		
43D	7R 120		
43D	7R 120		
43D	7R 117		
43D	6R 86+		
43D	6R 87+		10R, 1T, 20-
44C	7T 125+		4R, 5-
44D	7R 117	65	16-, 4R
44D	8T 183		
44D	7R 128		
44D	7R 100		
44D	6R 83		
44D	7T 100+		
44E			4 -

APPENDIX IV: FT. SAN FELIPE LEVEL NAILS 1983

SITE PROV. NUMBER	NAIL TYPES (2-10) & NAIL HEAD CODE (Rose, T, or L) Length (mm)	CLINCHED (C) OR BENT NAIL, HEAD TO BEND (mm)	NAIL FRAGMENT COUNT WITH NAIL HEAD CODE Point (-),R,T,L
38BU162G-			
2B			1 -
5A	7R 118		
5B	79 109		1 -
6A			1R, 1-
8A		50	
10A			3-, 1R
10B			1 -
13A			1R
15A			1R
17A	10R 247		1R
18A	7R 112+		
18A	6R 72		
23A	4R 45		
24A			1-, 1R
26A			2R
28A			1 -
30A			1-,1R
30B	6R 88		
31A			1R
35A			1 -
38A			4-, 3R
39A			2R
40A			2R
41A	3R 39		
43A			1T, 1-
44A			1R, 1-
44B	5R 58		1R
45A			5R
45B			2 -
46A			3R, 2-
47A			1R
48B			1-, 1R
50A	7R 110		3R
50A	3R 37		
51A	7R 120		2R, 3-
51A	7R 110		
51A	5R 49		
52A	7R 92		7R, 3-
52A	7R 110	65C	
52A	4R 47+		
53A	7R 115	71	
53A	7R 110	70	
53A	6R 74		
53A	6R 82		

APPENDIX IV: FT. SAN FELIPE LEVEL NAILS 1983

SITE PROV. NUMBER	NAIL TYPES (2-10) & NAIL HEAD CODE (Rose, T, or L) Length (mm)	CLINCHED (C) OR BENT NAIL, HEAD TO BEND (mm)	NAIL FRAGMENT COUNT WITH NAIL HEAD CODE Point (-),R,T,L
38BU162G-			
53B	7R 110		
53B	7R 102		
53B	7R 92		
53B	5R 58		
53B	6R 79+		
53B	7R 90+	40	
53B	5R 62		
53B	4R 45		
53B	3R 39		2-, 2R
54A	6R 89		
54A	7R 95+		1R, 3-
54A	7R 92	50	
54B	4R 40+		
54B	7R 113+		
54B	7R 115+		2R
55A	7R 82		2R, 2-
56A	5R 52		3R
57A	7R 130	55	3R, 3-
57A	6R 83		
57A	6R 87		
57A	7R 116		
57A	6R 89		
57A	6R 78		
57A	3R 39		
57B	7R 118		
57B	5R 60		
58A	5R 62		1R
58B	5R 52		2R, 1-
58B	6R 66		
59A	6R 67	45	1R, 2-
59A	3R 35		
59B			1R
60A			1R
61A			1R, 1T
62A	6R 86		1 -
63A	8R 160		
63A	7R 110		
63B			2 -
64A	6R 88+		4R, 2-
64A	5R 60		
65A	6R 88+		
65A	6R 86+		
65B	7R 115		1R
65B	6R 85		

APPENDIX IV: FT. SAN FELIPE LEVEL NAILS 1983

SITE PROV. NUMBER	NAIL TYPES (2-10) & NAIL HEAD CODE (Rose, T, or L) Length (mm)	CLINCHED (C) OR BENT NAIL, HEAD TO BEND (mm)	NAIL FRAGMENT COUNT WITH NAIL HEAD CODE Point (-),R,T,L
38BU162G-			
66A	7R 102		
66A	7R 105		
66A	6R 80+		
66A	6R 82		
66A	6R 63+		
66A	3R 39		2R
66B			1R
67A	7R 117		1R
67B			1R
69A	7R 115		3R, 2-
69A	3R 40		2R
70A			2 -
71A	4R 42		1R, 2-
71A	7R 92		
72A	5R 51		1 -
73A			1R
77A	7R 108	45	
77A	6R 84		
77A	6R 85+		
77A	7R 100+		
77A	5R 50+		
77A	5R 50+		
77A	4T 42+		
77A	7R 104+		
77A			1R, 1-
77B	3R 39		
93A	7R 95+		
93A	7R 97+		
93A	4R 45+		2R, 1-
105A	7R 97	55C	5 -

APPENDIX IV: FT. SAN FELIPE FEATURE NAILS 1983

SITE PROV. NUMBER	NAIL TYPES (2-10) & NAIL HEAD CODE (Rose, T, or L) (Length (mm)	CLINCHED (C) OR BENT NAIL, HEAD TO BEND (mm)	NAIL FRAGMENT COUNT WITH NAIL HEAD CODE Point (-),R,T,L
38BU162G-			
146	6R 85		1 -
146A	2R 27		
146A	2R 27		3R, 7-
146B	7R 105		
146B	7R 112		
146B	7R 103		
146B	6R 79		
146B	6R 82		
146B	6R 73	60C	6R, 4-
146B	7R 110		
146B	6R 84	40	
146B	5R 60+		
146B	5R 54		
147	7R 110		
147	5R 55+		2-, 2R
148	7R 110		
148	7R 98		
148	7R 92		6-, 1R
149	8R 161+		
149	7R 110		
149	7R 105		
149	7R 95		
160	7R 99		
172			3 -
172A	6R 80	36	3-, 1R
173			1 -
202	7R 112		
203			3R
204			1 -
214A	6R 88		
214A	7R 101		
216			1 -
217	7T 116+		8R, 13-
217	6R 80		
217	6R 70		
217	6R 66		
217	6R 80		
217	6R 64		
217	6R 67		
217	6R 75	45C	
222	8R 174		
222	8R 140		
222	7R 100		
224	8R 164		

APPENDIX IV: FT. SAN FELIPE FEATURE NAILS 1983

SITE PROV. NUMBER	NAIL TYPES (2-10) & NAIL HEAD CODE (Rose, T, or L) (Length (mm)	CLINCHED (C) OR BENT NAIL, HEAD TO BEND (mm)	NAIL FRAGMENT COUNT WITH NAIL HEAD CODE Point (-),R,T,L
38BU162G-			
226			1R
227	8R 172		
228			1 -
229	7R 115		
231	8T 157		
231	7R 114		
237			4-, 1R
241A			5-, 2R
241B			7 -
244	8R 169		
244	7R 108		
247	6R 78	58C	
247	6R 82		
247A			1R
248			1R

APPENDIX IV: FT. SAN FELIPE LEVEL NAILS 1984

SITE PROV. NUMBER	NAIL TYPES (2-10) & NAIL HEAD CODE (Rose, T, or L) (Length (mm)	CLINCHED (C) OR BENT NAIL, HEAD TO BEND (mm)	NAIL FRAGMENT COUNT WITH NAIL HEAD CODE Point (-), R,T,L
38BU162H-			
74A	6R 79		
74B	8T 162	140	
74B	8T 182		1 -
75A	7R 120		3R
75B			2R
76A	5R 56		
76A	7R 100		2R, 2-
76A	6R 85		
76A	6R 80		
76B	7R 112		
77B			1 -
78A	5R 53		3R
78A	6R 71+		2R
79A	6T 76		3R
79A	7R 108		
79A	7R 119		
79A	6R 85		
79B	9T 190		2 -
79B	6R 85		
79B	7R 90+		
79B	6R 75+		
79B	6R 65+		
79B	6R 85		
80A			1R
80B	7R 92		1 -
81A			2R
82A	7R 105		1 -
82A	7R 120		
83A	6R 83		2R
84A	6R 83		2R
86B	6R 87		
87A	5R 60		1 -
87B			1R
88A	7R 105		
88A	6R 88		
88A	5R 53	28C	
88B	5R 60		1R, 1-
88B	6R 75		
89A	6R 85		2R, 1-
89B	7R 103		1R, 1-
89B	6R 83		
89B	7R 102		
89B	7R 90+	70C	
89C	7R 120		1R
90A	6R 80	55C	3R
90A	6R 72		

APPENDIX IV: FT. SAN FELIPE LEVEL NAILS 1984

SITE PROV. NUMBER	NAIL TYPES (2-10) & NAIL HEAD CODE (Rose, T, or L) (Length (mm)	CLINCHED (C) OR BENT NAIL, HEAD TO BEND (mm)	NAIL FRAGMENT COUNT WITH NAIL HEAD CODE Point (-), R,T,L
38BU162H-			
90A	6R 75		
90A	7R 91+		
90B			1R
91A	2R 30		1 -
91A	3R 34		
91A	4R 47+		
91A	6R 73		
91A	7R 97		
91A	7R 108		
91B	8R 184+		1R
92A			1R
92B	9R 204		
94A	7R 109		
94A	6R 74		1 -
95A	6R 80.		
98A	6R 85	25C	2R
99B	6R 69+		1T, 1-
100A	7R 93		1R
100A	6R 75+		
100A	5R 60		
100B	7R 103		1R
100B	7R 113		
101A	7R 106		2R
101A	7R 97		
101A	6R 80+		
101B			3R
103A	6R 69+		
103A	5R 57+		
104B			1R
107A	5R 59		
107A	3R 39		
110A	7R 108+		1R
110A	7R 92+		
111A			1R
112A			1R
113A	5R 62+		2R, 1-
113B	7R 110+		1 -
113B			
113B	7R 103+		3R
113B	6R 86+		
113B	5R 60+		
113B	5R 58		
113C	7T 100	7 0	1R
118A			1R

APPENDIX IV: FT. SAN FELIPE FEATURE NAILS 1984

SITE PROV. NUMBER	NAIL TYPES (2-10) & NAIL HEAD CODE (Rose, T, or L) (Length (mm)	CLINCHED (C) OR BENT NAIL, HEAD TO BEND (mm)	NAIL FRAGMENT COUNT WITH NAIL HEAD CODE Point (-),R,T,L
38BU162H-			
146C	6R 77		
146D			1R
146F			2 -
146G			6-, 5R
172D	5R 55+		1 -
172E	7R 112		
172E	5R 51	33C	
172E	5R 54	38C	3R, 8-
172F	7R 120		
172F	8R 150		
197A			1 -
217A			5R, 8-
217B	7R 115		
217C	2R 25		2R, 9-
217C	2R 27		
217C	2R 30		
217C	3R 35		4 -
217C	3R 31		
217C	3R 35		
217C	4R 43		
217C	5R 57		
217D	4R 41		3-, 1R
217E			4 -
260B	7R 108	70C	
260B	7R 108	70C	
260B	7T 102		
260B	3R 39+		
261	8R 140	70C	
261	8R 160		
261	7R 123	93	
261	7R 104		
261	7R 103		
261	6R 64+		
261	7R 100	70C	
261	7R 102		1R
283	7R 130		
287	7R 113		1R
293	7R 108+		1R
307A	4R 42+		1R
307A	3R 36	26C	
307A	7R 115		
318	8R 139+		
333C	6R 78		3 -
333C	5R 54		

APPENDIX IV: FT. SAN FELIPE FEATURE NAILS 1984

SITE PROV. NUMBER	NAIL TYPES (2-10) & NAIL HEAD CODE (Rose, T, or L) (Length (mm)	CLINCHED (C) OR BENT NAIL, HEAD TO BEND (mm)	NAIL FRAGMENT COUNT WITH NAIL HEAD CODE Point (-),R,T,L
38BU162H-			
333F			1 -
334	8R 140	60C	1R, 1-
335B			1 -
335C			1R
335E			1 -
337	8R 180		
386	7R 110		
397A	4R 43+		1R, 1-
397A	7R 95	55C	
397A	7R 90+		
397A	7R 100		
397A	5R 53+		
405	9R 220		
405	9R 215		
407A	8R 162		

APPENDIX V

SPANISH NAIL SIZE TABULATION

APPENDIX V: SANTA ELENA NAIL SIZE FREQUENCY

SITE NUMBER = 38BU162

NAIL SIZE (mm)	1979 162 & B SAMPLE	1979 162A HUT	1981 162C LEVELS	1981 162C FEAS.	1982 162D LEVELS	1982 162D FEAS.	1985 162J & K SAMPLE	SANTA ELENA TOTAL
NAIL TYPE 2								
20		1						1
21								
22								
23								
24			2					2
25						2		2
26								
27	1			2				3
28							1	1
29				3				3
30								
TOTAL	1	1	2	5	0	2	1	12
NAIL TYPE 3								
31							1	1
32					1	1		2
33						2		2
34			1			1		2
35			2					2
36	1							1
37			1	1				2
38						1		1
39				2				2
40			2		1	1		4
TOTAL	1	0	6	3	2	6	1	19
NAIL TYPE 4								
41	1	2	3	1		2		9
42	1		2			1		4
43		1	1	1	1	1		5
44			2			2		4
45	1		3	1				5
46								
47								
48	1		1			1	1	4
49			1					1
50			4	1				5
TOTAL	4	3	17	4	1	7	1	37
NAIL TYPE 5								
51						1		1
52		1	2	1		1		5
53				1	2			3
54					1			1
55	3		2		1			6
56	1		2		1			4

APPENDIX V: SANTA ELENA NAIL SIZE FREQUENCY

SITE NUMBER = 38BU162

NAIL SIZE (mm)	1979 162 & B SAMPLE	1979 162A HUT	1981 162C LEVELS	1981 162C FEAS.	1982 162D LEVELS	1982 162D FEAS.	1985 162J & K SAMPLE	SANTA ELENA TOTAL
NAIL TYPE 5								
57	1		1			1		3
58		1	1		1		2	5
59	1	1	1					3
60	1		1	1			1	4
61	3			1	1			5
62			1			1		2
63	1	2	2					5
TOTAL	11	5	13	4	7	4	3	47
NAIL TYPE 6								
64			3		1			4
65	1		4	2				7
66				2	1		1	4
67		1	2	2	1	1		7
68	1	1	1					3
69			1	2	1			4
70	1	4	7	4	2	2		20
71								
72		3	7	1		1		12
73	1		2	2				5
74		2	3	2				7
75		1	4	2	4		3	14
76	1			1			1	3
77					2	1		3
78	1			2		1		4
79			2	1		1		4
80			7	6	3	2	2	20
81	2		2		1			5
82	1		2	1	1	1		6
83		1						1
84		1	1	3			1	6
85		1	1				1	3
86				1				1
87		2	3	1	3	1		10
88			1	1				2
89		1		1		1		3
90		1		2			1	4
TOTAL	9	19	53	39	20	12	10	162
NAIL TYPE 7								
91	1	1	1		1	3		7
92	2		4				1	7
93			2	1				3
94	1				1	2		4
95	1	2	1	1			1	6

APPENDIX V: SANTA ELENA NAIL SIZE FREQUENCY

SITE NUMBER = 38BU162

NAIL SIZE (mm)	1979 162 & B SAMPLE	1979 162A HUT	1981 162C LEVELS	1981 162C FEAS.	1982 162D LEVELS	1982 162D FEAS.	1985 162J & K SAMPLE	SANTA ELENA TOTAL
NAIL TYPE 7								
96	1	1	2	1				5
97			3				1	4
98			1			1		2
99	1		2				1	4
100	1	1	2	3	1	2		10
101			1					1
102								
103		1						1
104				3	1	1		5
105	1		5	3	1			10
106		1						1
107				1				1
108		1	2	1	2	1		7
109		1			1			2
110	1		1	3				5
111			1			1		2
112				1		1		2
113	1						1	2
114			1					1
115		1	5	1		2		9
116			1	1		1		3
117				1				1
118			1					1
119								
120		1	1		1			3
121	1							1
122			1					1
123			1	2				3
124			1	1				2
125			1					1
126								
127							1	1
128			1					1
129			1					1
130				1				1
131								
132			1	1				2
133								
134								
135			1					1
TOTAL	12	11	45	26	9	15	6	124

APPENDIX V: SANTA ELENA NAIL SIZE FREQUENCY

SITE NUMBER = 38BU162

NAIL SIZE (mm)	1979 162 & B SAMPLE	1979 162A HUT	1981 162C LEVELS	1981 162C FEAS.	1982 162D LEVELS	1982 162D FEAS.	1985 162J & K SAMPLE	SANTA ELENA TOTAL
NAIL TYPE 8								
179								
180	1							1
181								
182			1					1
183								
184								
185								
TOTAL	3	2	11	6	0	3	1	26
NAIL TYPE 9								
186								
187			1			1		2
188								
189						1		1
190								
191								
192								
193								
194								
195								
196								
197								
198								
199								
200				1				1
201								
202								
203								
204								
205								
206								
207								
208								
209				1				1
210						1		1
211								
212								
213								
214								
215								
216								
217								
218								
219								

APPENDIX V: SANTA ELENA NAIL SIZE FREQUENCY

SITE NUMBER = 38BU162

NAIL SIZE (mm)	1979 162 & B SAMPLE	1979 162A HUT	1981 162C LEVELS	1981 162C FEAS.	1982 162D LEVELS	1982 162D FEAS.	1985 162J & K SAMPLE	SANTA ELENA TOTAL
NAIL TYPE 8								
179								
180	1							1
181								
182			1					1
183								
184								
185								
TOTAL	3	2	11	6	0	3	1	26
NAIL TYPE 9								
186								
187			1			1		2
188								
189						1		1
190								
191								
192								
193								
194								
195								
196								
197								
198								
199								
200				1				1
201								
202								
203								
204								
205								
206								
207								
208								
209				1				1
210						1		1
211								
212								
213								
214								
215								
216								
217								
218								
219								

APPENDIX V: SANTA ELENA NAIL SIZE FREQUENCY

SITE NUMBER = 38BU162

NAIL SIZE (mm)	1979 162 & B SAMPLE	1979 162A HUT	1981 162C LEVELS	1981 162C FEAS.	1982 162D LEVELS	1982 162D FEAS.	1985 162J & K SAMPLE	SANTA ELENA TOTAL
NAIL TYPE 9								
220					1			1
221								
222								
223								
224								
225			1	1				2
226								
227								
228								
229								
230								
TOTAL	0	0	2	3	1	3	0	9
NAIL TYPE 10								
231								
232								
233								
234			1					1
235								
236								
237								
238								
239								
240								
241								
242								
243								
244								
245								
246								
247								
248								
249								
250								
251								
252								
253								
254								

APPENDIX V: SANTA ELENA NAIL SIZE FREQUENCY

SITE NUMBER = 38BU162

NAIL SIZE (mm)	1979 162 & B SAMPLE	1979 162A HUT	1981 162C LEVELS	1981 162C FEAS.	1982 162D LEVELS	1982 162D FEAS.	1985 162J & K SAMPLE	SANTA ELENA TOTAL
NAIL TYPE 10								
255								
256								
257								
258								
259								
260								
TOTAL	0	0	1	0	0	0	0	1
GRAND TOTAL	41	41	150	90	40	52	23	437

APPENDIX V: FT. SAN FELIPE NAIL SIZE FREQUENCY

SITE NUMBER = 38BU162

NAIL SIZE (mm)	1982 162E LEV. & FEAS.	1982 162E MOAT	1983 162G FORT TOTAL	1984 162H FORT TOTAL	FT. SAN FELIPE TOTAL
NAIL TYPE 2					
20					
21					
22					
23					
24					
25				1	1
26					
27			2	1	3
28					
29					
30				2	2
TOTAL	0	0	2	4	6
NAIL TYPE 3					
31				1	1
32					
33					
34				1	1
35			1	2	3
36				1	1
37			1		1
38					
39			5	2	7
40		1	1		2
TOTAL	0	1	8	7	16
NAIL TYPE 4					
41			1	1	2
42			2	1	3
43				2	2
44					
45		1	3		4
46					
47			1	1	2
48					
49		1	1		2
50			2		2
TOTAL	0	2	10	5	17
NAIL TYPE 5					
51			1	1	2
52		2	2		4
53				3	3
54		1	1	2	4
55		1	1	1	3
56				1	1

APPENDIX V: FT. SAN FELIPE NAIL SIZE FREQUENCY

SITE NUMBER = 38BU162

NAIL SIZE (mm)	1982 162E LEV. & FEAS.	1982 162E MOAT	1983 162G FORT TOTAL	1984 162H FORT TOTAL	FT. SAN FELIPE TOTAL
NAIL TYPE 5					
57				2	2
58	1		2	1	4
59				1	1
60			3	4	7
61					
62			2	1	3
63		1	1		2
TOTAL	1	5	13	17	36
NAIL TYPE 6					
64	1		1	1	3
65				1	1
66			2		2
67	2		2		4
68	1				1
69				2	2
70	1		1		2
71		2		1	3
72	1	2	1	1	5
73		1	1	1	3
74			1	1	2
75	1	4	1	4	10
76		2		1	3
77		1		1	2
78		1	2	1	4
79			2	1	3
80		1	4	4	9
81		1			1
82			5		5
83		2	1	3	6
84	1	1	2		4
85		1	3	6	10
86		1	2	1	4
87	1	2	1	1	5
88	4		4	1	9
89			2		2
90			1	3	4
TOTAL	13	22	39	35	109
NAIL TYPE 7					
91	1	2		1	4
92	1	1	6	2	10
93	1	1		1	3
94					
95			3	1	4

APPENDIX V: FT. SAN FELIPE NAIL SIZE FREQUENCY

SITE NUMBER = 38BU162

NAIL SIZE (mm)	1982 162E LEV. & FEAS.	1982 162E MOAT	1983 162G FORT TOTAL	1984 162H FORT TOTAL	FT. SAN FELIPE TOTAL
NAIL TYPE 7					
96					
97			2	2	4
98			1		1
99			1		1
100		3	2	4	9
101		1	1		2
102			2	3	5
103			1	4	5
104		2	1	1	4
105			3	2	5
106		1		1	2
107		1			1
108	1	1	2	6	10
109			1	1	2
110		1	10	2	13
111					
112	2		3	2	7
113			1	2	3
114	2		1		3
115	2	1	5	2	10
116			2		2
117	1	3	1		5
118			2		2
119				1	1
120		3	1	4	8
121					
122	1	1			2
123		1			1
124					
125		1			1
126					
127					
128		1			1
129	1	1			2
130		2	1	1	4
131					
132	1				1
133					
134		1			1
135	1				1
TOTAL	15	29	53	43	140

APPENDIX V: FT. SAN FELIPE NAIL SIZE FREQUENCY

SITE NUMBER = 38BU162

NAIL TYPE 8

NAIL SIZE (mm)	1982 162E LEV. & FEAS.	1982 162E MOAT	1983 162G FORT TOTAL	1984 162H FORT TOTAL	FT. SAN FELIPE TOTAL
136					
137		1			1
138					
139		1		1	2
140	2		1	2	5
141		1			1
142		1			1
143		1			1
144					
145	1				1
146	1	1			2
147	1				1
148	1				1
149		1			1
150				1	1
151					
152		1			1
153					
154					
155	1				1
156					
157			1		1
158					
159					
160			1	1	2
161			1		1
162	2			2	4
163					
164			1		1
165	1	1			2
166	1				1
167					
168	1				1
169			1		1
170	2				2
171	1				1
172			1		1
173					
174			1		1
175					
176					
177					
178					

APPENDIX V: FT. SAN FELIPE NAIL SIZE FREQUENCY

SITE NUMBER = 38BU162

NAIL SIZE (mm)	1982 162E LEV. & FEAS.	1982 162E MOAT	1983 162G FORT TOTAL	1984 162H FORT TOTAL	FT. SAN FELIPE TOTAL
NAIL TYPE 8					
179					
180				1	1
181					
182				1	1
183		1			1
184				1	1
185					
TOTAL	15	10	8	10	43

NAIL TYPE 9					
186					
187					
188					
189					
190				1	1
191					
192	1				1
193					
194					
195					
196	1				1
197					
198					
199					
200					
201		1			1
202					
203					
204				1	1
205					
206					
207					
208					
209					
210					
211					
212					
213					
214					
215		1		1	2
216	1				1

APPENDIX V: FT. SAN FELIPE NAIL SIZE FREQUENCY

SITE NUMBER = 38BU162

NAIL SIZE (mm)	1982 162E LEV. & FEAS.	1982 162E MOAT	1983 162G FORT TOTAL	1984 162H FORT TOTAL	FT. SAN FELIPE TOTAL
NAIL TYPE 9					
217					
218					
219					
220				1	1
221					
222					
223					
224					
225					
226					
227					
228					
229	1				1
230					
TOTAL	4	2	0	4	10

NAIL TYPE 10					
231					
232					
233					
234					
235					
236					
237					
238					
239					
240		1			1
241					
242	1				1
243					
244					
245		1			1
246					
247			1		1
248					
249	1				1
250					
251					
252					
253					
254					

APPENDIX V: FT. SAN FELIPE NAIL SIZE FREQUENCY

SITE NUMBER = 38BU162

NAIL SIZE (mm)	1982 162E LEV. & FEAS.	1982 162E MOAT	1983 162G FORT TOTAL	1984 162H FORT TOTAL	FT. SAN FELIPE TOTAL
NAIL TYPE 10					
255					
256					
257					
258	1				1
259					
260					
TOTAL	3	2	1	0	6
GRAND TOTAL	51	73	134	125	383

APPENDIX VI

WHOLE AND BROKEN NAIL TOTALS

APPENDIX VI: NAIL TYPE TOTALS FROM SANTA ELENA

SITE NO. 38BU162 TYPE NO.	1979 162 & B SAMPLE	1979 162A HUT	1981 162C LEVELS	1981 162C FEAS.	1982 162D LEVELS	1982 162D FEAS.	1985 162J&K SAMPLE	TOTAL	%
TYPE 1 NAILS	3	0	7	4	11	7	3	35	-
ROSE-HEAD NAILS									
Type 2	1	1	1	5	0	2	1	11	1.40
Type 3	1	0	5	3	2	6	1	18	1.80
Type 4	4	3	14	3	0	7	0	31	4.00
Type 5	10	4	11	4	7	4	3	43	5.50
Type 6	7	18	44	35	17	11	9	141	18.10
Type 7	10	7	40	20	6	13	5	101	13.50
Type 8	1	1	7	5	0	2	0	16	2.20
Type 9	0	0	2	3	0	1	0	6	0.80
Type 10	0	0	1	0	0	0	0	1	0.10
Whole R Total	34	34	125	78	32	46	19	368	47.40
Broken R Total	17	21	198	86	42	37	8	409	52.60
GRAND TOTAL	51	55	323	164	74	83	27	777	100.00
PERCENTAGE OF R-HEAD NAILS AMONG TOTAL NAILS								777	88.80
L-HEAD NAILS									
Type 2									
Type 3									
Type 4									
Type 5									
Type 6			2					2	20.00
Type 7			1	1				2	20.00
Type 8	1							1	10.00
Type 9					1	1		2	20.00
Type 10									
Whole L Total	1		3	1	1	1		7	70.00
Broken L Total			1		2			3	30.00
GRAND TOTAL	1		4	1	3	1		10	100.00
PERCENTAGE OF L-HEAD NAILS AMONG TOTAL NAILS									0.90
T-HEAD NAILS									
Type 2			1					1	1.10
Type 3			1					1	1.10
Type 4			3	1	1		1	6	5.60
Type 5	1	1	2	4				4	5.60
Type 6	2	1	7	5	3	1	1	19	22.20
Type 7	2	4	4	1	3	2	1	21	23.30
Type 8	1	1	4			1	1	9	10.00
Type 9						1		1	1.10
Type 10									-
Whole T Total	6	7	22	11	7	5	4	62	70.00
Broken T Total	2	2	10	5	4	1	3	27	30.00
GRAND TOTAL	8	9	32	16	11	6	7	89	100.00
PERCENTAGE OF T-HEAD NAILS AMONG TOTAL NAILS								89	10.30
TOTAL OF ALL HEADED NAILS (TYPES 2-10) =								876	100.00
NO HEAD NAILS	22	21	180	130	67	62	9	491	-

APPENDIX VI: NAIL TYPE TOTALS FROM FT. SAN FELIPE

SITE NO. 38BU162 TYPE NO.	1982 162E BASTION	1982 162E MOAT	1983 162G FEAS.	1983 162G LEVELS	1984 162H FEAS.	1984 162H LEVELS	1985 162J & K SAMPLE	%
TYPE 1 NAILS	11	24	0	2	2	7	46	
ROSE-HEAD NAILS								
Type 2			2		3	1	6	1.00
Type 3				8	5	2	15	2.60
Type 4		3	3	6	4	1	14	2.40
Type 5		4	16	12	6	11	36	6.30
Type 6	11	23	18	23	3	28	104	18.10
Type 7	11	23	6	35	18	27	132	23.00
Type 8	5	5		1	7	1	25	4.40
Type 9		2			2	1	5	0.90
Type 10	3	1		1			5	0.90
Whole R Total	30	61	45	86	48	72	342	59.60
Broken R Total	6	39	30	81	24	52	232	40.40
GRAND TOTAL	36	100	75	167	72	124	574	100.00
PERCENTAGE OF ROSE-HEAD NAILS AMONG TOTAL NAILS							574	92.40
L-HEAD NAILS								
Type 2								
Type 3								
Type 4								
Type 5								
Type 6	1						1	
Type 7								
Type 8								
Type 9								
Type 10								
Whole L Total	1							
Broken L Total								
GRAND TOTAL	1						1	
PERCENTAGE OF L-HEAD NAILS AMONG TOTAL NAILS							1	0.20
T-HEAD NAILS								
Type 2								
Type 3								
Type 4				1			1	2.10
Type 5	1						1	2.10
Type 6	1					1	2	4.30
Type 7	3	5	1		1	1	12	25.50
Type 8	11	5	1			2	18	40.50
Type 9	4					1	5	10.60
Type 10		1					1	2.10
Whole T Total	20	11	2	1	1	5	40	87.20
Broken T Total		3		2		1	4	12.80
GRAND TOTAL	20	14	2	3	1	6	46	100.00
PERCENTAGE OF T-HEAD NAILS AMONG TOTAL NAILS							46	7.40
TOTAL OF ALL HEADED NAILS (TYPES 2-10) =							621	100.00
NO HEAD NAILS	5	97	59	58	54	17	290	-

APPENDIX VII

BENT AND CLINCHED NAIL TABULATION

APPENDIX VII: BENT AND CLINCHED NAILS FROM SANTA ELENA AND FT. SAN FELIPE

NAIL TYPE NO. AND HEAD FORM (R,L,OR T)		CLINCHED (C) OR BENT (B) HEAD TO BEND (mm)	INTERPRETED BOARD THICKNESS (1/2 Head to Bend) (mm)	(inches)
38BU162A = SANTA ELENA HUT 1979				
4R		30C	15.00	5/8"
5T		23B	11.50	1/2"
6R		35B	17.50	3/4"
6R		55B	27.50	1 1/8"
6R		30B	15.00	5/8"
6R		40C	20.00	3/4"
6R		45C	22.50	7/8"
6T		35B	17.50	3/4"
7R		78C	39.00	1 1/2"
7R		70B	35.00	1 3/8"
7R		65B	32.50	1 1/4"
7T		35B	17.50	3/4"
8R		70C	35.00	1 3/8"
38BU162 AND 162B = SANTA ELENA SAMPLE SQUARES 1979				
5R		30B	15.00	5/8"
5R		21C	10.50	5/16"
6R		42B	21.00	7/8"
7R		28B	14.00	5/8"
7R		50B	25.00	1"
7R		40C	20.00	3/4"
8T		105C	50.00	2"
8R			52.50	2"
STRAIGHT NAILS (Head to Rust)				
7R		50B	25.00	1"
38BU162C = SANTA ELENA LEVELS 1981				
3R		20B	10.00	3/8"
4T		18B	9.00	3/8"
5R		20B	10.00	3/8"
5R		35C	17.50	3/4"
5R		20C	10.00	3/8"
6R		57B	28.50	1 1/8"
6R		55B	27.50	1 1/8"
6R		25C	12.50	1/2"
6R		53C	26.50	1"
6R		27C	13.50	1/2"
6R		50C	25.00	1"
6R		25C	12.50	1/2"
6R		60B	30.00	1 1/4"
6R		20C	10.00	3/8"
6R		40B	20.00	3/4"
7R		35B	17.50	3/4"

APPENDIX VII: BENT AND CLINCHED NAILS FROM SANTA ELENA AND FT. SAN FELIPE

NAIL TYPE NO. AND HEAD FORM (R,L,OR T)		CLINCHED (C) OR BENT (B) HEAD TO BEND (mm)	INTERPRETED BOARD THICKNESS (1/2 Head to Bend) (mm)	(inches)
38BU162C-SANTA ELENA LEVELS 1981				
7T		20C	10.00	3/8"
7R		30C	15.00	5/8"
7T		20C	10.00	3/8"
8R		80C	40.00	1 1/2"
8R		100C	50.00	2"
8T		160C	80.00	3 1/8"
8T		35C	17.50	3/4"
9R		35B	17.50	3/4"
10R		140C	70.00	2 3/4"
38BU162C = SANTA ELENA FEATURES 1981.				
2R		15B	7.50	1/4"
2R		18B	9.00	3/16"
4R		15B	7.50	1/4"
6R		35B	17.50	3/4"
6R		25B	12.50	1/2"
6R		25B	12.50	1/2"
6R		35C	17.50	3/4"
6R		55C	27.50	1 1/8"
6R		60B	30.00	1 1/4"
6R		40C	20.00	3/4"
6T		40C	20.00	3/4"
6T		40C	20.00	3/4"
7R		40C	20.00	3/4"
7R		97C	48.50	1 7/8"
7R		40B	20.00	3/4"
7R		80C	40.00	1 1/2"
7T		40B	20.00	3/4"
7T		45B	22.50	7/8"
7R		30B	15.00	5/8"
7T		55B	27.50	1 1/8"
7R		90B	45.00	1 3/4"
7R		60B	30.00	1 1/4"
8T		50C	25.00	1"
8R		25B	12.50	1/2"
9R		170C	85.00	3 3/8"
38BU162D = SANTA ELENA LEVELS 1982				
1 flat		10C	5.00	1/4"
1 flat		18C	9.00	3/4"
6R		30B	15.00	5/8"
6R		40B	20.00	3/4"
7R		65B	32.50	1 1/4"
7R		65B	32.50	1 1/4"

APPENDIX VII: BENT AND CLINCHED NAILS FROM SANTA ELENA AND FT. SAN FELIPE

NAIL TYPE NO. AND HEAD FORM (R,L,OR T)		CLINCHED (C) OR BENT (B) HEAD TO BEND (mm)	INTERPRETED BOARD THICKNESS (1/2 Head to Bend) (mm)	(inches)
38BU162D = SANTA ELENA FEATURES 1982				
4R		20C	10.00	3/8"
5R		32B	16.00	5/8"
5R		32B	16.00	5/8"
6R		22B	11.00	3/8"
6R		40C	20.00	3/4"
7R		45B	22.50	7/8"
7T		50B	25.00	1"
7R		30B	15.00	5/8"
7R		30C	15.00	5/8"
7R		70B	35.00	1 3/8"
7R		60B	30.00	1 1/4"
8R		110C	55.00	2 1/8"
8R		100C	50.00	2"
38BU162J AND 162K = SAMPLE FRAME AND HOUSE AREA 1985				
5R		20B	10.00	3/8"
6R		35B	17.50	3/4"
6R		45C	22.50	7/8"
6T		40B	20.00	3/4"
8T		100C	50.00	2"
38BU162E = NORTHWEST BASTION FEATURES AT FT. SAN FELIPE 1982				
6R		35B	17.50	3/4"
6T		54C	27.00	1 1/8"
6R		64C	32.00	1 1/4"
7T		54C	27.00	1 1/8"
7R		65C	33.00	1 1/4"
7R		60C	30.00	1 1/4"
7R		40C	20.00	3/4"
10R		80C	40.00	2 5/8"
38BU162E = NW BASTION MOAT AT FT. SAN FELIPE 1982				
5R		20B	10.00	3/8"
6R		45B	22.50	7/8"
7T		58C	29.00	1 1/8"
7T		54C	27.00	1 1/8"
7T		55B	27.50	1 1/8"
7R		60C	30.00	1 1/4"
7R		75B	37.50	1 1/2"
7R		65B	32.50	1 1/4"
8T		55B	27.50	1 1/8"
9R		150B	75.00	3"
9R		70C	35.00	1 3/8"
10R		110B	55.00	2 1/8"

APPENDIX VII: BENT AND CLINCHED NAILS FROM SANTA ELENA AND FT. SAN FELIPE

NAIL TYPE NO. AND HEAD FORM (R,L,OR T)		CLINCHED (C) OR BENT (B) HEAD TO BEND (mm)	INTERPRETED BOARD THICKNESS (1/2 Head to Bend) (mm)	(inches)
38BU162G = FEATURES INSIDE FT. SAN FELIPE 1983				
6R		60C	30.00	1 1/4"
6R		40B	20.00	3/4"
6R		36B	18.00	3/4"
6R		45C	22.50	7/8"
6R		58C	29.00	1 1/8"
38BU162G = LEVELS INSIDE FT. SAN FELIPE 1983				
6R		45B	22.50	7/8"
7R		50B	25.00	1"
7R		65C	32.50	1 1/4"
7R		71B	35.50	1 3/8"
7R		70B	35.00	1 3/8"
7R		40B	20.00	3/4"
7R		50B	25.00	1"
7R		55B	27.50	1 1/8"
7R		45B	22.50	7/8"
7R		55C	27.50	1 1/8"
38BU162H = FEATURES INSIDE FT. SAN FELIPE 1984				
3R		26C	13.00	1/2"
5R		33C	16.50	5/8"
5R		38C	17.00	3/4"
7R		70C	35.00	1 3/8"
7R		70C	35.00	1 3/8"
7R		93B	46.50	1 7/8"
7R		70C	35.00	1 3/8"
7R		55C	27.50	1 1/8"
8R		70C	35.00	1 3/8"
8R		60C	30.00	1 1/4"
38BU162H = LEVELS INSIDE FT. SAN FELIPE 1984				
5R		28C	14.00	5/8"
6R		55C	27.50	1 1/8"
6R		25C	12.50	1/2"
7R		70C	35.00	1 3/8"
7T		70B	35.00	1 3/8"
8T		140B	70.00	2 3/4"

APPENDIX VIII

SANTA ELENA LEAD SHOT TABULATION

APPENDIX VIII: SANTA ELENA LEAD SHOT FROM FEATURES AND LEVELS

PROVENIENCE 38BU162	DIAMETER (mm)
Weight 1.5 grams	
J76B	6.20
Weight 2 grams	
C117	5.25
C179B	6.00
C351B	6.00
D115	6.00
D37	3.30
D118	6.40
C138B	6.50
D115	6.50
J119B	6.65
D69	6.90
J88B	7.00
K7A	7.00
J75A	7.05
Weight 2.5 grams	
C168B	5.70
C211A	6.40
C71B	6.50
C204A	6.50
D115	6.60
D118	6.60
D69	6.90
C136A	7.00
C179B	7.00
C199B	7.00
C221A	7.00
C178B	7.15
Weight 3 grams	
C162B	6.40
A5A	6.50
C136A	6.50
C203B	6.50
A5A	6.70
C136A	6.85
C140B	6.85
A55B	7.00
B59C	7.00
C71B	7.00
C138B	7.00
D118	7.00
A12B	7.10
B58A	7.10

PROVENIENCE 38BU162	DIAMETER (mm)
Weight 3 gms.	
C138B	7.10
C332A	7.15
C351B	7.20
C138B	7.30
C168B	7.30
C331B	7.30
D124	7.30
A106A	7.50
C132A	7.50
C10B	7.75
C53B	7.75
C201A	7.75
C137B	7.95
C137B	8.00
C331B	8.00
C168A	8.80
C64A	9.05
Weight 3.5 grams	
C141B	6.35
C14B	6.60
C144B	7.00
C144B	7.00
C144B	7.00
C147A	7.00
D118	7.00
A6A	7.20
C141B	7.20
C180B	7.40
C195B	7.40
C169A	7.50
C154A	7.75
C205A	9.00
J85B	9.60
Weight 4 grams	
C27B	7.50
C143A	7.75
C117	7.80
B36A	8.05
C201A	8.10
C168B	8.20
J80A	8.85

APPENDIX VIII: SANTA ELENA LEAD SHOT FROM FEATURES AND LEVELS

PROVENIENCE 38BU162	DIAMETER (mm)
Weight 4.5 grams	
C23A	8.00
C140B	8.15
C133B	8.20
A129B	8.40
C117	8.40
C68A	8.55
C172	8.65
C141A	8.70
A5A	9.00
C168B	9.00
Weight 5 grams	
C22B	8.10
C17A	8.65
A13B	9.65
Weight 5.5 grams	
D102	10.10
Weight 6 grams	
C123	9.35
C203B	9.80
C141A	13.20
Weight 6.5 grams	
C144B	10.00
Weight 10.5 grams	
C1	12.80
Weight 11 grams	
K7A	13.15
J86A	14.00
Weight 12 grams	
C35A	12.75
C202A	13.00
C34A	13.50
Weight 12.5 grams	
J121B	12.90
Weight 13 grams	
C117	12.50
C196B	13.85

PROVENIENCE 38BU162	DIAMETER (mm)
Weight 14 grams	
C71A	12.50
C30B	12.80
C167B	13.15
C218B	13.20
Weight 14.5 grams	
C58A	13.10
C100	13.15
C46B	13.30
J53B	13.50
C153B	13.55
Weight 15 grams	
A17B	13.00
Weight 15.5 grams	
C207A	12.70
C207A	14.00
C18B	15.90
Weight 16 grams	
C144B	13.00
Weight 16.5 grams	
J139B	-
C138A	14.00
C198B	14.20
D50	15.00
Weight 17 grams	
C169B	14.00
Weight 17.5 grams	
C59A	14.00
A94A	15.00
Weight 18 grams.	
B55D	14.10
C301	14.20
C72B	14.30
Weight 18.5 grams	
C162B	14.40
Weight 19 grams	
D102	14.50
A55B	14.60

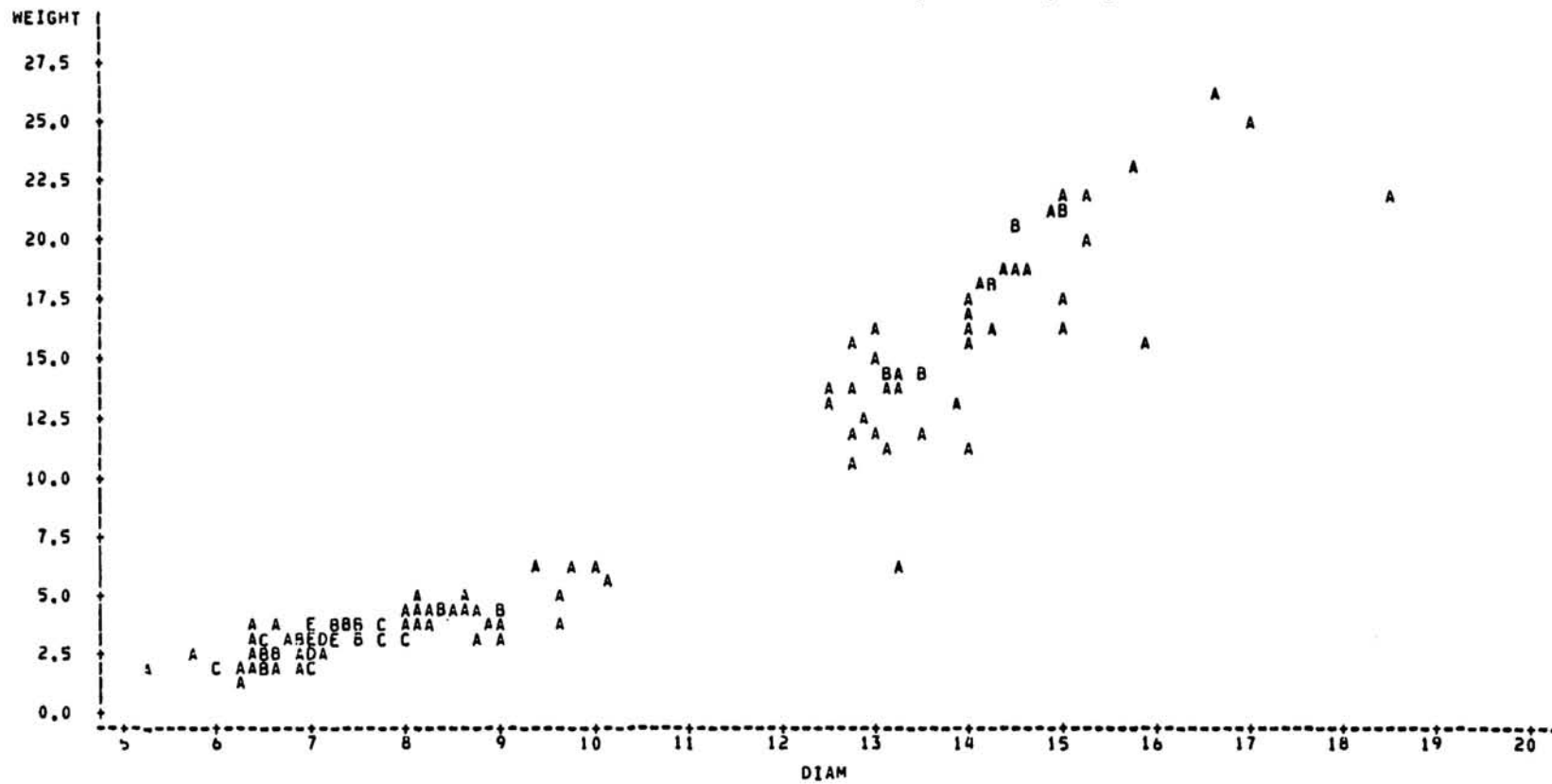
APPENDIX VIII: SANTA ELENA LEAD SHOT FROM FEATURES AND LEVELS

PROVENIENCE 38BU162	DIAMETER (mm)
Weight 20 grams	
C21B	15.20
Weight 20.5 grams	
C140A	14.50
D115	14.50
Weight 21 grams	
D102	14.90
C4A	15.00
C46A	15.00
Weight 22 grams	
A95	15.00
C21B	15.20
J38A	18.50
Weight 23 grams	
C1	15.80
Weight 25 grams	
B10B	17.00
Weight 26.5	
J40A	16.60

SUMMARY OF LEAD SHOT DATA

WEIGHT	FREQUENCY
1.50	1
2.00	13
2.50	12
3.00	31
3.50	15
4.00	7
4.50	10
5.00	3
5.50	1
6.00	3
6.50	1
10.50	1
11.00	2
12.00	3
12.50	1
13.00	2
14.00	4
14.50	5
15.00	1
15.50	3
16.00	1
16.50	4
17.00	1
17.50	2
18.00	3
18.50	1
19.00	2
20.00	1
20.50	2
21.00	3
22.00	3
23.00	1
25.00	1
26.50	1
TOTAL	145

PLOT OF WEIGHT*DIAM LEGEND: A = 1 OBS, B = 2 OBS, ETC.



APPENDIX IX

FT. SAN FELIPE LEAD SHOT TABULATION

APPENDIX IX: FT. SAN FELIPE LEAD SHOT FROM FEATURES AND LEVELS

PROVENIENCE 38BU162	WEIGHT (grams)	DIAMETER (mm)
E40D	11.00	-
G70A	14.00	-
H103A	11.50	-
H103A	5.00	-
H113A	1.50	-
G146	1.00	5.10
H307A	1.00	5.90
G57A	2.50	6.10
E38C	2.00	6.40
H113B	1.00	6.50
E26B	1.50	6.50
G67A	2.00	6.65
H113A	2.00	6.65
E41E	3.00	6.70
G56A	3.25	6.70
G56A	3.25	6.70
G57A	2.50	6.70
E38C	2.50	6.75
E42C	2.50	6.75
G198	2.50	6.80
G56A	2.50	6.80
G71A	2.00	6.80
E42C	2.50	6.90
E8B	2.00	6.90
E38A	2.50	7.00
E38C	3.00	7.00
E41E	2.50	7.00
E42C	2.50	7.00
E44C	2.50	7.00
E44C	2.50	7.00
G46A	3.00	7.00
G53B	3.00	7.00
G57A	2.50	7.00
G105A	2.00	7.00
G105A	2.50	7.00
H74A	2.00	7.00
H78B	2.00	7.00
H87A	2.00	7.00
H119A	1.50	7.00
E7A	2.00	7.00
E41E	3.50	7.10
G217	3.00	7.10
H79B	2.00	7.10
H113A	2.00	7.10
G44B	2.50	7.15
H92A	2.00	7.15

PROVENIENCE 38BU162	WEIGHT (grams)	DIAMETER (mm)
H92A	2.00	7.15
E14B	1.50	7.15
342C	2.50	7.20
E42C	2.00	7.20
G9A	3.00	7.20
H74A	1.00	7.20
H91A	2.00	7.20
H109A	1.50	7.20
E38C	2.50	7.25
E43C	3.00	7.25
H120A	2.00	7.25
E42C	3.50	7.35
E38C	3.00	7.40
G35A	3.00	7.40
H94A	2.50	7.40
G9A	3.00	7.50
G54A	4.00	7.50
H97A	2.00	7.50
H100A	2.50	7.50
H97A	2.50	7.70
H91A	3.00	7.80
H89A	3.00	7.90
G54A	4.00	8.00
G57A	4.00	8.00
E43C	3.50	8.15
G217	4.00	8.20
H90A	3.00	8.20
E13B	3.50	8.20
E42D	3.00	8.25
G217	4.00	8.25
H79B	3.00	8.30
G93A	3.50	8.35
H94A	3.50	8.35
H113	2.50	8.35
E42C	3.50	8.40
H78B	2.50	8.40
H79A	3.00	8.40
H375A	5.00	8.45
H79A	3.00	8.45
E41D	3.50	8.50
E42C	4.00	8.50
E42C	4.00	8.50
G26A	4.00	8.50
G93A	4.00	8.50
H82A	2.50	8.50
H90A	3.00	8.50

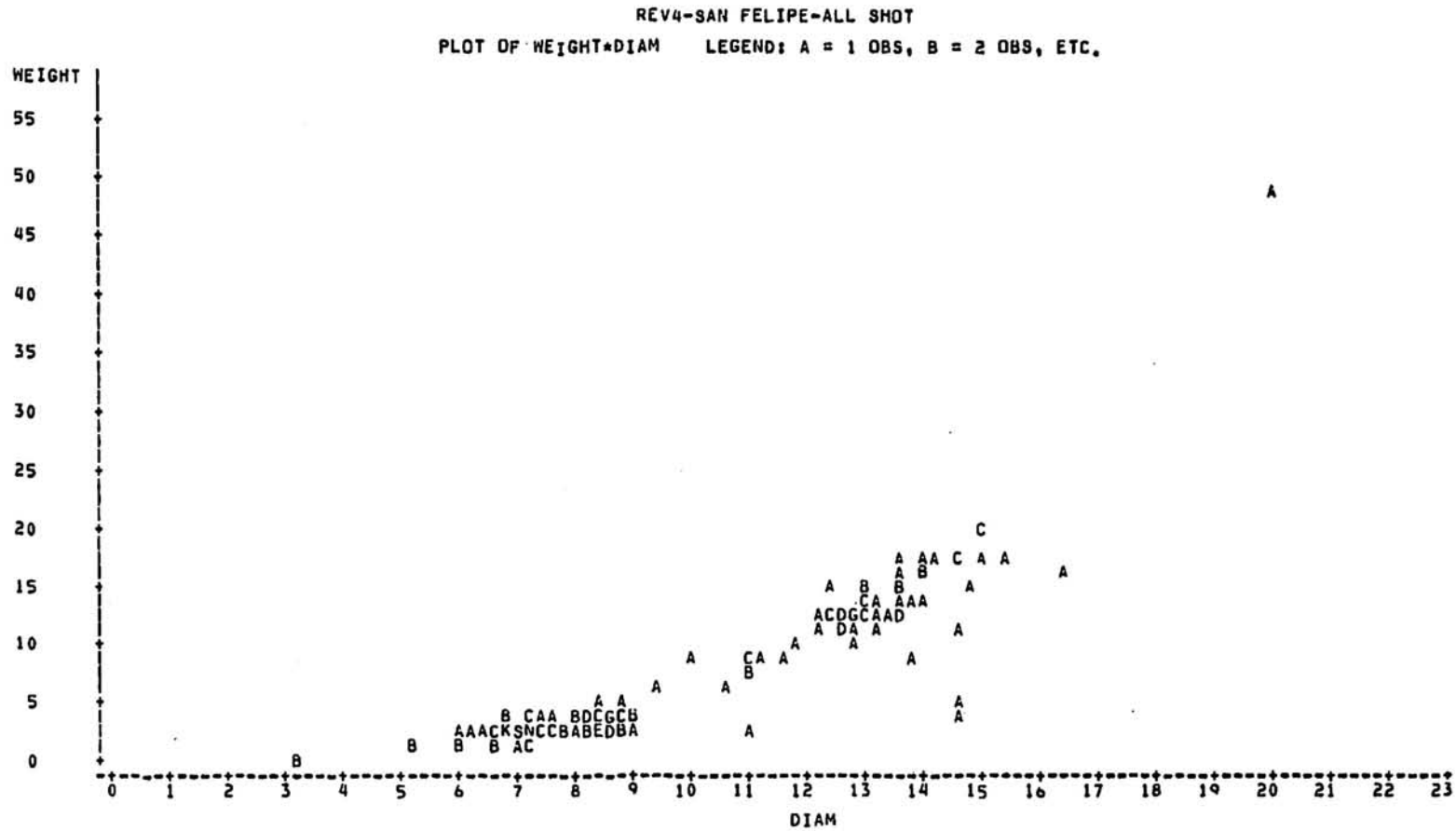
APPENDIX IX: FT. SAN FELIPE LEAD SHOT FROM FEATURES AND LEVELS

PROVENIENCE 38BU162	WEIGHT (grams)	DIAMETER (mm)
H92A	2.00	8.50
E26B	3.50	8.50
H100B	3.00	8.55
G224	4.00	8.60
G44B	4.00	8.70
H103A	3.00	8.70
G93A	4.00	8.75
G93A	4.00	8.75
H101A	3.00	8.85
H96A	3.50	8.90
E40C	3.00	9.00
G57A	4.00	9.00
H146F	8.50	10.00
H104A	6.00	10.55
G9B	9.00	11.00
G46B	9.00	11.00
G56A	9.00	11.00
H80A	3.00	11.00
H99A	7.50	11.00
H106A	8.00	11.00
E38E	9.00	11.10
E44C	8.50	11.50
E41E	10.00	11.80
E41E	11.50	12.25
E41E	12.00	12.25
G105A	12.00	12.35
H333E	15.50	12.35
E40D	12.00	12.40
E41E	12.00	12.45
E41E	11.50	12.50
G66A	12.00	12.50
H120A	11.50	12.50
G71A	12.50	12.60
E41E	13.00	12.65
H101A	11.50	12.65
E31A	11.00	12.65
H309	13.00	12.70
H120A	12.50	12.70
H86A	10.50	12.75

PROVENIENCE 38BU162	WEIGHT (grams)	DIAMETER (mm)
H101A	11.50	12.75
E40D	12.50	12.80
E41E	12.50	12.80
G93A	12.00	12.80
H101B	12.50	12.80
E40D	12.00	12.85
E41E	14.00	13.00
E41E	13.00	13.00
E41E	12.00	13.00
E41E	13.00	13.00
G148	13.50	13.00
G60A	14.50	13.00
H375A	15.00	13.00
H92A	14.00	13.00
G55A	14.00	13.10
H89A	11.50	13.10
E41D	13.00	13.20
H101B	13.00	13.30
E46A	12.50	13.50
E37C	16.00	13.50
H80A	14.00	13.50
H101A	13.00	13.50
H113B	12.50	13.50
G65B	15.00	13.60
H79B	14.50	13.60
H90A	13.00	13.60
H375A	17.00	13.65
H113B	14.00	13.75
H118A	9.00	13.80
E40C	18.00	14.00
G16B	16.00	14.00
G57A	16.00	14.00
H110B	14.00	14.00
G70A	5.50	14.50
H333E	17.50	14.50
H81A	11.00	14.40
H90A	18.00	14.50
H88A	3.50	14.60
H113B	18.00	14.60
H82A	15.50	14.75
E46B	20.50	14.90
G93A	20.00	14.90
E35B	18.00	15.00
H82A	20.50	15.00
H101A	17.00	15.30
H100A	16.00	16.40

APPENDIX IX: FT. SAN FELIPE LEAD SHOT SUMMARY

WEIGHT (gms.)	FREQUENCY
1.00	4
1.50	5
2.00	19
2.50	24
3.00	24
3.25	2
3.50	11
4.00	14
5.00	2
5.50	1
6.00	1
7.50	1
8.00	1
8.50	2
9.00	5
10.00	1
10.50	1
11.00	3
11.50	7
12.00	8
12.50	7
13.00	8
13.50	1
14.00	7
14.50	2
15.00	2
15.50	2
16.00	4
17.00	2
17.50	1
18.00	4
20.00	1
20.50	2
TOTAL	179


REV4-SAN FELIPE-ALL SHOT
PLOT OF WEIGHT*DIAM LEGEND: A = 1 OBS, B = 2 OBS, ETC.
WEIGHT
55
50
45
40
35
30
25
20
15
10
5
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
DIAM

APPENDIX X

TABULATION OF LEAD SHOT FROM FEATURES

APPENDIX X: LEAD SHOT FROM SPANISH FEATURES

PROVENIENCE NUMBER 38BU162	WEIGHT (grams)	DIAMETER (mm)	
SANTA ELENA SPANISH FEATURES			
C100	14.50	13.15	REFUSE PIT
C117	13.00	12.50	REFUSE IN DAUB PROCESSING PIT
C117	4.50	8.40	"
C117	4.00	7.80	"
C117	2.00	5.25	"
C123	6.00	9.35	REFUSE PIT
C172	4.50	8.65	REFUSE DEPOSIT
C301	18.00	14.20	REFUSE IN DAUB PROCESSING PIT
FT. SAN FELIPE SPANISH FEATURES			NW BASTION MOAT FILL
E37C	16.00	13.50	"
E38C	2.50	7.25	"
E38C	2.50	6.75	"
E38C	3.00	7.40	"
E38C	3.00	7.00	"
E38C	2.00	6.40	"
E38E	9.00	11.10	"
E40C	3.00	9.00	"
E40C	18.00	14.00	"
E40D	11.00	-	"
E40D	12.00	12.40	"
E40D	12.50	12.80	"
E40D	12.00	12.85	"
E41D	13.00	13.20	"
E41D	3.50	8.50	"
E41E	11.50	12.50	"
E41E	12.50	12.80	"
E41E	11.50	12.25	"
E41E	13.00	12.65	"
E41E	14.00	13.00	"
E41E	13.00	13.00	"
E41E	12.00	13.00	"
E41E	13.00	13.00	"
E41E	12.00	12.25	"
E41E	12.00	12.45	"
E41E	10.00	11.80	"
E41E	2.50	7.00	"
E41E	3.00	6.70	"
E41E	3.50	7.10	"
E42C	3.50	8.40	"
E42C	2.50	7.20	"
E42C	2.00	7.20	"
E42C	2.50	6.90	"
E42C	3.50	7.35	"
E42C	4.00	8.50	"

APPENDIX X: LEAD SHOT FROM SPANISH FEATURES

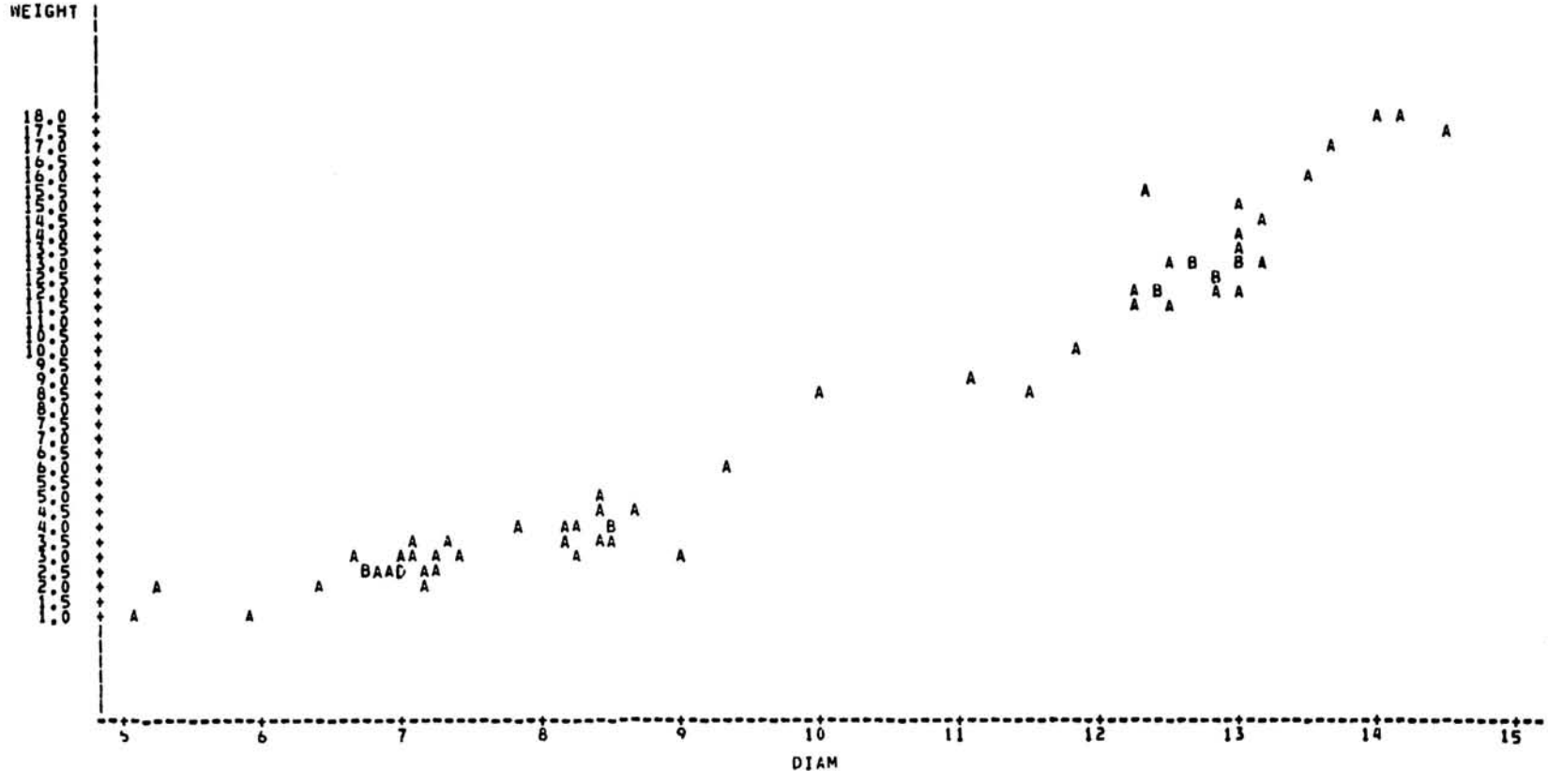
PROVENIENCE NUMBER	WEIGHT (grams)	DIAMETER (mm)	
38BU162			
FT. SAN FELIPE SPANISH FEATURES			NORTHWEST BASTION MOAT FILL
E42C	4.00	8.50	"
E42C	2.50	7.00	"
E42C	2.50	6.75	"
E42C	3.00	8.25	"
E43C	3.50	8.15	"
E43C	3.00	7.25	"
E44C	8.50	11.50	"
E44C	2.50	7.00	"
E44C	2.50	7.00	"
G146	1.00	5.10	CASA FUERTE WELL FILL
G148	13.50	13.00	CASA FUERTE POSTHOLE FILL
G198	2.50	6.80	"
G217	3.00	7.10	CASA FUERTE WELL FILL
G217	4.00	8.20	"
G217	4.00	8.25	"
H146F	8.50	10.00	"
H307A	1.00	5.90	CASA FUERTE POSTMOLD
H309	13.00	12.70	CASA FUERTE DITCH
H333E	15.50	12.35	CASA FUERTE WELL FILL
H333E	17.50	14.50	"
H375A	15.00	13.00	REFUSE PIT
H375A	17.00	13.65	"
H375A	5.00	8.45	"

SUMMARY OF LEAD SHOT FROM FEATURES

WEIGHT	FREQUENCY
1.00	0
2.00	3
2.50	10
3.00	7
3.50	5
4.00	5
4.50	2
5.00	1
6.00	1
8.50	2
9.00	1
10.00	1
11.00	1

WEIGHT	FREQUENCY
11.50	2
12.00	5
12.50	2
13.00	6
13.50	1
14.00	1
14.50	1
15.00	1
15.50	1
16.00	1
17.00	1
17.50	1
18.00	2
TOTAL	64

PLOT OF WEIGHT*DIAM LEGEND: A = 1 OBS, B = 2 OBS, ETC.



APPENDIX XI

LEAD SPRUE TABULATION

APPENDIX XI: LEAD CASTING SPRUE AND SCRAP

PROVENIENCE	LEAD SPRUE FROM LEVELS COUNT	WEIGHT (gms.)	SPRUE FROM FEATURES COUNT	WEIGHT (gms.)	TOTAL
38BU162 SANTA ELENA					
8B	1	15.00			
95A	1	0.50			
100A	1	12.00			
109B	1	4.50			
119B	2	16.00			
67E			1	5.00	
141B			1	1.00	
38BU162A					
13A	2	8.50			
17B	1	30.50			
141B	2	11.00			
38BU162B					
2A	2	31.00			
6A	1	1.50			
14A	1	4.00			
51A	1	2.00			
53A	1	1.00			
54C	1	4.00			
38BU162C					
7A	1	4.50			
15B	1	8.00			
22B	1	3.00			
27B	1	11.50			
28B	1	2.00			
31A	1	7.00			
33B	1	4.00			
35A	1	2.00			
38B	1	13.00			
40B	1	1.50			
46A	1	7.50			
69B	1	8.00			
132A	1	34.00			
132B	2	2.00			
136B	1	5.00			
140B	3	13.00			
141B	2	8.00			
144B	1	9.50			
145A	1	2.50			
147B	1	4.00			
148A	1	3.00			
148B	1	2.00			
154B	1	10.00			
168B	1	1.50			

APPENDIX XI: LEAD CASTING SPRUE AND SCRAP

	LEAD SPRUE FROM LEVELS		SPRUE FROM FEATURES		
PROVENIENCE	COUNT	WEIGHT (gms.)	COUNT	WEIGHT (gms.)	TOTAL
38BU162C	SANTA ELENA				
169B	1	12.50			
170A	1	10.00			
175A	2	22.00			
178B	3	19.50			
179A	1	7.50			
181B	1	8.00			
202B	2	7.00			
203B	1	3.50			
204B	1	6.50			
205B	3	10.00			
217B	1	19.00			
218B	1	4.50			
220B	1	11.50			
221B	1	8.50			
251B	2	5.00			
331B	1	8.00			
346B	2	15.00			
351B	1	14.50			
117			2	6.50	
268			1	0.50	
282			1	5.50	
288			2	6.50	
357			1	30.00	
38BU162D					
67			1	1.00	
68			3	1.50	
115			7	11.00	
117			1	0.50	
124			1	4.00	
38BU162J					
13B	1	1.50			
35A	1	4.00			
57A	1	9.50			
58B	1	4.50			
73B	1	2.50			
74B	1	6.50			
78A	1	5.00			
78B	1	2.50			
124A	1	34.50			
TOTAL	81	571.00	22	73.00	644 (wt.)
Santa Elena PERCENTAGE		88.70		11.30	24.3

APPENDIX XI: LEAD CASTING SPRUE AND SCRAP

PROVENIENCE	LEAD SPRUE FROM LEVELS COUNT	WEIGHT (gms.)	SPRUE FROM FEATURES COUNT	WEIGHT (gms)	TOTAL
38BU162E FT. SAN FELIPE					
104B	1	1.00			
39C			3	47.00	
41C			2	6.50	
42C			2	5.50	
42D			1	13.00	
43C			1	2.00	
38BU162G					
9A	1	11.00			
10A	3	20.50			
10B	1	4.00			
11A	1	10.50			
12A	1	1.00			
12B	1	6.50			
15A	1	5.00			
16A	2	35.00			
16B	1	4.00			
20A	1	1.50			
22A	4	11.50			
24A	1	7.50			
26A	3	9.00			
38A	1	20.00			
40A	1	6.50			
45B	3	11.00			
53B	2	10.00			
55A	1	5.50			
57A	19	117.50			
57B	3	13.00			
58A	1	7.50			
59B	1	6.50			
65B	2	13.00			
66A	1	3.00			
69A	1	5.00			
70A	1	2.00			
71A	3	8.50			
72A	1	8.00			
77A	6	69.50			
77B	1	43.50			
93A	5	82.00			
105A	7	53.50			
148			2	3.00	
212			1	4.00	
229			3	15.50	

APPENDIX XI: LEAD CASTING SPRUE AND SCRAP

	LEAD SPRUE FROM LEVELS		SPRUE FROM FEATURES		
PROVENIENCE	COUNT	WEIGHT (gms.)	COUNT	WEIGHT (gms.)	TOTAL
38BU162H	FT. SAN FELIPE				
74A	3	16.00			
76A	3	11.50			
78B	2	14.00			
79A	13	60.50			
79B	9	95.00			
80A	9	54.00			
81A	3	20.00			
82A	1	18.50			
89A	3	35.50			
90A	4	29.00			
91A	7	38.50			
92A	6	28.50			
94A	1	10.00			
95A	2	5.00			
98A	1	11.00			
98B	1	12.00			
99A	2	4.00			
100A	3	25.50			
101A	8	99.00			
101B	5	28.00			
103B	2	24.00			
104A	11	95.00			
106A	1	23.00			
110A	5	18.50			
110B	3	13.50			
111A	1	9.50			
112A	2	43.00			
113A	5	116.50			
113B	13	198.00			
113C	1	0.50			
118A	1	23.00			
146C			1	1.50	
146G			1	49.50	
217A			1	1.00	
217G			2	7.50	
260A			1	1.00	
272B			16	35.50	
276			1	6.00	
307A			1	1.50	
333C			4	4.00	
333F			1	0.50	
337			1	6.50	
397A			2	3.00	
TOTAL	213	1793.50	47	214.00	2007.5 (Wt.)
GRAND TOTAL	294	2364.50	69	287.00	2651.5
Ft.San Felipe PERCENTAGE		89.30		10.70	75.7

APPENDIX XII

SPANISH BUTTONS FROM SANTA ELENA

by

Richard R. Polhemus

APPENDIX XII

SPANISH BUTTONS FROM SANTA ELENA*

Richard R. Polhemus

Ten cast metal buttons possessing wire eyes were recovered during the 1984 excavation season. These buttons, later augmented by eight additional examples from other contexts at Santa Elena, were thought by the author to be attributable to the Spanish occupation although at that time no examples had been recognized in a closed Spanish context. Two similar spherical cast buttons recorded from an Indian burial containing a shell tempered Dallas Mississippian vessel and marine shell beads from a site in Greene County, Tennessee (40GN9) suggested a context dating to the second half of the sixteenth century. Three specimens from Santa Elena were sent to Ivor Noël Hume, Resident Archaeologist at Colonial Williamsburg, for identification. Noël Hume confirmed the suspected Santa Elena temporal affiliation of the buttons, attributing them to a period beginning as early as the late fifteenth century and extending into the early seventeenth century (c. 1640), (personal communication, Ivor Noël Hume, June 21, 1985).

Table 1 presents contextual and descriptive data for each button identified. Buttons displaying similar characteristics are grouped together and described below as button types. The characteristics differentiating these types may be the result of differences in source of available raw materials, or in the relative status of the wearer.

*Originally published in South, Stanley, 1985: 231-235. Excavation of the *Casa Fuerte* and Wells at Ft. San Felipe 1984. The University of South Carolina Institute of Archaeology and Anthropology *Research Manuscript Series* 196. Columbia.

TABLE 1

Context and Descriptive Data for Spanish Buttons at Santa Elena

PROV.NO	DIA.(mm)	THICKNESS BALL	EYE PRESENT	BALL METAL (Acero)	EYE METAL	GILT? ("Painted") (Atauxia)
38BU162H						
84A	10.50	10.10	no	gray	iron	
89B	10.00	9.80	yes	"	brass	yes
90A	10.30	10.10	no	"		yes
91A	10.30	10.30	no	"	iron	
91A	10.30	10.30	no	"	iron	
101A			no	"		
101B	11.40	8.10	no	"		
113B	10.30	10.30	no	"	iron	
113B			no	"		
Fea. 397	10.30	10.10	yes	"	brass	
38BU162G						
47A	9.90	9.40	yes	brass	brass	
53B			no	gray		
38BU162C						
Fea.171	9.50	9.50	yes	brass	brass	yes
Fea. 171	9.50	9.50	yes	brass	brass	
170B	9.50	9.40	yes	brass	brass	
196A	9.50	9.50	yes	brass	brass	yes
8B			no	gray	iron	
144A	10.30	10.30	no	gray	iron	

Type 1 Gray metal with iron wire eye

Sample Size: 6			
Diameter: Range	10.3-10.5mm	Mean	10.24mm
Ball Thickness: Range	10.1-10.3mm	Mean	10.26mm

Description: Button Type 1 is characterized by a cast gray metal spherical (5) or dome shaped (1) body and traces of an iron wire eye. The body of the spherical buttons resembles a small musketball cast of a nearly corrosion free alloy. A mold mark and filed off casting nipple, situated near the eye, are evident on each spherical example. The iron wire eye is represented in each case only by a rusted spot protruding from the bottom body in line with the mold mark. Two buttons of this type, with traces of gilt surface preserved, have been recovered from an Indian site (40GN9) in Green County, Tennessee. The dome-shaped example was incomplete and possessed a series of concentric faint rings on the back and edges.

Type 2 Gray metal with brass wire eye

Sample Size: 2		
Diameter: Range	10.0-10.3mm	Mean 10.15mm
Ball Thickness: Range	9.8-10.1mm	Mean 9.95mm

Type 3 Gray metal without preserved wire eye

Sample Size: 5		
Spherical (4)		
Diameter: Range	10.3-11.4mm	10.85mm
Dome shaped (1)	11.4mm	
Ball thickness: Spherical	10.1mm	(one measurable example)
Dome shaped	8.1m	

Description: Button Type 3 is made up of those spherical and dome shaped gray metal buttons and button fragments lacking portions of the wire eye, and could be members of either Type 1 or Type 2. One example has traces of gilt surface preserved.

Type 4 Brass with brass wire eye

Sample Size: 5		
Diameter: Range	9.5-9.9mm	Mean 9.58mm
Ball Thickness: Range	9.4-9.5mm	Mean 9.46mm

Description: Button Type 4 resembles spherical button Type 2 with the exception that the body is cast of brass rather than the gray metal of the preceding types. The mold marks are less evident and the casting process results in the partial coating of the wire eye with brass producing a thicker eye wire than in the Type 2. Two examples have traces of gilt surface preserved.

Discussion

The buttons from Santa Elena described above provide the first opportunity to compare buttons from a known sixteenth century Spanish context with buttons recovered from the interior of the southeastern United States. The buttons from thle United States may relate to one of the several Spanish explorations, including

Hernando DeSoto and Tristan de Luna, as well as that of Juan Pardo. The route and activities of the Pardo expedition are of particular interst in that Santa Elena served as the base for the several trips Pardo made as far as the Eastern Valley of Tennessee. Buttons, described as "*Atauxia* " (see discussion by South this report), were distributed to various Indian groups by Pardo.

Table 2 illustrates the distribution of button types and buttons bearing gilt decoration. By site area: "C" representing the town area and "G" and "H" representing different excavation seasons within Ft. San Felipe. It will be noted that button Types 1 through 3, having a gray metal body, are concentrated within the fort, whereas Type 4, having a brass body, are concentrated within the town. Gilt is present on two gray metal examples found in the fort. The two gilt examples from the town have brass bodies.

TABLE 2

DISTRIBUTION OF BUTTONS BY TYPE AND SITE AREA

SITE PROVENIENCE LETTER	C S.E.	G Ft.	H Ft.	TOTAL
Type 1 gray metal w/iron eye	2		4	6
Type 2 gray metal w/brass eye			1	1
Gilt gray metal w/brass eye			1	1
Type 3 gray metal without eye		1	3	4
Gilt gray metal without eye			1	1
Type 4 brass w/brass eye	3	1		4
Gilt brass w/brass eye	1			1
TOTAL	6	2	10	18

A portrait of the founder of Santa Elena, Pedro Menéndez de Avilés, painted by Titian and represented by an eighteenth-century engraving (Manucy 1965: 8), illustrates the use of numerous, closely spaced, small buttons on the front of a doublet with slashed sleeves. Smaller numbers of such small buttons were also frequently utilized on the sleeves of men's clothing during this period (Ivor Noël Hume, personal communication, June 21, 1985). The presence of gilt surfaces on both gray metal and brass examples may indicate that the presence or absence of gilt may be a more important factor than the compositions of either the button body or the button eye. The good condition of the majority of specimens clearly indicates that most (78%) had not been so treated and may be, as Stanley South suggests in his report, the "*Acero* " buttons mentioned in Spanish documents. More examples are needed, and period paintings and clothing studied, before definitive statements can be made concerning the place of this button form in Spanish culture at Santa Elena.

REFERENCES

Manucy, Albert
1965 *Florida's Menéndez: Captain General of the Ocean Sea.* St. Augustine Historical Society. St. Augustine, Florida

APPENDIX XIII

AGLET TABULATION

APPENDIX XIII: AGLETS FROM FEATURES

PROVENIENCE	LENGTH	WIDTH AT BIG END (mm)	WIDTH AT POINT (mm)	FRAGMENT
38BU162	SANTA ELENA			
141B	-	-	1.70	1
38BU162A				
31(Not a Fea.)	26.50	2.40	1.20	
110	24.00	2.50	1.30	
110	20.85	2.50	1.70	
38BU162B				
33A	22.50	6.80	3.20	(larger type)
38BU162C				
26B(Not a Fea.)	30.30		1.20	
75	-	-	-	1
76	23.25	2.80	1.75	
105	33.30	2.35	1.25	
117	31.60	3.00	1.80	
117	28.70	2.35	1.50	
117	29.40	2.65	1.00	
117	25.85	2.85	1.70	
117	23.90	2.85	1.50	
117	24.50	2.50	1.30	
175	26.75	2.50	1.75	1
231	25.80	2.70	1.30	
236	26.80	2.95	1.95	
265	-	2.25	-	1
292	28.65	2.50	1.30	
296	28.60	3.00	1.70	
38BU162D				
38	33.60	2.50	1.40	2
38	30.20	3.00	1.60	
38	29.25	2.50	1.40	
38	32.30	2.25	1.25	
57	26.50	2.50	1.75	
66	34.00	3.30	1.15	2
66	29.65	2.55	2.10	
66	26.20	2.35	1.30	
66	32.85	2.30	1.40	
66	31.60	2.90	1.40	
67	33.80	2.20	1.30	
68	30.70	3.00	1.65	1
68	32.50	2.35	1.50	
68	30.90	2.85	1.50	
68	28.35	2.85	1.80	
69	28.00	2.60	1.50	
69	26.70	2.50	1.50	
70	17.25	-	-	
72	31.30	2.50	1.80	
72	32.90	2.60	1.00	

APPENDIX XIII: AGLETS FROM FEATURES

PROVENIENCE	LENGTH	WIDTH AT BIG END (mm)	WIDTH AT POINT (mm)	FRAGMENT
38BU162D	SANTA ELENA			
72	27.25	2.60	1.30	
72	27.80	2.80	1.50	
96	27.50	2.60	1.50	
115	25.85	1.50	1.85	2
118	25.35	2.70	1.50	
38BU162G	FT.SAN FELIPE			
146A	26.20	2.40	1.75	4
146A	26.25	2.70	1.80	
146A	25.85	3.50	1.90	
146B	26.30	3.00	1.50	2
198	25.70	2.50	1.75	
237	-	-	-	1
101A(Not a Fea.)	30.30	2.85	1.25	
172	25.65	3.00	-	
172	-	2.85	-	1
172A	-	-	1.30	1
198	26.80	2.50	1.40	
198	25.70	2.90	1.50	
38BU162H	FT.SAN FELIPE			
146D	27.00	2.90	1.70	
146F	24.25	3.00	1.70	
172F	-	-	-	2
261	-	-	-	3

APPENDIX XIV

BRASS PIN AND IRON WIRE TABULATION

APPENDIX XIV: BRASS PIN AND IRON WIRE DATA FROM FEATURES

PROVENIENCE	BRASS PINS			IRON WIRE	
	LENGTH (mm)	WIRE (mm)	HEAD (mm)	LENGTH (mm)	WIRE (mm)
38BU162	SANTA ELENA				
30A(Not a Fea.)				63.70	2.15
38BU162C	SANTA ELENA				
75	37.00	0.85	2.90		
75	25.80	0.75	1.85		
117	30.20	0.90	2.40	6.20	1.90
117	-	0.75	2.45		
123	28.50	0.80	2.15		
123	25.60	0.75	1.80		
38BU162D	SANTA ELENA				
37	-	0.80	2.45		
38	58.35	1.30	3.15	37.70	2.70
38	-	1.00	-	22.80	3.00
38				18.60	1.85
63	26.00	0.85	2.00		
66	39.70	1.15	2.85	9.30	2.05
66	26.80	0.80	1.70		
67	27.10	0.80	2.05	33.20	2.20
67				30.90	1.85
67				30.00	2.25
67				29.90	2.25
67				28.40	1.80
67				25.10	1.90
67				20.40	2.10
67				20.10	2.00
67				21.00	2.10
67				19.00	2.25
67				19.00	2.05
67				19.20	2.45
67				18.70	1.95
67				16.80	2.25
67				16.70	2.10
67				15.30	1.80
67				13.10	2.05
67				13.50	2.40
67				12.20	2.20
67				12.60	2.10
67				12.20	1.80
67				27.50	3.10
68	33.05	1.10	2.45		
69	-	0.95	-		
70	26.80	-	-	13.30	1.80
70	26.65	-	-	9.20	2.00
70				8.90	1.75
70				8.10	1.90

APPENDIX XIV: BRASS PIN AND IRON WIRE DATA FROM FEATURES

PROVENIENCE	BRASS PINS			IRON WIRE	
	LENGTH (mm)	WIRE (mm)	HEAD (mm)	LENGTH (mm)	WIRE (mm)
38BU162D	SANTA ELENA				
72	29.50	1.00	2.10	11.90	2.05
96	29.60	1.10	2.30	13.30	2.30
96				11.30	2.30
96				8.40	1.40
96				6.90	1.55
102	26.50	0.90	2.20		
118	-	0.75	-		
118	21.90	0.60	1.50		
38BU162E	FT. SAN FELIPE				
6A	29.40	1.10	2.30		
42D	39.90	1.10	2.80		
107	-	0.75	2.05		
38BU162G	FT. SAN FELIPE				
52A(Not a Fea.)	-	0.95	-		
93A(Not a Fea.)	29.30	1.30	2.25		
146	41.35	1.25	3.25		
146	31.25	1.10	2.40		
146	31.25	1.00	2.50		
146	29.80	0.90	2.20		
146	-	0.90	-		
146A	42.10	1.90	3.80		
146A	31.45	1.25	2.60		
146A	29.60	1.25	2.20		
146A	27.00	0.95	2.20		
146A	-	1.10	2.90		
146A	-	0.85	1.10		
146A	-	1.25	-		
146B	31.45	1.10	2.30		
146B	27.00	0.95	1.85		
146B	26.10	0.80	1.85		
146B	25.60	0.95	1.80		
147	33.30	1.10	2.60		
148	35.15	1.15	2.45		
148	26.20	0.85	2.10		
149	28.60	0.85	2.00		
172	32.45	1.00	2.25		
172	30.90	1.10	2.30		
172	30.15	1.00	2.40		
172	32.30	1.10	2.35		
172	26.40	1.05	2.25		
172	24.85	1.00	1.90		
172	24.55	0.95	1.90		
172	-	1.95	2.90		

APPENDIX XIV: BRASS PIN AND IRON WIRE DATA FROM FEATURES

PROVENIENCE	BRASS PINS			IRON WIRE	
	LENGTH (mm)	WIRE (mm)	HEAD (mm)	LENGTH (mm)	WIRE (mm)
38BU162G	FT. SAN FELIPE				
172	-	1.30	2.65		
172A	42.40	1.15	2.90		
172A	41.20	1.15	2.95		
172A	32.80	1.15	2.45		
172A	30.10	1.05	2.30		
172A	27.70	0.90	2.25		
172A	27.45	1.00	2.25		
172A	27.25	1.05	2.25		
172A	24.90	1.15	2.10		
172A	-	0.95	2.00		
172A	-	1.15	-		
172B	33.00	0.95	2.50		
172B	31.85	0.90	2.35		
172B	20.20	0.95	2.10		
172B	18.45	0.65	1.70		
173	30.80	1.05	2.30		
197	26.25	0.95	2.00		
198	28.40	0.95	2.20		
217	32.50	1.05	2.25		
383U162H	FT. SAN FELIPE				
146C	30.45	1.00	2.20		
172D	-	1.15	2.45		
172F				23.60	2.20
217A	29.50	1.05	2.30		
260B	28.45	2.70	3.25		
261	42.25	1.20	2.95		

APPENDIX XV

BEAD ANALYSIS

by

Richard R. Polhemus

APPENDIX XV

BEAD ANALYSIS FROM SANTA ELENA AND FORT SAN FELIPE

by

Richard R. Polhemus

Glass Beads from Fort San Felipe (1982 Season)*

Glass beads were recovered from seven provenience units during the 1982 excavation season at Fort San Felipe. The beads were classified to the type level utilizing the Kidd system (Kidd and Kidd: 1970). General color designations are provided in the following descriptions rather than Kidd color varieties due to variability in the condition of the beads described. The beads were examined while wet to reduce the effect of surface oxidation and to determine more easily if each bead was clear, transluscent, or opaque with respect to clarity. A uniform light source, and the examination of each bead utilizing both transmitted as well as reflected light, maintained uniformity in classifying the collection. The bead's diameter, length, and the diameter of the perforation for each bead represented by less than one hundred examples were measured in the same manner. It was thought that size or proportional modes may reflect differences in depositional origin and prove to be of use in comparison with glass beads recovered from other sites in the southeastern United States.

Each bead type, in the following description, is made up of one or more size or depositional modes. The collection as a whole is made up of two rather distinct clusters. The first, and northernmost, composed of Provenience Units 38BU162E-19A, 25A, and 26A, in the topsoil zone above a burned fire pit intruding into the northwest bastion moat, contained two beads (Feature 71). This first cluster is of different origin than the second, the southernmost, which is composed of Provenience Units 38BU162E-104B, 105A, 105B, and 107. These beads came from a charcoal and burned bead-filled pit intruding into the moat and around it (South 1983: 50, 52, 70-75). Both collections date from a period after the moat was backfilled.

Type 1. If Clear Colorless - Ground Facets

Type 1 is a tube drawn bead having six ground facets on each end. The body of the barrel-shaped bead also has six, pressed facets.

Sample size: 1
Diameter: 6.7 mm
Length: 5.6 mm
Perforation: 1.8 mm

Comment: Type 1 is characteristic of the last decade of the eighteenth century through much of the nineteenth century.

* Originally published in South 1983: 145-155.

Type 2. IIa Transluscent Turquoise Blue

Type 2 is a tube drawn, tumbled bead represented in three shape and size modes. The surface finish tends to be coarser than the other bead types and subject to greater chemical pitting.

Spherical (<4 mm)

Sample Size:	1,483	
Diameter:	2.6-4.0 mm	Mode 3.6 mm
Length:	1.6-3.9 mm	Mode 2.8 mm
Perforation:	0.7-1.6 mm	Mode 0.9 mm

Spherical (>4 mm)

Sample Size:	574	
Diameter:	4.1-7.6 mm	Mode 6.3 mm
Length:	3.6-8.8 mm	Mode 6.3 mm
Perforation:	1.0-2.2 mm	Mode 1.6 mm

Barrel

Sample Size:	39	
Diameter:	4.3-8.2 mm	Mode 7.3 mm
Length:	3.8-8.2 mm	Mode 5.2 mm
Perforation:	1.1-2.4 mm	Mode 1.8 mm

Oblong

Sample Size:	1
Diameter:	6.2 mm
Length:	13.6 mm
Perforation:	2.0 mm

Comment: Spherical beads of both size modes have been recovered in the Tennessee Valley in contexts dating from the late sixteenth century to the middle of the seventeenth century. The barrel and oblong-shaped beads are most common during the latter part of the seventeenth century and the early part of the eighteenth century, although they continue to be present well into the eighteenth century in small numbers. Barrel-shaped beads differ from spherical beads of the same dimensions in that they have a recognizable inflection point between the perforated ends of the bead and the center portion or body of the bead. The difference between the two form groups may relate to the manner and length of the "tumbling" process utilized to round the drawn tube segments; the spherical, beads have been "tumbled" to a greater degree than the barrel-shaped beads.

Type 3. IIa Clear Navy Blue

Type 3 is a tube drawn, tumbled bead represented in three size modes. The surface finish is glossy and does not show the chemical pitting present in Type 2.

Spherical (1.2-2.3 mm)

Sample Size:	748	
Diameter:	1.2-2.3 mm	Mode 2.2 mm
Length:	0.8-1.9 mm	Mode 1.3 mm
Perforation:	0.6-0.8 mm	Mode 0.7 mm

Spherical (2.4-4 mm)

Sample Size:	54	
Diameter:	2.3-4.0 mm	Mode 2.6 mm
Length:	1.2-4.0 mm	Mode 1.4 mm
Perforation:	0.7-1.1 mm	Mode 0.9 mm

Spherical (>5 mm)

Sample Size:	5	
Diameter:	5.8-6.4 mm	Mode 6.3 mm
Length:	5.4-7.2 mm	Mode 6.3 mm
Perforation:	1.5-2.0 mm	Mode 1.9 mm

Comment: Beads making up the two smaller size modes are primarily associated with the southernmost bead cluster. The larger size mode is associated with the northernmost cluster. Beads of this type appear to have an extended use period throughout the seventeenth and eighteenth centuries.

Type 4. IIa Clear Light Blue - Spherical

Type 4 is a tube drawn tumbled bead similar in all respects to Type 3 other than color. The surface finish is glossy and does not show the chemical pitting present in Type 2. Beads of this type appear to have an extended use period.

Sample Size:	1
Diameter:	3.8 mm
Length:	3.4 mm
Perforation:	1.1 mm

Type 5. IIa Clear Cerulean Blue - Barrel

Type 5 is a tube drawn tumbled bead having a recognizable inflection point between the perforated ends of the bead and the center portion or body of the bead.

Sample Size:	45	
Diameter:	5.8-7.7 mm	Mode 6.6 mm
Length:	4.4-8.9 mm	Mode 6.2 mm
Perforation:	1.2-2.7 mm	Mode 1.7 mm

Comment: Beads of this type are found only in the later cluster.

Type 6. IIa Clear Emerald Green - Spherical

Type 5 is a tube drawn, tumbled bead having an evenly rounded form and a rather small perforation.

Sample Size:	57	
Diameter:	4.3-4.9 mm	Mode 4.4 mm
Length:	3.5-4.5 mm	Mode 4.2 mm
Perforation:	0.7-1.0 mm	Mode 0.8 mm

Comment: Beads of this type are restricted to the southern cluster. Comparable beads are not present in the University of Tennessee Bead Type Collection (curated at the Frank H. McClung Museum), nor are they described, in a recognizable form at least, in the published literature on glass beads.

Type 7. IIa Opaque Black

Type 7 is a tube drawn tumbled bead represented in both a small spherical form and a larger barrel-shaped form. The glass is opaque even on the smallest beads under transmitted light, as opposed to the beads described as Type 9, which are often mistaken for opaque black when observed under reflected light only. Type 7 beads possess a surface that is less glossy and reflective than Types 8 and 9.

Spherical

Sample Size:	229	
Diameter:	2.4-4.4 mm	Mode 3.2 mm
Length:	1.2-4.4 mm	Mode 1.8 mm
Perforation:	0.6-1.1 mm	Mode 0.9 mm

Barrel

Sample Size:	9	
Diameter:	6.6-8.4 mm	Mode 6.8 mm
Length:	5.1-7.1 mm	Mode 5.8 mm
Perforation:	1.7-2.1 mm	Mode 1.8 mm

Comment: Spherical beads are restricted to the southernmost cluster, barrel shaped beads to the northernmost cluster.

Type 8. IIa Translucent Light Rose Brown

Type 8 is a tube drawn tumbled bead represented in both speherical and oblong forms. The bead surface is more glossy and reflective than Type 7 beads.

Spherical

Sample Size:	6	
Diameter:	2.6-3.9 mm	Mode 2.9 mm
Length:	1.6-2.4 mm	Mode 1.7 mm
Perforation:	0.8-1.0 mm	Mode 0.9 mm

Oblong

Sample Size:	1
Diameter:	5.8 mm
Length:	7.9 mm
Perforation:	2.1 mm

Comments: Beads of spherical form appear to have an extended use period and are found in small numbers on sites in the Little Tennessee River valley. No beads comparable to the oblong specimen are present in the University of Tennessee Bead Type collection.

Type 9. IIa Translucent Dark Rose Brown

Type 9 is a tube drawn tumbled bead represented in two size modes. It is similar in all respects to Type 8, and may be only a slightly darker version of the preceding type. This type appears black when viewed in reflected light and is frequently mistaken for Type 7.

Spherical (<4 mm)

Sample Size:	137	
Diameter:	2.4-3.7 mm	Mode 3.2 mm
Length:	1.2-2.3 mm	Mode 1.8 mm
Perforation:	0.7-1.3 mm	Mode 0.8 mm

Spherical (>6 mm)

Sample Size:	2
Diameter:	6.6-6.9 mm
Length:	5.7-5.8 mm
Perforation:	1.8-2.7 mm

Comment: Small spherical beads are restricted to the southernmost cluster. Large spherical beads are restricted to the northern cluster.

Type 10. IIa Opaque White

Type 10 is represented by larger beads of spherical, barrel, and oblong form.

Spherical

Sample Size:	3
Diameter:	5.8-6.3 mm
Length:	5.4-7.2 mm

Barrel

Sample Size:	1
Diameter:	6.3 mm
Length:	9.3 mm
Perforation:	1.8 mm

Oblong

Sample Size:	1
Diameter:	5.9 mm
Length:	8.2 mm
Perforation:	1.7 mm

Comment: These bead forms are associated with the northern bead cluster and are relatively common in the late seventeenth and much of the eighteenth centuries.

Type 11. IIb Clear Amber with White Stripes - Spherical

Type II is a tube drawn, tumbled bead having a series of twelve narrow opaque white lines parallel to the perforation. The color is a distinctive clear amber or deep yellow shade rather than the more common clear grey or colorless shade found on eighteenth century sites.

Sample Size: 4

Diameter:	2.6-2.8 mm
Length:	1.4-1.6 mm
Perforation:	0.4-0.8 mm

Comment: The distinctive color of this bead type may distinguish early examples of the "onion" or "gooseberry" bead from later relatively common clear grey or colorless examples.

Type 12. IVa Opaque White with Clear Colorless Core - Spherical

Sample Size:	1
Diameter:	3.4 mm
Length:	2.5 mm
Perforation:	0.8 mm

Comment: This bead type is associated with the southernmost cluster and is attributed to the late sixteenth and early seventeenth centuries (Marvin Smith, personal communication, August 21, 1982).

Type 13. IVb Opaque Bluish-white with Opaque Light Blue Core - Three Red and Three Blue Stripes - Oval

Type 13 is a tube drawn, tumbled bead of compound construction. Two layers of opaque light blue or bluish-white glass of differing shades are evident at the end of each bead and on broken surfaces. Three broad red stripes are spaced by three narrow dark navy blue stripes. The oval form possesses no inflection point between the ends and body of the bead. The surfaces on Type 13 beads are compact, glossy, and in the best condition of all the bead types from Santa Elena.

Sample Size:	438	
Diameter:	4.7-6.3 mm	Mode 5.2 mm
Length:	5.3-8.3 mm	Mode 7.3 mm
Perforation:	1.3-1.7 mm	Mode 1.4 mm

Comment: This bead type, associated with the southernmost cluster, is represented in the University of Tennessee Bead Type collection by a single group recovered from Pine Island, Alabama. The context from which the Pine Island sample was recovered is unknown; however, other bead types and trade material from the same source suggest an occupation during the seventeenth and early eighteenth centuries.

Type 14. IVbb Opaque Redwood with Clear Green Core - Three Black Stripes Bordered by White - Donut

Type 14 is a tube drawn, tumbled bead of compound construction. A thin opaque red layer overlies a thick, clear, green glass core. Three narrow black stripes bordered by wider white stripes parallel the perforation. A very thin gloss layer of clear glass appears to be present over the opaque body of the bead.

Sample Size:	1
Diameter:	8.5 mm
Length:	6.2 mm
Perforation:	2.3 mm

Comment: This bead type, associated with the northern cluster, is represented without the gloss layer in the University of Tennessee Bead Type collection by examples from a number of sites. Examples have been recovered from the Chota and Toqua sites in the Little Tennessee River Valley, as well as from the Hiwassee Island site in Meigs County, Tennessee. A use period from the second half of the seventeenth century into the early eighteenth century is suggested.

Discussion

The glass beads discovered during the 1982 excavation season at Santa Elena, described above, were recovered from two rather distinct clusters. The first northernmost, cluster, composed of 119 beads recovered from Provenience Units 162E-19A, 25A, and 26A, shares only four of sixteen typological categories (Table 2) with the second cluster. The second, southernmost cluster, composed of 3,722 beads recovered from Provenience Units 162E-104B, 105B, and 107, shares four of eleven typological categories (Table 2) with the first cluster. The first cluster is derived from "A" or topsoil levels above the moat fill of Fort San Felipe and may contain beads from more than one period of occupation or source. The second, southernmost cluster derived from a small bead and charcoal filled pit intrusive into the moat fill of Fort San Felipe and excavation units in its immediate vicinity, is made up of a group of strung beads intentionally deposited and burned and thus may be considered representative of a single point in time.

The lack of previously identified temporally diagnostic bead types poses a problem in assigning cultural or temporal parameters to the two bead clusters.

Bead cluster I (the northernmost) contains one specimen diagnostic of the nineteenth century (Type I) that has been previously identified from a number of coastal black or slave cabin sites (Fairbanks 1974: 90). The remaining beads, particularly the tube drawn, tumbled oblong forms, do not occur that late in time and, as a group, resemble a group of beads from Johns Island (38CH68), in Charleston County, South Carolina (Polhemus 1971), now attributed to the late seventeenth or early eighteenth centuries. The beads of cluster one, with the exception of the single Type 1 example attributable to the nineteenth century may most likely be attributed to the decades of English settlement in South Carolina.

TABLE 1

CLASSIFICATION OF GLASS BEADS BY PROVENIENCE UNIT
GLASS BEADS FROM FORT SAN FELIPE

TYPE	DESCRIPTION	38BU162E-	19A	25A	26A	104B	105A	105B	107	TYPE TOTAL
1.	If Cl.Colorless-Ground Facets		-	-	1	-	-	-	-	1
2.	IIa Tr.Turquoise Blue-Spherical (<4mm)		1	-	2	107	150	1,217	6	1,483
	-Spherical (>4mm)		-	-	3	37	45	479	10	574
	-Barrel		5	19	15	-	-	-	-	39
	-Oblong		-	1	-	-	-	-	-	1
3.	IIa Cl.Navy Blue-Spherical (1.2-2.3mm)		-	-	-	37	94	605	12	748
	-Spherical (2.3-4.4mm)		2	-	1	15	22	13	1	54
	-Spherical (>5mm)		-	1	4	-	-	-	-	5
4.	IIa Cl.Light Blue-Spherical		-	-	-	-	1	-	-	1
5.	IIa Cl.Cerulean Blue-Barrel		4	13	28	-	-	-	-	45
6.	IIa Cl.Emerald Green-Spherical		-	-	-	6	2	47	2	57
7.	IIa Op.Black-Spherical		-	-	-	13	27	185	4	229
	-Barrel		3	-	6	-	-	-	-	9
8.	IIa Tr.Light Rose Brown-Spherical		-	-	-	-	6	-	-	6
	-Oblong		-	-	1	-	-	-	-	1
9.	IIa Tr.Dark Rose Brown-Spherical (<4mm)		1	-	-	12	17	103	4	137
	-Spherical (>6mm)		-	2	-	-	-	-	-	2
10.	IIa Op.White-Spherical		-	-	3	-	-	-	-	3
	-Barrel		-	1	-	-	-	-	-	1
	-Oblong		1	-	-	-	-	-	-	1
11.	IIb Cl.Amber/White Stripes-Spherical		-	-	-	-	2	2	-	4
12.	IVa Op.White w/Cl.Colorless Core-Spherical		-	-	-	1	-	-	-	1
13.	IVb Op.Bluish White w/Op. Light Blue Core Blue and Red Stripes-Oblong		-	-	-	11	-	418	9	438
14.	IVbb Op. Redwood w/Cl.Green Core/Black Stripes bordered by White-Donut		1	-	-	-	-	-	-	1
Provenience Unit Total			18	37	64	239	366	3,069	48	3,841

TABLE 2

COMPARISON OF BEAD CLUSTERS
GLASS BEADS FROM FORT SAN FELIPE

TYPE DESCRIPTION	CLUSTER I COUNT	CLUSTER I TYPE%	CLUSTER II COUNT	CLUSTER II TYPE%	TYPE TOTAL
1. If Cl.Colorless-Ground Facets	1	100*	-	-	1
2. IIa Tr. Turquoise Blue					
-Spherical (<4mm)	3	0.2	1,480	99.8	1,483
-Spherical (>4mm)	3	0.5	571	99.5	574
-Barrel	39	100	-	-	39
-Oblong	1	100*	-	-	1
3. IIa Cl.Navy Blue					
-Spherical (1.2-2.3mm)	-	-	748	100	748
-Spherical (2.3-4.4mm)	3	5.6	51	94.4	54
-Spherical (>5mm)	5	100	-	-	5
4. IIa Cl.Light Blue-Spherical	-	-	1	100*	1
5. IIa Cl.Cerulean Blue-Barrel	45	100	-		45
6. IIa Cl.Emerald Green-Spherical	-	-	57	100	57
7. IIa Op.Black-Spherical	-	-	229	100	229
-Barrel	9	100	-	-	9
8. IIa Tr.Light Rose Brown					
-Spherical	-	-	6	100	6
-Oblong	1	100*	-	-	1
9. IIa Tr. Dark Rose Brown					
-Spherical (<4mm)	1	0.7	136	99.3	137
-Spherical (>6mm)	2	100	-	-	2
10. IIa Op.White-Spherical	3	100	-	-	3
-Barrel	1	100*	-	-	1
-Oblong	1	100*	-	-	1
11. IIb Cl.Amber/White Stripes					
-Spherical	-	-	4	100	4
12. IVa Op.White w/Cl.Colorless Core-Spherical	-	-	1	100*	1
13. IVb Op. Bluish White w/Op.Light Blue Core					
Blue and Red Stripes-Oval	-	-	438	100	438
14. IVbb Op.Redwood w/Cl.Green Core/ Black Stripes bordered by White-Donut	1	100*	-	-	1
CLUSTER TOTAL	119		3,722		3,841

A different problem is presented by Bead cluster II (the southernmost). This cluster is associated with the burned bead and charcoal pit, intrusive and therefore later than Fort San Felipe, as was cluster I. Beads, strung primarily by bead type (as indicated through excavation data and preserved segments fused together by heat), had been placed in a small pit containing combustible wood material and burned. At a later date a nineteenth century vineyard ditch intruded a portion of the pit resulting in the dispersal of some beads into adjoining deposits. The lack of glass beads from documented Spanish contexts excavated to date at Santa Elena or Fort San Felipe prevents intrasite comparisons. The predominance of spherical Type 2 beads, the presence of a Type 12 bead, and the absence of previously identified diagnostic bead types suggest that bead cluster II is associated with an event which took place at the site of Fort San Felipe at some point after 1576 and prior to the middle of the seventeenth century. When beads recovered from the church excavated by David Hurst Thomas on St. Catherines Island are examined, perhaps some additional comparisons may be made.

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Beads from Fort San Felipe (1983 Season)*

Three beads were recovered during the 1983 excavations at Fort San Felipe. These beads, in contrast to the large number of glass beads recovered during the 1982 season intruding into the northwest bastion of the fort, are attributable to the Spanish occupation on the basis of context or direct association with Spanish material. Each of the beads will be described in detail in the following paragraphs.

The first bead (38BU162G-198), (from the *casa fuerte* ditch inside the fort), manufactured of transparent red garnet by lapidary techniques, is attached to a segment of silver wire bordado by a loop of the wire extended through the perforation. This mode of attachment appears more in the nature of loss prevention than of decoration as a part of the bordado. The bead was created by first perforating a small garnet crystal or fragment and then grinding a series of 17 rather unequal facets around the body of the bead, 8 of which are inclined toward one end and 9 toward the other. Larger facets tend to be separated by smaller facets on each end and mesh between the larger facets on the opposed end. The bead is 4.0 mm in maximum diameter, 3.2 mm in diameter across the flats, and 2.8 mm in length. The perforation, 1.2 mm in diameter, originates in a fracture pit at one end and tapers slightly toward the other end. The color and clarity of the stone is good, although several small flaws are apparent upon close examination.

The second bead (38BU162G-146), derived from the upper fill of a well inside the fort, is a tube drawn, tumbled spherical glass bead of transparent amethyst color. The bead is 6.3 mm in diameter, 4.9 mm in length, and has a perforation 2.2 mm in diameter. The bead surface is in good condition with little patina evident, although surface striations parallel to the perforation and a certain amount of erosion is evident at each end. This bead is within the typological class IIa in the Kidd classification (Kidd and Kidd 1970).

The faceted garnet bead first described is representative of a diverse yet related class of beads most closely associated with the early Spanish colonial occupation of the Americas. Such beads are manufactured from a variety of raw materials such as crystal quartz, jet, amber, and garnet through the use of lapidary techniques. These beads appear to be associated with personal adornment or religious objects such as rosaries rather than for trade or barter with aboriginal groups. The association of the faceted garnet bead with bordado, itself an item of personal adornment possessing status connotations, tends to confirm such an assumption.

The glass bead has not been previously reported from Santa Elena or Fort San Felipe. The form and color of this bead are not out of place within a Spanish context (Marvin Smith, personal communication, 1983).

*Originally published in South 1984: 95-96.

The third bead (38BU162G-146A), from the upper level of the Spanish midden-filled well, is made of amber, the surface of which has been affected by ground conditions. The material was tested by heating a small splinter of the bead on a stainless steel spatula. It melted as per expecation for amber. Microscopic examination of a broken surface at 20X also disclosed the characteristic fracture pattern for amber. In form the bead appears to have been roughly spherical, although slight facets may have been present at one time. The fragment represents approximately one third of the original bead and does not display any trace of the central perforation. The fragmentary length of the bead is 5 +mm, with an estimated original length of 6 mm.The fragmentary diameter of the bead is 5.5 +mm, estimated original diameter 7 mm. Amber beads have been recovered from other Spanish colonial contexts (Marvin Smith, personal communication, March 24, 1984). Such beads, along with the garnet, jet, rock crystal, agate, ivory, ebony, and olive wood beads, may be associated with Spanish dress and accouterments, particularly rosaries.

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1970 A classification system for glass beads for the use of field archeologists. Canadian Historic Sites, *Occasional Papers in Archaeology and History:* 45-89.

Beads from Fort San Felipe (1984 Season)*

Beads were recovered from 12 provenience units during the 1984 excavations within Fort San Felipe at Santa Elena. The sample is made up of glass beads and one wooden bead. The glass beads were classified to the type level utilizing the Kidd system (Kidd and Kidd 1970). General color designations are provided in the following descriptions rather than Kidd color varieties due to the variability in the condition of the beads described. The glass beads were examined while wet to reduce the effect of surface oxidation and to determine more easily if each bead was clear, translucent, or opaque with respect to clarity. A uniform light source, and the examination of each bead utilizing both transmitted as well as reflected light, aided in maintaining uniformity in classifying the collection. The diameter, length, and the diameter of the perforation of each bead were measured with metric vernier calipers. The provenience and type of each bead is presented in Table 1. Each bead type are described and discussed below.

Type 1: IIa Translucent Turquoise Blue

Type 1 is a tube drawn tumbled bead represented in one Kidd size range and in both spherical and barrel shapes. The surface finish tends to be coarser than the other bead types and subject to greater chemical pitting.

Spherical

Sample Size:	9	
Diameter:	6.0-6.8 mm	Mean 6.5 mm
Length:	4.5-6.5 mm	Mean 5.6 mm
Perforation:	1.4-2.3 mm	Mean 1.9 mm

Barrel

Sample Size:	1
Diameter:	8.6 mm
Length:	8.0 mm
Perforation:	2.2 mm

Comment: Spherical tube drawn, tumbled glass beads of translucent turquoise blue glass have been recovered in the Tennessee Valley in contexts dating from the second half of the sixteenth century to the middle of the seventeenth century. The barrel-shaped form is most common during the latter part of the seventeenth century and the early part of the eighteenth century, although present in small numbers well into the eighteenth century. The potential temporal significance of this trend from spherical to barrel-shaped bead form has been discussed elsewhere (previous section and Polhemus 1983). This bead type is the most common type recovered, making up 56% of the sample total, and was the most common type recovered during the 1982 season as well (see first section of this appendix).

*Originally published in South 1985: 225-230.

TABLE 1

Classification of Glass Beads by Provenience Unit
Beads from Fort San Felipe

TYPE DESCRIPTION 38BU162H-	76A	77B	81A	84A	85A	86A	87A	88A	97A	100A	101A	110A	113B
1. IIa Tr. Turquoise Blue-Spherical	1				1		2	1	1		1	1	1
-Barrel						1							
2. IIa Cl.Dk.Cerulean Blue-Spherical					1								
3. IIa Op. Black-Spherical				1									
4. IIb Op. Black w/ white stripes-Spherical									1				
5. WIb Op. Black-Spherical										1			
6. WIIA Cl.Green -Heart Shaped			1										
7. Ebony Spherical		1											
Provenience Unit Total	1	1	1	1	2	1	2	1	2	1	1	1	1

Type 5. WIb Opaque Black

Type 5 is a spherical opaque black glass bead of wire wound construction. The bead is symmetrical, well formed, and has a well preserved surface.

Spherical

Sample Size:	1
Diameter:	10.6 mm
Length:	1.5 mm
Perforation:	2.5 mm

Comments: This bead type dates to the second half of the seventeenth century.

Type 6. WIIa Transparent Green

Type 6 is a heart shaped, heavy lead glass bead of wire wound construction. The bead (part of an earbob) is flattened in section with an indentation on each face paralleling the perforation. A length of brass wire with a small loop on each end is present in the perforation.

Heart Shaped

Sample Size:	1
Diameter:	10.2x4.8 mm
Length:	11.5 mm
Perforation:	1.3 mm

Comment: Five identical beads, one with iron wire in the perforation, have been reported from a pit at the Conklin Site, dated to A.D. 1450-1555 (Pratt 1982: 6). Pratt suggests, however, that they may be a later introduction to the site. The absence of historical materials other than a small amount of scrap brass at the Conklin Site would support an early attribution for this type. It is likely that such beads, joined by chain-like links of wire, served as earrings, or as part of rosaries (see Figure 94, this report for illustration of such earring from 1555 A.D.).

Type 7. Ebony Bead

Type 7 is a relatively large spherical bead manufactured of wood. The bead was manufactured by turning on a lathe. The wood type is ebony, identifiable as such on the basis of wood structure, density, and color when examined with a low power microscope (Edlin 1969: 117-118).

Spherical

Sample Size:	1
Diameter:	10.3 mm
Length:	8.0 mm
Perforation:	2.0 mm

Comment: This ebony bead, recovered from the B level in Provenience Unit 77, is probably a representative of the diverse yet related class of beads most closely associated with the early Spanish colonial occupation of the Americas. Such beads are manufactured from a wide range of raw materials, including amber and garnet examples recovered during the 1983 season at Fort San Felipe (Polhemus 1984: 95-96 and a previous section of this appendix), and would appear to be associated with personal adornment or religious objects such as rosaries rather than trade or barter with aboriginal groups.

Discussion

The beads recovered during the 1984 excavation season once again display an ambiguous relationship to the Spanish occupation at Fort San Felipe. The lack of glass beads associated with features of known Spanish provenience leaves the cultural association of beads recovered from the A and B levels in doubt. All that can be said at the present time is that, with the exception off the spherical wire wound example (Type 5), all of the beads recovered could be associated with the Spanish occupation or they could be associated with subsequent reuse of the site at any point up to the end of the seventeenth century. The ebony bead is most likely associated with the Spanish occupation.

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1982 Oneida Iroquois glass trade bead sequence 1585-1745. *Indian Glass Trade Beads Color Guide Series No. 1.* Pratt and Pratt Archaeological Consultants. Syracuse.

Beads from Santa Elena (1985 Season) and Fort San Felipe*

Six hundred sixty-five beads are classified by the author in the present study and are listed by type and provenience unit in the accompanying tables. The bead sample, made up of 636 glass, 24 shell, 4 bone, and one jet bead, is similar in many respects to that previously reported from Fort San Felipe (previous sections of this appendix). The beads were classified to the type level utilizing the Kidd system (Kidd and Kidd: 1970). General color designations are provided in the following descriptions rather than Kidd color variations due to variability in the condition of the beads described. The beads were examined while wet to reduce the effect of surface oxidation and to determine more easily if each bead was clear, translucent, or opaque with respect to clarity. A uniform light source, and the examination of each bead utilizing both transmitted as well as reflected light, maintained uniformity in classifying the collection. The diameter, length, and the diameter of perforation of each bead represented by less than one hundred examples were measured with metric vernier calipers. Fifty to seventy-five percent of each type represented by more than one hundred examples were measured in the same manner.

A small group of glass beads, types Ia (n=1), If (n=3), and IIIf (n=3), are characteristic of the last decade of the eighteenth century through much of the nineteenth century. A second small group of glass beads, types IIIk (n=1), IVk (n-1), as well as shell beads (n=24), a distinctive form of bone bead (n=4), and a single jet bead, are clearly associated with the sixteenth century occupation of Santa Elena and Fort San Felipe. As with previous samples the great majority of the glass beads have been derived from non-feature, A zone units, burned "bead cremation pits" containing little diagnostic materials, as well as from a small number of "B" or below-the-plowed-soil units. The temporal and cultural associations of these beads, particularly the tube drawn, spherical, translucent turquoise blue bead type, have been the subject of much discussion and will not be clarified in this summary discussion of beads not previously examined.

Such clarification awaits an examination of the spatial and vertical distribution of each bead type with regard to other, presently more diagnostic artifact types across the site. If these beads are associated with the Spanish occupation of Santa Elena and Fort San Felipe they should co-occur with other materials of Spanish origin and not as If and IIIf. If these beads are associated with a post-Santa Elena Indian occupation or *visita* dating to the early part of the seventeenth century they should co-occur with aboriginal ceramics which may or may not be distinguishable from aboriginal ceramics associated with the Spanish occupation. If these beads are associated with a later, colonial period plantation occupation they should co-occur with both the known late bead types and other colonial period materials. On typological grounds and the association of these bead types with aboriginal sites in the interior Southeast, this group of bead types, shapes, and colors should not date later than the middle of the seventeenth century.

Bead types that have been previously described from Fort San Felipe (Polhemus 1983, 1984, 1985 and this appendix) occurring in the accompanying tables were found to be similar in all respects and so will not be further described at this time. Bead types not previously described are discussed below.

*Originally published in South and Hunt 1986: 67-76.

The beads dealt with here are from various seasons of excavation, with 38BU162, 162B 162F, and 162J from three foot sample squares in Santa Elena, either in the A or B levels, and are, therefore, not from the best Spanish related contexts. Provenience units 38BU162A, 162C, 162D and 162K are from block excavations in Santa Elena, from the A and B zones above the subsoil level, and are also not of the best Spanish related contexts. Proveniences 38BU162E, 162G and 162H are from Fort San Felipe, mostly from the A (plowed soil) zone in the fort. Two features (162K-100 and 139) are burned bead pits, one (162K-139) having a plantation period pipestem fragment associated with the cremated beads.

IIIk Early Faceted Chevron (162J - 111B) (Figure 93)

This Early Faceted Chevron bead has six facets cut on each end, is 6.3 mm in diameter, and has a length of 7.4 mm. The five layers making up the bead, beginning with a clear green core, are opaque white, opaque red, opaque white and a clear navy blue exterior. The perforation is 1.8 mm in diameter. This bead type has been found at a number of aboriginal sites in the interior Southeast and is generally attributed to the sixteenth century.

IVk Tumbled Blue Chevron (l162J-57A) (Figure 93)

One-half of a tumbled blue chevron bead was found in the A zone of sample unit 57. The bead is 8.4 mm in diameter, 8.1 mm in length, and has a perforation 2.0 mm in diameter. The five bead layers are, beginning with a clear colorless core, opaque white, opaque red, opaque white, and a clear navy blue exterior. Tumbled chevron beads are generally attributed to the latter part of the sixteenth century and the first half of the seventeenth century.

Oblong with Stripes and Metal Caps (162-66D)

This bead is of complex construction and in rather poor condition. The bead is 13.5 mm in length, 8.0 mm in greatest diameter, and has a perforation formed of a bass tube 2.5 mm in diameter. The core of the bead is formed of what appears to have been an applied mass of rather unstable clear green glass. This core was covered by an opaque white surface layer decorated by the application of three sets of longitudinal stripes. The bead is tear drop shaped and possesses small six lobed sheet brass caps on each end. The stripes consist of pairs of closely spaced gold lines. Through the tube making up the perfortion, a link of brass wire is preserved, measuring 0.5 mm in diameter, attached to a shorter link on one end, and 16.0 mm in length. This bead is probably part of a rosary or possibly an earring and is associated with the Spanish occupation of Santa Elena.

Shell beads - Class III Cylindrical

Twelve marine shell beads of cylindrical form, manufactured from the wall of a marine gastropod and having a biconically drilled perforation perpendicular to the shell wall, were recovered from three provenience units within Fort San Felipe (Table 3). None of the beads were burned, in contrast to the marine shell disc beads described next. The beads range from 2.9 mm to 5.8 mm in diameter and 3.6 mm to 6.0 mm in length. Eleven of the twelve beads were recovered from Spanish Feature 38BU162H-337, a daub-processing pit associated with the post-*casa fuerte* structure inside Fort San Felipe.

Shell Beads - Class III Disk

Twelve marine shell beads, all recovered within Fort San Felipe (Table 3), are manufactured from somewhat thinner sections of the wall of a marine gastropod than the preceding type. The beads range from 4.0 mm to 7.1 mm in diameter and 2.3 mm to 3.1 mm in length and possess biconically drilled perforations. Eight marine shell disk beads are burned, and nine of the twelve beads were recovered from Spanish Feature 337.

Bone Beads - Tapered Barrel

Four beads of this type are in the sample, all of which were recovered from separate Spanish features or excavation units (Table 3) in the town. Three of the four are burned or stained black. These beads, which at first examination appeared to be drilled drum fish teeth, are actually manufactured from the shaft wall of animal long bones in a manner similar to bone buttons of later periods. A narrow tubular drill was used to cut each previously perforated bead from the bone resulting in a slightly tapered form through wear of the interior of the tube. These bone beads range from 3.1 mm to 6.4 mm in diameter and 2.7 mm to 5.3 mm in length. These beads are not biconically drilled and the method of manufacture suggests a European source for this distinctive bead type which, to my knowledge, has not been previously described except in South (1982: 57-58) who thought they were made from drum teeth. The black color of three specimens suggests that they may have been stained or treated rather than burned, and they also may represent portions of rosaries.

Jet Bead (162G-57A)

The single stone bead in this sample consists of a highly polished spherical bead of jet. The bead is 6.2 mm in diameter and 5.1 mm in length with a drilled perforation 1.6 mm in diameter. This bead was recovered from a ten foot by ten foot excavation unit within Fort San Felipe.

Discussion

The distinct spatial distribution of the known Spanish bead types described above suggests that the next step in examining these beads not clearly attributed to a particular occupation of the site is to compare the spatial patterning of glass beads by type to other classes of archaeological data across the site. The presence of two additional "bead and charcoal filled pits" in area 162K is of some interest as such features have not been reported at any other site in the Southeast, and the uniformity of the content is striking.

SANTA ELENA (38BU162)
GLASS BEAD TABLE 1
162 - 162E

	162 52B	162 66D	162A 12B	162A 182	162B 7A	162C 28A	162C 68A	162C 139B	162C 163B	162D 24B	162D 27B	162E 4B	162E 7A
Ia' Sl.Tumbled Cane Cl.Lt.Rose Brown													
If Faceted Barrel Cl.Blue							1						
If Faceted Barrel Cl.Lavender									1				
If Faceted Barrel Op.Black						1							
IIa Spher. Tr.Turquoise Blue	1		5					1		1	1	1	
IIa Oblong Tr.Turquoise Blue				1									
IIa Spher. Cl.Navy Blue													
IIa Spher. Cl.Lt.Blue													
IIa Spher. Cl.Aqua Blue					1								
IIa Spher. Cl.Cerulean Blue													2
IIa Spher. Op.White													
IIa Oblong Op.White													
IIa Spher. Cl.Lt.Rose Brown													
IIa Spher. Cl.Dk.Rose Brown													
IIa Spher. Op.Black													
IIa Spher. Cl.Emerald Green													
IIIf Faceted Barrel Cl.Navy over White													
IVb Oblong Op.Bluewhite over Lt.Blue W/S													
Early Faceted Chevron Blue													
Tumbled Chevron Blue													
Oblong with Stripes and Metal Caps		1											
WI Spher. Cl.Amber													1
WI Spher. Cl.Colorless													
WI Spher. Op.Black													
UNIT TOTAL	1	1	5	1	1	1	1	1	1	1	1	1	3

SANTA ELENA (38BU162)
GLASS BEAD TABLE 1
162 - 162E

	162E 18A	162E 19A	162E 24A	162E 25A	162E 26A	162E 31A	162E 31B	162E 32A	162E 33A	162E 37C	162E 37D	162E 39C	162E 40C
Ia' Sl.Tumbled Cane Cl.Lt.Rose Brown													
If Faceted Barrel Cl.Blue													
If Faceted Barrel Cl.Lavender													
If Faceted Barrel Op.Black													
IIa Spher. Tr.Turquoise Blue	2	1		2	3	2	1	3	1	4	17	1	5
IIa Oblong Tr.Turquoise Blue													
IIa Spher. Cl.Navy Blue					3								3
IIa Spher. Cl.Lt.Blue													
IIa Spher. Cl.Aqua Blue													
IIa Spher. Cl.Cerulean Blue	10		1		5		1	3					7
IIa Spher. Op.White													
IIa Oblong Op.White													
IIa Spher. Cl.Lt.Rose Brown													
IIa Spher. Cl.Dk.Rose Brown					2				1				
IIa Spher. Op.Black											1		2
IIa Spher. Cl.Emerald Green													1
IIIf Faceted Barrel Cl.Navy over White													
IVb Oblong Op.Bluewhite over Lt.Blue W/S											14		
Early Faceted Chevron Blue													
Tumbled Chevron Blue													
Oblong with Stripes and Metal Caps													
WI Spher. Cl.Amber													
WI Spher. Cl.Colorless													
WI Spher. Op.Black													
UNIT TOTAL	12	1	1	2	13	2	2	6	2	4	32	1	18

SANTA ELENA (38BU162)
GLASS BEAD TABLE 1
162 - 162E

	162E 40D	162E 41C	162E 44C	162E 55	162E 71	162E 101B	162E 102B	162E 103B	162E 104B	162E 118	TOTAL
Ia' Sl.Tumbled Cane Cl.Lt.Rose Brown											
If Faceted Barrel Cl.Blue											1
If Faceted Barrel Cl.Lavender											1
If Faceted Barrel Op.Black											1
IIa Spher. Tr.Turquoise Blue		2	1	3	1	6	8	1	14		88
IIa Oblong Tr.Turquoise Blue						1					2
IIa Spher. Cl.Navy Blue				2			10		53		71
IIa Spher. Cl.Lt.Blue											
IIa Spher. Cl.Aqua Blue											1
IIa Spher. Cl.Cerulean Blue	1	2			1						33
IIa Spher. Op.White		1									1
IIa Oblong Op.White											
IIa Spher. Cl.Lt.Rose Brown									6		6
IIa Spher. Cl.Dk.Rose Brown									6		9
IIa Spher. Op.Black									7		10
IIa Spher. Cl.Emerald Green										1	2
IIIf Faceted Barrel Cl.Navy over White											
IVb Oblong Op.Bluewhite over Lt.Blue W/S											14
Early Faceted Chevron Blue											
Tumbled Chevron Blue											
Oblong with Stripes and Metal Caps											1
WI Spher. Cl.Amber											1
WI Spher. Cl.Colorless											
WI Spher. Op.Black											
UNIT TOTAL	1	5	1	5	2	7	18	1	86	1	242

SANTA ELENA (38BU162)
GLASS BEAD TABLE 2
162F - 162K

	162F 7B	162G 47A	162G 49A	162G 55A	162G 64A	162G 66A	162G 67A	162G 70A	162G 72A	162H 172C	162H 263	162J 57A	162J 61A	162J 76A
Ia' Sl.Tumbled Cane Cl.Lt.Rose Brown													1	
If Faceted Barrel Cl.Blue														
If Faceted Barrel Cl.Lavender														
If Faceted Barrel Op.Black														
IIa Spher. Tr.Turquoise Blue				2	1	3	1	1			1			
IIa Oblong Tr.Turquoise Blue		1												
IIa Spher. Cl.Navy Blue														
IIa Spher. Cl.Lt.Blue														
IIa Spher. Cl.Aqua Blue														
IIa Spher. Cl.Cerulean Blue														
IIa Spher. Op.White														
IIa Oblong Op.White														
IIa Spher. Cl.Lt.Rose Brown				1										
IIa Spher. Tr.Dk.Rose Brown										1				
IIa Spher. Op.Black									1					
IIa Spher. Cl.Emerald Green														
IIIf Faceted Barrel Cl.Navy over White	1		1											
IVb Oblong Op.Bluewhite over Lt.Blue W/S														
Early Faceted Chevron Blue														
Tumbled Chevron Blue												1		
Oblong with Stripes and Metal Caps														
WI Spher. Cl.Amber														
WI Spher. Cl.Colorless								1						
WI Spher. Op. Black														1
UNIT TOTAL	1	1	1	3	1	3	1	2	1	1	1	1	1	1

SANTA ELENA (38BU162)
GLASS BEAD TABLE 2
162F - 162K

	162J 81B	162J 102A	162J 111B	162J 139B	162K 1A	162K 1B	162K 2B	162K 5A	162K 6A	162K 6B	162K 8B	162K 100	162K 139	TOTAL
Ia' Sl.Tumbled Cane Cl.Lt.Rose Brown														1
If Faceted Barrel Cl.Blue														
If Faceted Barrel Cl.Lavender														
If Faceted Barrel Op.Black														
IIa Spher. Tr.Turquoise Blue	1	1			39	1	3	1	12	8	2	90	30	197
IIa Oblong Tr.Turquoise Blue					1							1	1	4
IIa Spher. Cl.Navy Blue												124	34	158
IIa Spher. Cl.Lt.Blue												5	13	18
IIa Spher. Cl.Aqua Blue												1		1
IIa Spher. Cl.Cerulean Blue														
IIa Spher. Op.White														
IIa Oblong Op.White													1	1
IIa Spher. Cl.Lt.Rose Brown												1		2
IIa Spher. Tr.Dk.Rose Brown												1		2
IIa Spher. Op.Black												1		2
IIa Spher. Cl.Emerald Green												1		1
IIIf Faceted Barrel Cl.Navy over White				1										3
IVb Oblong Op.Bluewhite over Lt.Blue W/S														
Early Faceted Chevron Blue			1											1
Tumbled Chevron Blue														1
Oblong with Stripes and Metal Caps														
WI Spher. Cl.Amber														
WI Spher. Cl.Colorless														1
WI Spher. Op. Black														1
UNIT TOTAL	1	1	1	1	40	1	3	1	12	8	2	225	79	394

Table 3
SANTA ELENA (38BU162)
BONE, SHELL, AND STONE BEADS
162 - 162E

	162C 105	162D 38	162D 66	162D 68	162G 57A	162G 146A	162G 172A	162H 337	162H 337A	162H 349	TYPE TOTAL
BONE											
Tapered Barrel	1										1
Tapered Barrel - Burned		1	1	1							3
SHELL											
Class III											
Cylindrical						1		8	3		12
Disk							1		3		4
Disk - Burned								6		2	8
JET											
Spherical					1						1
UNIT TOTAL	1	1	1	1	1	1	1	14	6	2	29

Glass Beads from the Fort San Felipe Moat

Four glass beads attached to a star-shaped piece of *bordado* recovered from the C-level of the Fort San Felipe moat were examined. Two of the beads were received in measurable condition while the remaining two were represented by small fragments. The association of these small beads with *bordado* mirrors the association of a garnet bead with *bordado* at Santa Elena described in a previous report (Polhemus 1984: 95) and enhances the attribution of such small beads to status related clothing ornamentation in Spanish contexts.

The four glass beads are manufactured from a rather unstable transparent red glass. The measurable examples are 2.5 mm and 2.6 mm in diameter and 1.8 mm in length. The exact manufacturing technique is difficult to determine due to the small size of the preserved examples; however, their slightly asymetrical form suggests wire-wound construction (Smith and Good 1982: 18).

The use of small beads of various materials in conjunction with metalic threads or *bordado* on clothing provides tangible evidence of the status differentiation suggested in contemporary paintings by Titian and others. Smaller beads, like buttons, may have entered the archaeological record with items of clothing.

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Polhemus, Richard R.
1984 Beads from Santa Elena (1983 season). Testing Archaeological Sampling Methods at Fort San Felipe 1983, by Stanley South. *Research Manuscript Series 190* , pp. 95-96. South Carolina Institute of Archaeology and Anthropology. University of South Carolina. Columbia.

Smith, Marvin T. and Mary Elizabeth Good
1982 *Early Sixteenth Century Glass Beads in the Spanish Colonial Trade.* Conttonlandia Museum Publications. Greenwood, Mississippi.

APPENDIX XVI

BARREL BAND TABULATION

APPENDIX XVI: BARREL BANDS AND STRAP IRON FRAGMENTS

PROVENIENCE	STOCK WIDTH (mm)	STOCK THICKNESS(mm)
38BU162	SANTA ELENA	
66C	29.90	5.80
70	20.75	5.80
93B	22.80	3.65
131B	21.25	5.75
136	23.55	3.15
FEA.141S	Corroded	-
FEA. 141	21.1-23.8	5.5-7.5

Fea.141 data = whole hoop 27" across

38BU162A	SANTA ELENA	
45	23.40	1.60
95	17.40	4.55
110	21.55	4.35
112	23.35	1.80
127	24.30	4.85
140	Corroded	-
133	22.65	4.20
148	22.65	4.30
148	26.40	-
148	Corroded	-

38BU162C	SANTA ELENA	
20B	20.40	4.40
26B	Corroded	-
52B	22.80	4.10
FEA. 76	21.30	3.50
FEA.88	23.10	-
FEA. 105	23.35	4.10
145B	25.30	4.1-6.05
168B	22.75	5.60
FEA.171	Corroded	-
196B	Corroded	-
199B	Corroded	-
203B	24.20	4.80
204B	Corroded	-
205B	23.15	3.70
FEA. 231	Corroded	-
FEA. 269	26.3-19.1	4.2-8.3
FEA. 278	16.35	5.20
FEA. 278	18.35	4.50
FEA. 278	22.40	5.35
FEA. 278	22.00	2.90
FEA. 278	12.10	6.00
FEA. 298	20.3-25.6	4.7-6.4
331B	22.90	4.10
332B	Corroded	-

APPENDIX XVI: BARREL BANDS AND STRAP IRON FRAGMENTS

PROVENIENCE	STOCK WIDTH (mm)	STOCK THICKNESS(mm)
38BU162C	SANTA ELENA	
346B	Corroded	-
FEA. 357	22.10	5.10
FEA. 357	Corroded	-
FEA. 357	Corroded	-
FEA. 357	Corroded	-
358B	Corroded	-
FEA.361	22.20	-

38BU162D	SANTA ELENA	
2B	24.00	3.90
2B	21.05	3.00
5B	Corroded	-
6B	21.90	3.40
7B	19.80	3.95
9B	16.35	5.15
22B	22.60	5.35
22B	Corroded	-
FEA. 38	26.00	4.40
FEA. 38	24.80	4.70
FEA. 69	20.50	4.45
FEA. 69	24.80	5.60
FEA. 69	21.50	5.00
FEA 71	22.90	5.35
FEA. 89	Corroded	-
FEA. 89	Corroded	-
FEA. 102	13.50	3.80
FEA. 118	21.20	5.60
FEA. 124	24.70	-
FEA. 125	23.00	-
FEA. 125	Corroded	-
38BU162J	Corroded	-
38BU162K	Corroded	-

38BU162E	FT. SAN FELIPE	
37C (Moat)	Corroded	-
37C "	Corroded	-
37C "	Corroded	-
39C "	22.35	-
39C "	Corroded	-
39C "	Corroded	-
39C "	10.15	-
40C "	Corroded	-
41D "	23.50	5.10
42D "	Corroded	-
42D "	Corroded	-

APPENDIX XVI: BARREL BANDS AND STRAP IRON FRAGMENTS

PROVENIENCE	STOCK WIDTH (mm)	STOCK THICKNESS(mm)
38BU162E	FT. SAN FELIPE	
42D "	Corroded	-
42D "	Corroded	-
42D "	Corroded	-
43D "	17.35	4.80
38BU162G	FT. SAN FELIPE	
56A	25.65	-
38BU162H	FT. SAN FELIPE	
172E (Well)	Corroded	-
333E "	Corroded	-
333E "	Corroded	-
333E "	Corroded	-
333E "	Corroded	-

A

C

G

H

I

J

K

L

M

N

O

P

Q

T

U

V

W

X

Y

Z