

APPENDICES FOR *EXCAVATING FORT RALEIGH*,  
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APPENDIX 1  
QUANTITATIVE ANALYSIS

At the close of the twentieth century any archaeological study that lacks computerized charts and graphs based on quantitative and distributional analysis of the artifacts is bound to be dismissed by peer critics as shallow and the work of incompetents. By their inclusion, however, reams of paper can be expended to convert a short report into a deceptively thick volume. However, in this writer's view there is nothing to be learned from the mindless counting of sherds, nor is there reliability in formulae that use the numbers from one area to postulate the quantities that would have been found elsewhere on the site had one dug there.

At Fort Raleigh every excavation from Talcott Williams in 1895, to Pinky Harrington in 1947, John Ehrenhard in 1983, and the Virginia Company in 1991, has cut into the same archaeological lode--the Harriot-Gans Science Center complex. Consequently, a major proportion of the recovered artifacts has been those overlooked by previous excavators. Thus, for example, 47 of the 136 fragments of Normandy flasks come from a single area of backfill (2A) and theoretically are unstratified. But in truth they can still be pin-pointed to a significant area of the Science Center and are of scarcely less significance than are those found actually on its sandy gray floor.

The number of fragments into which an object breaks is rarely of any consequence. What matters is the number of different ceramic objects that can be identified from them. But when the sherds are small, unless they include bases, necks or handles that occur one to a vessel, sorting by shape or color can lead to distorting conclusions. The Martincamp flasks, for example, vary in color from one side to another depending on localized atmospheric variations in the kiln. Thus, a reddish stoneware body sherd may look very different from one that is dark gray, while still

being part of the same flask.

That vessels can break into a great many pieces was demonstrated by Harrington's find of an aboriginal pot represented by 130 fragments --and still was incomplete. In contrast, the total Carolina Indian pottery sherd count from the 1991-1993 excavations amounted to 158 fragments. Nevertheless, even when disturbed, the close proximity of joining sherds is evidence that the sherds had not traveled far. Thus, for example, the small Indian vessel found in the back-filled trench within the fort was represented by eleven joining fragments and another only one excavation square distant.<sup>1</sup> Similarly, the bowl whose basal fragments were found pressed into the Science Center floor was represented by 27 sherds, most of them from non-contiguous sectors of the gray sandy loam of the 1585-1586 work floor, and thus confirming their relationship one to another.<sup>2</sup>

Total sixteenth-century sherd counts from the 1991-1993 excavations, both stratified and otherwise, were as follows:

Crucible .....	119	23%
Cupel. ....	9	1.5%
Tin-glazed earthenware drug jar....	17	3.5%
North Devon baluster jar .....	19	4%
Martincamp flask. ....	136	27%
Spanish olive jar .....	2	0.5%
Bottle glass .....	25	5%
Roofing tile .....	5	1%
Aboriginal vessel. ....	158	31%
Aboriginal tobacco pipe.....	18	3.5%

Although the number of fragments says little beyond asking the question "Where are all the rest of the pieces for what seems to have been a significant number of vessels?," as noted above, the concentration of their horizontal distribution does have something to offer. It demonstrates a) that one focus of Science Center activity was concentrated south of Harrington's outwork and measured approximately thirty-two feet square, and b) his outwork structure to the north may have been a separate though related activity area. Unfortunately, any distributional separation or linkage between them was obscured by the extent of the previous digging. Quite clearly, however, there was a third activity area that now lies partially or wholly within the reconstructed fort.

The glass, concentrated in a single layer ten feet in diameter, as was another that yielded the iron scale, might lead one to suppose that both had something significant to say. But because so

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<sup>1</sup> See p.142, No.3. F.R.E.R.53A (11 sherds), 55B (1).

<sup>2</sup> See p. 142, No.1. F.R.E.R.2A, 8D #7 & 19, 8F, 8G #s.1, 44, 45, & 48

much else had been disturbed, conclusions are dangerous to the point of being worthless. Similarly, the fact that lead was found in the area occupied by the earthen fort, as were Harrington's large lumps of furnace melted copper, might be saying that the principal metallurgical work was conducted to the east of the core Science Center site. But when one considers that all the crucible sherds that contain cuprous residue were found in the Science Center area, that thesis collapses. It may be pertinent, too, that the bar of antimony was found near the iron scale and that both point to the storage of supplies. Then again it may be important to note that the copper that contained antimony came from the fort. In sum, therefore, so many theories are possible that none are reliable.

## APPENDIX 2 RELEVANT ARCHAEOLOGICAL STRATIGRAPHY AND NUMBERED FEATURES

On most archaeological sites, the layering of the soils in relationship to the artifacts found in each stratum or ground disturbance is crucial to an understanding of the sequence of events that had contributed to their deposition. Even when differing activities had occurred on a short-lived site (e.g. kitchen, slave quarter, stable), it is essential that any reporting should separate the artifacts from these activities both in illustrations and in text. But the area of Fort Raleigh investigated in the 1991 to 1993 excavations revealed a one time, one place, one activity, and one stratum site. That is not to say that there was not a maze of intrusions and unrelated features (post holes, tree holes, utility trenches, water lines, etc.) that required to be plotted both horizontally and vertically, if only for the purpose of elimination, but those have no relevance and are not discussed. Although the Science Center and the fort were treated separately, their finds are recorded under the same system, i.e., by grid squares, balks (the separating berms), and by stratum or feature. Artifacts are recorded by the Virginia Company's Fort Raleigh Excavation Register (F.R.E.R.) number, e.g., 31A, this being the first layer under the topsoil which, throughout, is given the unlettered number. When artifacts were considered sufficiently important to be plotted in situ they were given additional: numbers, e.g., F.R.E.R.8G, #71.

As previously explained on p.96, n.152, the site was divided into fifty-foot squares and subdivided into sixteen ten foot squares bisected first by three-foot balks and then by two-foot baulks which are recorded thus: III.C.5/9. That designation locates the balk between north-south squares 5 and 9 in the fifty-foot grid III.C. Layering, in this case the topsoil, within the baulk is appended, e.g., III.C.5/9, F.R.E.R.23 (see Appendix 3). Pertinent Excavation Register numbers (i.e., those layers and features yielding 1585-1586 occupation artifacts) are as follows:

### SCIENCE CENTER

- 2A. Artifacts recovered from Harrington's 1965 backfill, III.C.14, 10/14, 13/14.
- 2B. Harrington's outwork ditch fill of black sandy loam, 1585. III.C.14. See also 48H.
- 8D. Gray sandy loam of Science Center work area, 1585. III.C.9.
- 8F. Artifacts disturbed into Park Service roadside ditch, ca. 1950, Area as above.

- 8G. Science Center gray sandy loam, 1585. Partially below 8D. Area as 8D above.
- 8H. Harrington backfill. Area as above.
- 8J. Post hole under Harrington backfill, gray sandy loam; ca. 1950 guard rail post. As 8D above.
- 8N. Posthole (?) filled with brown mottled loam, sealed by 8F & 31A, probably 1585-1586. Area as above.
- 8R. Posthole(?), fill of dark gray to black sandy loam, sealed by 8G, 1585. Area as 8D above.
- 10K. Dark gray sand mottled with buff intrusions, sloping from 1/2" at N.E. to 9 1/2" at south, possibly the product of wash during fort construction in 1950. II.C.4.
- 12B. Brown sandy loam, Ehrenhard backfill, 1983. III.C.5, 5/9.
- 12C. Science Center, gray sandy loam, 1585. Area as above.
- 14A. Yellow mottled soil, Park Service backfill. Layer included a 1957 penny. II.C.7.
- 16D. Dark sandy loam, disturbed. II.C.11.
- 17D. Orange sandy soil below bottom of Dare marker trench containing bricketage fragments, almost certainly of Elizabethan date. III.C.4.
20. Topsoil, over Harrington backfill, II.D.4.
23. Topsoil, III.C.5/9, less west 2'00".
- 23A. Backfill over utility trench. Area as above.
- 23B. Gray sandy loam, probably Science Center floor, 1585. Area as 23 above.
29. Topsoil, north 3'00" of III.D.3, 3/7.
- 31A. Gray and brown sandy loam immediately under Harrington and Ehrenhard backfills, as 8F, probably disturbed 1585-1586 workplace level. III.C.9/10 & N.E. 2'00" of 10.
- 31B. Science Center, gray sandy loam. This takes in most of what was left of Harrington's north-south baulk and was the most concentrated area of *in situ* finds, 1585. Area as above.
- 31D. Posthole (?) sealed by 31B, 1585. Area as 31A above.
- 34F. Harrington backfill, 1965. II.D.3.
35. Topsoil, southern half of II.D.7.
- 35B. Medium gray sandy loam, apparently the 16th-century land surface, prehistoric finds only. Area as above.
- 36A. Harrington backfill, 1956. II.D.8, excluding NE quarter.
- 36B. Gray sandy loam below root matt and cut by Harrington 1965, possible 1585 stratum. Area as above.
- 36C. Mottled light gray sandy loam with flecks of charcoal below "B", possible 1585 stratum. Area as above.
- 38B. Gray silty sand, disturbed. South half of III.D.1.
- 39B. Harrington backfill, 1965. III.C.13.
40. Topsoil, III.C.10.
- 40A. NW/SE utility trench cutting through Science Center stratum. Modern. III.C.10.
- 40C. Harrington backfill. Area as above.
- 40D. Fill in modern waterline trench. Area as 40 above.
- 40F. Science Center, gray sandy loam with charcoal, 1585. Area as above.
- 40G. Posthole cutting through F, ill-defined at edges. Area as 40 above.
- 40H. Mottled yellow sand, probably impacted by bottom of Park Service road ditch. Area as 40 above.
- 40L. Black sandy fill with charcoal, but probably disturbed. Area as 40 above.
- 40M. Science Center, black sand with charcoal, SW corner of unit. Areas as above.
- 40N. Posthole cutting Science Center stratum but believed to be contemporary. Area as 40

- above.
- 40W. Light gray sand with charcoal, probably extension of Science Center floor 40M. 1585.  
Area as above.
- 40Y. Mottled sand possibly in posthole sealed below the 1585-86 spread of 40F. Area as above.
- 43A. Mound of redeposited charcoal from Harrington's "charcoal pit" in his re-excavated 1947 test trench. IV.A.10.
- 46B. Gray sandy loam under root matt, disturbed. II.D.6.
- 48A. Harrington backfill, 1965. III.C.10/14 and south 2'00" of 13/14.
- 48B. Science Center, dark gray sandy loam with charcoal; important finds *in situ*; part of the baulk left by Harrington, 1585. Area as above.
- 48C. Lighter soil in 48B, 1585. Area as 48 above.
- 48D. Post hole excavated in 1992, previously sectioned in 1991 as 8H. 1585. Area as above.
- 48H. Medium gray sandy loam fill of 1585 ditch SW of Harrington's outwork but not disturbed by him. Area as 48 above. See also 2B.
- 48DD. Amorphous feature at SW corner of unit, medium gray sandy loam with charcoal, 1585. Area as above.
- 49A Light brown sandy loam below topsoil, contains asphalt from modern road. North half of II.C.12, 12/16, south half of 16, and east half of II.C.16/III.C.13.
- 49B. Harrington backfill. Area as above.
- 49D. Posthole containing modern auto spark plug at first thought to be a dagger pommel. Area as 49 above.
- 49F. Gray sandy loam with flecks of black ash, 1585 stratum. Area as above.
52. Topsoil, III.C.9/13.
57. Three sherds ca.1790-1805 at interface of topsoil and sandy gray loam. NW 2'0" of IV.A.6, north 2'00" of 6/7, 7/11 and north 2'00" of IV.A.7.

#### FORT INTERIOR

- 41B. Re-excavation of Harrington's early trench across the fort interior under the blockhouse.  
Disturbed fill but containing redeposited 1585 artifacts. I.B.11.
- 41F. A deep ovoid feature at the north edge of the square containing yellow to gray fill. Five crucible fragments were present as well as a large Normandy flask sherd, but so too was a piece of modern bottle glass. This all appeared to be Harrington's backfilling into his feature 50-18A & B. Area as above.
- 41J. Mixed fill adjacent to and associated with 41F containing more crucible sherds, but also modern bottle glass. Areas as 41B above.
- 51A. Interface of topsoil and undisturbed subsoil 51G. I.B.15.
- 51B. Gray sandy loam with pea gravel, modern backfill around base of brick footing for the 1896 monument. Area as above. I.B.15.
- 53A. Backfill at north end of Harrington's early trench 50-18B. I.C.3.
54. Topsoil across Area I.B.10.
- 54A. A large, irregular shaped modern feature below topsoil, perhaps backfilling of a tree and coinciding with Harrington's rectangular feature described as "Recent deep intrusion; predates 1936 blockhouse." Dark gray fill. South half of Square I.B.10.
- 54C. Light gray soil from root system below 54B, but yielding one crucible fragment. Area as above.
- 54E. Modern backfill on top of earlier root disturbance. Area as 54A above.

55B. Strip of dark gray sand along south edge of the area recorded as appearing “to be an old excavation unit of some kind.” Finds included modern bottle glass. Northern 8’00” of Square I.B.16.

### APPENDIX 3 ARTIFACT DISTRIBUTION

The following tabulation by artifact type is intended to be used in tandem with Appendix 2 to determine the context in which each artifact was found. By using those numbers in association with the site plan, the placement of each artifact can be re-established. Because elevation measurements have no relevance to this study (there being only one 1585-1586 stratum) those are omitted in the interests of both brevity and clarity. Numbers in parentheses provide the fragment count for each group; square brackets indicate cross-mending.

<b>CRUCIBLES</b>	40H.	23A.	8D #8.
<b>(119)</b>	41B.	23B #23.	8F.
2A [8G #71].	41F.	<b>NORTH DEVON</b>	8F #30.
8D #4.	41J.	<b>BALUSTER</b>	8G.
8D #9.	48A.	<b>JARS</b>	8G #32.
8D #14.	48B.	<b>(19)</b>	8G #33.
8E.	48B #3.	8F.	8G #34.
8F.	48C #17.	8G #32.	8G #35.
8G #71 [2A].	48D #31.	13C.	8G #36.
12B.	49B.	31B.	8G #38.
23B.	<b>CUPELS (9)</b>	31B #52 [#7S].	8H #25.
29.	2A.	31B #54.	8J.
31B #5.	8G #37.	31B #57.	8N #1.
31B #53.	31B.	31B #7S.	8R.
31B #56.	31B#81[2A, 31B]	31B #83.	16D.
31B #57.	48D #62 (poss.	39B.	20.
31B #62.	Spanish)	40A.	31B.
31B #63.	<b>TIN-GLAZED</b>	40E.	31B #9
31B #73.	<b>EARTHENWARE</b>	40F.	31B #61.
31B #74.	<b>APOTHECARY</b>	40H.	31B #96.
31B #94.	<b>JARS</b>	40R#45.	38B.
36B.	<b>(17)</b>	40Y #55 [40A].	39B.
36C.	8D.	<b>MARTINCAMP</b>	40 [48A].
39B.	12B.	<b>FLASKS (136)</b>	40D #62.
40D #62.	12C.	2A.	40F #53.
40F #53.	23.	2B.	40H.
		8D #5.	

<b>(Martincamp Flasks, cont.)</b>	<b>IRON SCALE (106)</b>	<b>NAILS &amp; TACKS (5 +5)</b>	<b>(Carolina Indian Pottery, cont.)</b>
41B.	12C.	8D #10.	40M #39.
41F.	<b>FLINT (58)</b>	8D #12.	40M #40.
41J.	8D.	8D #16.	40M #41.
48A [40].	8F.	8F.	40M #47.
48B.	8G #39.	12C.	40W #51.
48B #3.	8G #40.	31B.	40W #52.
48C #17.	8G #41.	<b>CAROLINA INDIAN</b>	40W #53.
48D #31.	8G #42.	<b>PIPE FRAG`S (18)</b>	40W #63
49B.	8G #43.	2A.	49A.
<b>SPANISH OLIVE JARS (2)</b>	8G #46.	8D #13.	49C.
40D #62.	8J.	8E.	49F.
54 A.	8N #61.	10K.	51B.
<b>GLASSWARE (GERMAN?)</b>	31A.	14A.	52.
8F.	31B.	31B #86.	54.
8G #47.	31B. #55.	47C.	54A.
31A.	31B. #80.	<b>CAROLINA INDIAN</b>	54E.
31B [40G].	31B. #92.	<b>POTTERY (119)</b>	<b>LATER ENGLISH CERAMICS (3)</b>
31B #77.	31B. #102.	2A.	57.
31B #82.	40G #35.	8D #26	
31B #84.	40M.	8F.	
31B #88.	40M #47.	8F #28	
31B #91.	40W #54.	8G.	
31B #100.	48D #32.	8G #44.	
39B.	48H #64.	8N.	
40G [31B].	49F #2.	31B.	
48A.	<b>ANTIMONY (1)</b>	31B #59	
48C #2.	12C #17.	31B #60	
48D #44.	<b>LEAD (2)</b>	34F.	
<b>ENGLISH ROOFING TILES (5)</b>	41F. (waste)	35.	
2A.	41J (seal)	36A.	
2B.	<b>CUPROUS RING</b>	36B.	
31B #88.	31B #79.	36C.	
48DD #65.	<b>FISH HOOK (1)</b>	39B.	
49B.	8D.	39B [48A]	
		40A.	
		40H.	
		40L.	

## APPENDIX 4

### THE EXAMINATION OF METALLURGICAL REMAINS FROM ROANOKE ISLAND: PRELIMINARY RESULTS

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#### ANALYSIS PERFORMED

Five artifacts were analyzed from the Roanoke excavations: the “antimony” bar fragment (12C.17), an amorphous copper-oxide lump (40G29), two prills from crucible sherds (36C and 2a), and one large, copper-base metal piece (87). The techniques used were XPS and X-Ray Diffraction.

#### EXAMINATION OF COPPER PRILLS ATTACHED TO CRUCIBLE FRAGMENTS

Two prills from crucible sherds were examined. The prill from crucible sherd 2a was entirely oxidized and contained copper, tin, lead, iron, and a trace amount of silver. The prill from crucible sherd 36C is also entirely oxidized and contained copper (27%) and trace amounts of silver and lead (<0.5%).

These prills provide incontrovertible evidence that European metallurgical technology was being performed at the Roanoke site during this period. Unfortunately, all that can be currently concluded is that the metal being heated was copper-based. It does not appear to be the product of assaying, although the presence of trace amounts of silver in the prill from crucible sherd 36C might indicate that some precious metals were being sought. Other prills need to be examined to determine whether all the metals being investigated were copper-base and if others contain more significant quantities of precious metals.

#### EXAMINATION OF THE “ANTIMONY” BAR FRAGMENT

XPS analysis of the artifact revealed that it was primarily antimony (54.5%), with a significant amount of sulfur (26%), minor amounts of iron (3.4%) and chromium (5.84%), and trace amounts of tin. The bar had a distinctive fibrous macrostructure.

Antimony had a variety of uses in the late 16<sup>th</sup> century. Metallic antimony was added to lead and tin for pewter vessels and printing type, to copper and tin for bell-metal and mirrors, to iron for musket and cannon balls, and to silver by alchemists to “fix” it and give it a “gold” color (Agricola, 1950, 92 & 321). Assayers used antimony sulphide for separating gold from other metals, such as silver, copper, and iron (Agricola, 1950, 451, 463, 544; Biringuccio, 1942, 201-202). In addition to metallurgical processes, antimony was used as a medication for abscesses and incurable ulcers and as a yellow glaze for earthenware vases, enamels, and glasses (Agricola, 1950, 92). Italy was the major 16th century-century source of antimony, but metallic antimony “cakes” were also exported from Germany (Agricola, 1950, 92). Biringuccio (1942, 202) stated that antimony “that has long thin fibers like a bundle of bristles” was preferable for metallurgical purposes. He also stated (1942, 201) that using antimony to separate silver from gold was “much quicker, less dangerous, and less expensive” than other methods.



The long macro-structure of the antimony artifact matches that described by Biringuccio (1942, 202), which suggests that this artifact was to be used by metallurgists on the site to assay ores from local sources. In John Smith's account of the exploration of the Chesapeake, however, he mentions that he was taken by native guides to an aboriginal mine which contained antimony instead of the silver for which he had hoped. The village of Patawomeke was located in Stafford County, Virginia, and the aboriginal mine was probably situated at the headwaters of Aquia Creek (Stephen Potter, personnel communication). The fact that Britain was dependent upon imported antimony from Italy during this period might prove sufficient reason for the colonists to attempt to find local sources of the metal for exploitation by Britain.

Further metallurgical examination of the local antimony ore sources is required to determine whether this metal was an indigenous sample that was obtained as part of the colonists' search for new metal sources or was imported from Europe as part of an assayer's kit.

#### EXAMINATION OF THE LARGE AMORPHOUS, COPPER-BASE, METAL LUMP

The artifact is a large piece of metal that consists of approximately 90% copper, 5.4% antimony, 2.4% lead, and 2.2% tin. There could also be a trace of mercury, although the concentration was almost in the noise region of the analysis (<0.2%). The artifact is important because the large concentration of antimony shows that this metal was actually being used on the site. The composition of the artifact is unusual, however: pewter was predominantly made of lead; print type was "three parts of fine tin, an eighth part of black lead, and another eighth part of fused marcasite of antimony" (Biringuccio, 1942, 374); and bells were made of an alloy of "three-quarters of copper and one of tin, and in order to make it somewhat lighter in color they added an eighteenth part of antimony" (Biringuccio, 1942, 388). Although none of these alloys match exactly the concentrations discovered in the artifact at Roanoke, bell metal is the most similar. Further research is required to determine if this alloy could have been used for the production of the small, ornamental bells that Europeans traded with Native Americans, such as the ones found in the rich Contact Period burial at the Potomac Neck site (Potter, 1993). It should be noted that the Potomac Neck site is a mortuary complex associated with the village mentioned by John Smith as having provided him with guides for the exploration of the aboriginal antimony mine on what is now thought to have been Aquia Creek.

Antimony sulphide was commonly used for assaying. The sulfur concentration in the antimony bar would classify it as a sulphide. However, to separate gold from copper supposedly required an almost equivalent content of antimony to copper, and there is no mention of tin or lead being used in early texts. Also, no sulfur appears in the metal artifact, although it could have been driven off during the heating process. Thus, it might be that this artifact is the result of an unknown assaying technique or an attempt to make an alloy that is currently unknown. The concentrations of the alloying metals would suggest that they were added deliberately, however, and were not an impurity of the ore source. Further research is required to determine if this metal was an assaying residue, an alloy produced for a specific purpose, or simply some scrap to be later recycled. Metallographic examination is currently being undertaken to address these questions.

## EXAMINATION OF THE AMORPHOUS, COPPER-OXIDE LUMP

The artifact is entirely made of oxides. XPS results show that the main metal elements are copper (89%), lead (7.71%), and iron (2.5%). There could also be trace amounts of tin, although the concentration was almost in the noise region (<1%). The XRD analysis is extremely complex and requires further analysis. The complexity might suggest that this piece is a copper slag derived from an attempt to smelt copper ore. However, this conclusion is still extremely preliminary.

This artifact is important because it could indicate either that native copper ores were being smelted to determine the richness of the sources or that native copper artifacts were being melted by the Europeans for assaying or reuse. The Native American groups of the Late Woodland and Contact Periods with whom the Europeans interacted had fashioned and used artifacts made from indigenous sources of native copper prior to contact. Therefore, this artifact could indicate that copper artifacts or ores were being obtained by the Europeans via their interactions with Native Americans.

The lack of assaying additives for the separation of precious metals from copper would imply that the piece was not being assayed, however. Further research is required to clarify its pyrotechnological nature and geographic origin.

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## APPENDIX 5

### CRITIQUE OF PREVIOUS EXCAVATIONS AT FORT RALEIGH

[Editor's note: Noël Hume's questioning the date of the earthwork construction was based on the stratigraphic relationship of artifacts to structural features, i.e., ditch and rampart. This was correct, but more recent fieldwork by First Colony Foundation reveals that the earthwork, while not the first Tudor activity at the site, nevertheless can be firmly assigned to Lane's colony. Please contact FCF or NPS for further information, as made available. Note also that page references herein refer to pages in the published report.]

Setting aside Gans scholar Gary Grassl's arguments that the earthwork was erected by Captain Page between 1758 and 1766,<sup>3</sup> it behooves us to review and eliminate other post-1586 reasons for erecting earthworks through "Science Center" debris. The earliest, of course, would have to be a later Lane construction, perhaps (as has been suggested) a sponce erected to defend a nucleus of his men left behind while he went with Harriot and at least one mineral man in an expedition up the Moratuc (Roanoke) River in March, 1586. That theory requires that at least part of the Harriot-Gans work area had been destroyed to make way for the earthwork before the explorers and their miners set out in search of ores which, upon their return, would need to be assayed in the area that had been invaded if not destroyed.

The next candidates are Grenville's 1586 garrison of fifteen or eighteen men who were attacked *neere the houses where [the] men carelesly lived*. One remembers that they fled into their *house, wherein all their victuall, and weapons were: but the Savages foorthwith set the same on fire*.<sup>4</sup> The burned structure is usually considered to have been a store building of sufficient size to house one or two years' supplies, but it could also have been one of the dwellings. The case has earlier been made for Thomas Harriot living apart from the rest of Lane's settlers and doing so in the general vicinity of the Science Center.<sup>5</sup> It might be suggested, therefore, that Grenville's men, being so few in number, preferred to occupy the house (or houses) of Harriot and the other research-related workers, rather than live amid the depressingly vacant homes of the village proper. Such a theory could explain why, when White arrived at the 1585-1586 settlement in '87, he could fail to notice the burned down store and instead found *all the houses standing unhurt*.<sup>6</sup> It could also explain why Grenville's embattled garrison did not retreat into the wooden fort described to Diaz only a few weeks earlier. Then, too, the story as told to White had trees relatively close to the houses and woods through which the garrison had

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<sup>3</sup> Gary Carl Grassl, *The Search for the First English Settlement in America: America's First Science Center*.

<sup>4</sup> Hakluyt, *Principal Navigations*, vol. 6, p. 203.

<sup>5</sup> The absence of any domestic waste in both the vicinity of the Science Center and the earthwork interior is strong evidence that Harriot did not reside within the area investigated in 1991-1992, nor, it would seem, in those adjacent areas previously investigated by Harrington and Ehrenhard.

<sup>6</sup> Hakluyt, *Principal Navigations*, vol. 6, p. 203.

to retreat. This could be consistent with an outwork settlement set some distance apart from the main village. There is, alas, not a shred of archaeological evidence to support that thesis, although it is true that there is ample unexcavated area to the west of the science-related site where one or more houses could have stood. But even if this scenario has merit, it does nothing to equate the earthwork defense with Grenville's garrison -- knowing as we do that it fled, not into a sconce or into any kind of fort, but into the house that held the supplies. Indeed, it is the absence of any defense that gives the theory of the garrison's proximity to the Science Center such credibility as it has.

With Lane's and Grenville's men eliminated, there remains only White's ultimately lost colony. That its settlers lived in Lane's village we know. We also know that in 1590 White returned to the same village and found the buildings, but its site surrounded (or so it is interpreted) by a high and fort-like stockade. None of this information equates with an earthwork cutting through and intruding into the Science Center area. There is, of course, nothing to say that White's settlers did not later tear down the abandoned research-related structures and build a sconce in the vacated area, perhaps because the space had been cleared of trees. It is possible, too, that because White's stay with his people was so short and so busy that he never visited the Science Center area; indeed, not having been to the island since Lane's settlement was established in the fall of 1585 (as this writer argues), he did not know that it had existed.

The trouble with the proposition that White's 1587 settlers constructed the earthwork is that their stay was expected to be short, and that the effort of constructing one substantial and fort-like palisade around their settlement should have been enough. Were it not, one might expect that the second structure would also have been built from great trees. The counter argument that the earthwork could have served as a stand-in until the trees were felled and the village-girdling wall up, immediately solicits the response that so many tourists voice: Why so small a haven for so many people?

Before considering other later alternatives, Harrington's 1950 archaeological data has to be entered into evidence.

Unlike Bennie Keel and his 1992 crew, Harrington enjoyed the luxury of a site virtually flat and waiting to be explored from ditch to ditch. Today, a third of his area is covered by the reconstructed rampart and no longer available for study (see p.119). However, Harrington's lateral freedom was not matched by a wealth of vertical data. Most of the overburden within the ditched area had been disturbed by one previous activity or another (see p.65). Nevertheless, within the "V" of the easterly bastion he came upon the scorched remains of a fire that initially appeared to be proof of activity within the fort. Harrington's Note Book entries chronicle the evolution of his reasoning:

*Feat[ure] 50-5: Fire pit or 'hearth,' Sq. 5280:5430. Area of charcoal, ash, etc. at level of old ground line. The fire pit seems to lie outside the 'grey' sand deposit of fort, suggesting that either Whites or Indians had built fires in the very apex of the eastern bastion. The parapet would have served as an excellent wind screen. [A marginal comment reads 'Actually under parapet.'] The fire pit was about 3to 4 inches deep, a circular saucer-shaped area, about 4ft. in diam ... There was some charcoal in the feature, but relatively little ash*

*mixed with the earth.<sup>7</sup> Adjacent earth showed moderate effects of heat. Pit contained, in addition to charcoal, fractured rock. One small fragment appears to be chert. Further checking indicates that the fire pit possibly lies partially under the 'grey' sand layer, and probably is pre-1585. It would be Indian, therefore. Unfortunately the edge of the 'grey' sand layer is not sufficiently distinct in plan to be able to draw it exactly. Therefore, the fire pit might still be outside the 'grey' sand and of post-1585 date.<sup>8</sup>*

From a relatively certain Indian feature, the fire pit became mobile in time, and in the end a post-1585 date remained a possibility. On balance, however, one would be inclined to vote for Feature 50-5 being an Indian hearth -- were it not for the fact that people burning in shallow pits before the fort was built are no longer precluded from being English. Though later changing his mind, Harrington first concluded that the feature was located under the foot of the parapet and so predated it -- but by how much remains the ultimate question. The notes go on to record the presence of a Spanish *olive jar* sherd in the same square at a depth of two to four inches, and his would appear to be another pre-earthwork deposition.<sup>9</sup> However, the next entry lists a 'China doll' in the same square and an inch deeper.<sup>10</sup> In the absence of explanatory stratigraphy, and the doll probably dating no earlier than the nineteenth-century, the presumption must be that both were disturbed after the rampart had been dismantled or eroded. The notes go on to mention more olive jar sherds being found in the same area, and presumably all were associated.<sup>11</sup> The doll notwithstanding, it is reasonable to assume that the Iberian jar fragments were deposited in the Harriot/Gans operational period and subsequently covered by the rampart. A neck fragment from a comparable (if not the same jar) was found by Harrington at the bottom of the ditch. One therefore has reason to suppose that if the fragments found under the rampart predate the fort, then the neck from the ditch could do likewise.<sup>12</sup>

The same argument may be said of a lump of worked copper reportedly found *just below the surface in the parapet remnant*.<sup>13</sup> That this heavy (12 oz.) lode of copper was found *in* rather

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<sup>7</sup> Experiments with burying charcoal and ash in clay soil and humus strata have demonstrated that ash is quickly absorbed into the soil and can vanish within about two years. See Ivor Noel Hume, *Martin's Hundred*, p. 250.

<sup>8</sup> Harrington Note Book #2, p. 49f, entry beginning August 17, 1950.

<sup>9</sup> Harrington artifact No. 62.

<sup>10</sup> Bebe Woody was unable to find this doll in the Harrington collection. Harrington artifact No. 63.

<sup>11</sup> Harrington's Note Book #2, p.49f.

<sup>12</sup> Harrington artifact No. 81 "in fort ditch at bottom at point of southeast angle." *Ibid.*, p.71. Harrington, *Search for The Cittie of Raleigh*, p. 22, Fig. 20.

<sup>13</sup> *Ibid.*, p. 21; artifact No. 85.

than *under* the remains of the parapet suggests that it was displaced from the land surface when the earthwork began to be erected, at which time topsoil stripped in digging the ditch would automatically be transferred to the bottom of the berm. The reader will remember that a second and heavier lump of comparable copper waste was found in the ditch fill at a point approximately halfway down.<sup>14</sup> The smaller lump was submitted to the Bureau of Standards for analysis, which reported that there was no doubt that the lump was the product of smelting. This prompted Harrington to conclude that the copper was *almost certainly of European origin, since a temperature of just under 2,000 F., required for the melting of copper, would not have been possible through simple methods available to the aborigines.*<sup>15</sup> In 1992, while the contents of crucibles and other material from the Science Center area were being analyzed, the larger of Harrington's copper lumps was studied and found to contain *some antimony, lead, and tin*. This suggested an association between the smelting of this lump and antimony of the kind found on the workshop floor.<sup>16</sup>

Other finds from the ditch included the previously mentioned apothecary's copper-alloy weight which was found in the fill only about a foot from the surface, but nonetheless an acceptable Elizabethan-type object (see p.78). Less than six inches from the bottom of the ditch lay an iron sickle. Although tools of this shape and size have been in use since Roman times and before, there is no reason to doubt that the recovered example can be of the Raleigh settlements' period.<sup>17</sup> Harrington noted, *Although it cannot be dated from shape alone, its position near the bottom of the fort ditch associates it quite definitely with the Raleigh colony.*<sup>18</sup>

Harrington's unequivocal statement is valid providing that the fort does date to the Raleigh period. But like the copper in the mid-section of the ditch fill, the artifacts can date to the sixteenth century even if the fort does not. Just as in airline baggage the first aboard is last off, so the first earth (the topsoil loam) to be dug out and thrown up beside the ditch forms the base of the berm, and the last to be dug from the ditch bottom will be thrown on top of the displaced pile. If left to weather, erosion normally starts at the top causing the last of the clay thrown up to be the first to wash back. In theory, therefore, anything that lay on the land surface when the ditch digging began should remain where it has been redeposited until the barren clay overburden has washed entirely away -- thus causing the early artifacts to be moved yet again, this time into the

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<sup>14</sup> Ibid., artifact No. 87.

<sup>15</sup> Ibid. p. 22.

<sup>16</sup> Report from Drs. Robert M. Ehrenreich and Peter Glumac. See Appendix 4.

<sup>17</sup> For an Iron Age example found in a hoard in the isle of Angelsey, see Rees, *Ancient Agricultural Implements*, Pl. 14 and Fig. 24.

<sup>18</sup> Harrington, *op. cit.*, p. 17, artifact No. 97. His notes (Book #2, p. 93f.) state that the sickle and gouge were found within a foot of each other and that both were at the very bottom of the ditch before any earth accumulated. However, the published report indicates greater, albeit vertical, separation, stating that the sickle was lying less than 6 inches above the bottom of the fort ditch. Ibid.

upper silting of the ditch. That readily explains the location of the pharmaceutical weight, but not the sickle or an iron gouge found at the ditch bottom.<sup>19</sup> One must remember, however, that the old land surface and the redeposited Science Center (?) soil covered by the berm on the inside of the ditch, are not similarly protected on the outside. Beyond the fort the historical land surface remained uncovered and vulnerable to erosion as weathering ate away at the rim, thus causing artifacts to break free and to slide into the progressively silting ditch. Had the second lump of copper lain a foot or two from the outer edge, a hundred or more years might have elapsed before it washed loose and rolled down.

Although the presence of the European artifacts can be explained in that way, the deposition of aboriginal pottery is less easily explained -- unless, indeed, the earthwork was erected during the English occupation and the silting progressed at a fast pace during the years of Indian presence (i.e., until the early 18th century) and then slowed to virtually nothing. This is by no means an impossible scenario, for the regularity of the original sandy clay construction would have been more quickly assailed than would the later more rounded contours.

Found at the bottom of the ditch was an Indian tobacco pipe and a small Indian vessel, the latter shell-tempered, with stamped and grooved external ornament, and paralleled by an even smaller pot of the same type found in 1992 in the north/south ditch within the earthwork (see p.142, No.3). Both the pipe bowl and the pot had pieces missing and so were not usable artifacts inadvertently left behind by Indians taking shelter in the ditch. However, both objects were paralleled in Harriot/Gans contexts and so cannot be precluded from coming from that source.<sup>20</sup>

Harrington, in his first 1947 test cut across the still filled ditch deduced *that the deposit of humus material is in layers, quite obviously representing a slow accumulation rather than intentional fill at one time.*<sup>21</sup> The worth of that conclusion is fits the fact that there is no archaeological evidence of occupation in the earthwork's immediate vicinity until the century's end. Remembering, however, R. Bruce Etheridge's belief that it was little short of a miracle: ... *the elements have spared [the earthwork] on an Island where the merest exposure of the loose, thin soil starts shifting sands to pile dunes and level them,*<sup>22</sup> we, too, must question how a rampart raised out of soil that was as much sand as clay could have survived through some 275 years to be sufficiently clearly defined to be drawn by Richard Johnson in 1862.

On the basis of the archaeological evidence so far discovered, one could argue that because

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<sup>19</sup> Harrington, artifact No. 96.

<sup>20</sup> Harrington pipe No. 98 "on very bottom of fort ditch. (Bowl broken); Indian vessel No. 89, Portion of small Indian pot in fort ditch." See Harrington, Note Book #2, p. 95 and 89, also *Search for The Cittie of Raleigh*, pp. 41-45.

<sup>21</sup> Harrington, Note Book #1, p. 15, entry for 3/13/47. To that day's entry he added no artifacts were found.

<sup>22</sup> Powell, *Paradise Preserved*, p.35, quoting R. B. Etheridge in "Fort Raleigh -- Its History," *The Trinity Archive*, vol. 13 (October, 1899), pp.18-30.

there is no proof of immediate area occupation for centuries, and assuming that the cited Indian artifacts were displaced from a Harriot/Gans context, there is nothing to preclude the fort from being erected in the mid-eighteenth century and therefore being little more than one hundred years old when Johnson drew it. There is, however, other evidence to rebut that proposition, and it comes from more Indian material found by Harrington in the fort ditch. He described it thus:

*Remnants of two campfires, or hearths, were found in the partially filled ditch, each containing charcoal and ashes, with the earth below baked hard and red from the heat. One of these hearths, feature 50-11, was near the bottom of the ditch and contained fragments of a restorable pot. Another restorable pot was at the same level, but about two feet distant. This pot may have been used in the nearby campfire, but thrown aside when no longer serviceable, whereas [the other] was simply left in the hearth.*

*A second hearth, feature 50-20, also clearly of post-fort date, was found at a higher elevation than feature 11, just over 2 feet above the bottom of the ditch. Unless the ditch here had filled up more rapidly, this feature must date from a much later period than feature 11. Like the earlier one, it contained ashes and charcoal, but no other refuse of any type -- not even a broken pot.<sup>23</sup>*

If no other explanations exist to account for the presence of two burned deposits within the ditch, they are compelling evidence that the fort was in existence while Indians still dwelt, camped, or hunted on Roanoke Island. In considering the testimony of the Indian pottery, it is important to note that the Science Center discoveries demonstrated that colonists working there had been using aboriginal vessels, thus posing the possibility that many more of the always fragile Indian pots whose fragments have been found are really relics of English rather than Indian activity (see page 142, No.1). If, indeed, Indians cooked in the ditch before it began to silt that, one would think, would have occurred literally within days of the ditch's completion, for the first rains to wet the freshly thrown up rampart would inevitably have caused some of it to erode down into the ditch.<sup>24</sup>

As previously recognized, trying to reinterpret the records of long past excavations borders on the presumptuous, and while it is necessary to do so, there is no certainty that the new thinking is as reliable as the old. One wonders, nevertheless, whether, had Harrington not been satisfied that the fort was Lane's, he might have approached the evidence from a broader perspective and been less ready to conclude that the Indian pots had been left behind by departing cooks. Additional evidence of the redeposition of European and aboriginal artifacts into the lower levels of the ditch fill is provided by another Spanish jar sherd which was found *in ditch fill near #68*, the latter being the larger of the two fragmentary Indian pots. Indeed, the sherd was at first interpreted as another piece of the aboriginal vessel of which about 130 fragments were recovered.

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<sup>23</sup> Harrington, *Search for The Cittie of Raleigh*, p. 40f.

<sup>24</sup> In Virginia, and in much firmer clay than is to be found on the Fort Raleigh site, open excavations have been known to silt to a depth of as much as two feet over a weekend.





Appendix Fig. 1. The Spanish jar neck found by J. C. Harrington at the bottom of the earthwork's ditch (no. 81). Photo by Ira Block

Remembering that some thirteen fragments of Spanish jar were found inside the fort and at least one (and perhaps all) beneath and predating the rampart, and that a sherd from within the fort joined to the jar neck found at the bottom of the ditch. Harrington's ultimate conclusion regarding this Hispanic ware becomes of the first importance: *Since the neck fragment was pressed into the hard earth at the bottom of the ditch, and the group of 12 was probably under the parapet or the firing step, it would seem that the vessel had been broken and discarded while the fort was under construction.*<sup>25</sup> (Fig.1, above) Harrington very naturally wrote *while the fort was under construction* because he was satisfied that there had been no European occupancy of the site before Lane began to build his *Newe Forte in Verginia*. We believe, however, that Harriot and Gans may have generated a certain amount of industrial trash -- of which the Spanish jar could well have been part -- before the earthwork was erected. That at least one similar jar was used in the assaying process is proven by the presence of fragments of another neck, this time heavily blistered and vitrified resulting from usage in some facet of the Harriot/Gans research (see p.132, No.7).<sup>26</sup> Although it is possible to associate virtually everything found in the fort ditch with pre-earthwork activity on the site, there remains one of Harrington's artifacts whose presence defies explanation.

His report recorded it thus:

*One very small rim sherd is a uniform brick-red paste, with brown glaze on both surfaces. Edges are water worn, suggesting it was picked up on the beach,*

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<sup>25</sup> Harrington, *Search for The Cittie of Raleigh*, p. 22.

<sup>26</sup> III.C.10, F.R.E.R.40D & E. One of these sherds mends to a larger fragment found by Harrington in 1947 along with the associated Indian sherds found together in Trench P, but not then listed as Iberian or vitrified. Note Book #2, p. 75. Trench P had cut right across the outwork area, running NNW/SSE approximately 2' 0" south of his box-like structure.

*although it was found a foot deep in the ditch fill.*<sup>27</sup>

How could this happen, one asks? Who picked up a worthless potsherd from the shore, brought it all the way up onto the bluff, carried it past the dune line (if it then existed) and then threw the sherd into the ditch? All that can be deduced is that the ditch silting was still in progress at a time sufficiently removed from the Elizabethan era for the sherd to become water worn. Alas, like so much else at Fort Raleigh the mystery of the waterworn sherd may never be solved.

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<sup>27</sup> Harrington, *Search for The Cittie of Raleigh*, p. 22. Note Book No.2, p. 87, artifact No. 88 reads “Piece of brown glazed earthenware from ditch fill ... s.d. = 1. 0’; water worn; probably from beach.”