

# **The Glass Beverage Bottles of the HMS St. George**

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1785-1811

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A thesis submitted in partial fulfillment of the requirements of the University of Southern Denmark for the degree of M.A. in Maritime Archaeology.

## In Memoriam

to the more than 1,300 children, women, and men  
of the HMS St. George and HMS Defence lost to the North Sea on December 24-25, 1811.

***“...all your waves and breakers have swept over me.”***

*Psalm 42:7*

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## Abstract

Some 229 glass beverage bottles from the HMS St. George (1785-1811) are analyzed, recorded and categorized into eight “families” in a database. The thesis is a preface to, and interpretation of, the data through the lens of historical archaeology. It investigates many questions, primarily if the assemblage can be considered typical of a British warship of the period. It also explores where these artifacts may have originated, how they got aboard the St. George, and how they survived the St. George wrecking process – all within the ship’s and the artifacts’ archaeological and historical contexts. Archival research is central to the investigation.

Emphasis is placed on understanding the formation processes of the assemblage by understanding its original archaeological deposition and the subsequent formation processes, natural and man-caused, at work on the artifacts until recovery.

Although the bottles are categorized into eight groupings of design themes, the thesis argues against the “rush to type” within archaeology and takes a conservative approach to labeling certain design themes prevalent among glass-bottle artifacts from this period. It does not purport to be a “typology” and challenges prevailing orthodoxy within the archaeological study of glass bottleware from the period.

The database and photos of each artifact are presented in the Appendices.



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## I. INTRODUCTION and METHODOLOGY

The assemblage of glass beverage bottles from the HMS St. George (1785-1811) is perhaps the largest of its kind in the world. Numbering approximately 300 mostly intact bottles, the collection is extraordinary because of its volume, variety, diversity, and the remarkable level of preservation of details such as the unusually high number of corks that have survived – several of those corks with wax seals and legible lettering.

No other published collection from a Royal Navy warship from this period comes close to the depth, breadth, and diversity of the St. George assemblage. Material culture this rich does not come along very often in the world of maritime archaeology.

The St. George collection is housed at the Strandingmuseum in Thorsminde, Denmark. A total of 229 artifacts, representative of the entire collection, were examined and recorded in 2011.<sup>1</sup>

This thesis is a narrative of our investigation. It is not a typology, for reasons that will be explained clearly. Nor is it a primer on bottle-making or construction from the period, of which the literature is vast. It is, rather, an exploration of the meaning of these artifacts, e.g. how they came to us, what they might tell us about archaeology methods, about the Royal Navy, about life aboard a British second-rater that was once Nelson's flagship, and about historical events as seen through the prism of material culture.

### Questions

The central question addressed here: *"Is the St. George collection representative of what we would typically expect to find from comparable wreck sites?"* To answer this, the St. George collection will be compared to available data presented by bottles from similar wrecksites, i.e. British ships from the general period.

An important secondary question is also addressed: *"Upon examination, does a clear typology emerge from the collection?"*

Tertiary questions also explored:

- *How did such a large amount of unbroken glass bottles survive what was, by all contemporary accounts, as extremely violent wrecking event?*
- *Are the bottles mostly common or largely exceptional?*

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<sup>1</sup> The remaining artifacts (roughly 70) in the collection were unavailable for inspection as they were either on loan to other museums in Denmark or on display in inaccessible areas of the Stranding Museum at the time of analysis.

- *Are any bottles likely to have been personal items rather than communal stores? What depositional evidence supports this, if any?*
- *What explains the wildly different states of preservation among the bottles?*
- *What do we know of the in situ disposition of the bottles when first salvaged?*
- *Is there a manifest correlation between the bottles in the collection and the route and ports-o-call of the HMS St. George?*
- *Where were the bottles stowed aboard ship? How were they packed and stored?*
- *Is there archaeological or historical evidence that the bottles were the exclusive province of the officers and “off limits” in any way from the crew?*
- *What can data from comparable sites, excavations, etc. tell us about the St. George assemblage, if anything?*
- *What textual evidence exists from the known route of the HMS St. George during its last voyage (i.e. from the time it left Portsmouth until 24 December 1811?)*
- *What glass beverage flasks were standard-issue provisions aboard a second-rate ship of the line?*
- *Is there any evidence (manifests, survivor accounts, journals, communications, etc.) that the HMS St. George took on stores of glass beverage bottles during its ports-o-call on that final voyage?*

All of these questions will be addressed within the spatial limits of this thesis. However, we will not hesitate to “think out loud” about these questions, in spite of those spatial limits, where it is warranted. We would be derelict in our duty as archaeological investigators if we suborned critical avenues of inquiry here to academic page limits.

## **Methodology**

Over the course of approximately 60 days in 2011, the 229 artifacts were removed from their display cases at the Stranding Museum, carefully wrapped, and transported to a makeshift laboratory and photography station at the University of Southern Denmark in Esbjerg, Denmark (about a 90-minute drive from the museum).

Once analyzed, recorded and photographed, the bottles were again wrapped carefully and returned to their display cases at the museum.

Because of time, space, and funding limitations, no science was conducted for this thesis. None of the bottles or corks were subjected to any kind of chemical analysis to determine their composition; nor were the remaining liquid contents of two corked bottles chemically analyzed (although requests for both analyses were made to a local university’s chemistry department, which declined).

Nor was the *in situ* environment of the St. George wrecksite scientifically examined in any way – the water and sediment were not analyzed for their chemical properties, e.g. salinity, presence of absence of anoxic or anaerobic features, etc.

The bottles were simply recorded based on what the eyes of the investigator ascertained as important, repeating diagnostic characteristics (“metrics”) and then photographed.<sup>2</sup> This thesis explains those findings within the assemblage’s historical and archaeological contexts.

At the outset of analysis and recording, a sortable and searchable database (Appendix 1) was constructed. Item numbers in the database are the actual artifact inventory or accession numbers used by the Strandingmuseum. Each photo of each artifact features its unique identifying number. Photos of each artifact are included in Appendix 2.

Metrics were established early in the analysis according primarily to the objective, *measureable* characteristics presented by the majority of the bottles:

- Height
- Base diameter
- Color
- Based flared? (yes/no)
- Weight
- Cork present? (yes/no)
- Inside mouth diameter
- Inside mouth flared (yes/no)
- Pontil depth
- Turning (left/right)

These were determined to be the primary characteristics shared by the majority of the bottles. One important metric, a bottle’s capacity, could not be measured accurately without risk to the artifacts, given the constraints of the makeshift laboratory used for analysis. Capacities for bottles were not recorded as this metric was beyond our abilities.

The term “assemblage” and “collection” are used throughout this thesis to refer to the 229 artifacts.

### **No common language**

A chronic problem with glass-bottle analysis is the varying terminology used by experts both within archaeology and in the very vibrant global bottle-collecting community.

The two most prominent archaeologists relied on here are the pioneering Olive Jones (1985, 1986) and Ivar Noel Hume (1962, 1974). Recognized bottle experts Roger

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<sup>2</sup> Unfortunately, during post-processing, technical difficulties prevented the inclusion of photos for eight bottle-artifacts.



Dumbrell (1983), Willy Van den Bossche (2001), Robert McNulty (2004), Dr. Harold Henkes (1994), and Michiel Bartels (1991) are also important sources. All use different terminology for various parts of a glass bottle's "anatomy."

A common frame of reference or prevailing nomenclature in the archaeological analysis of glass beverage bottle does not exist. We are left therefore to define our own terms.

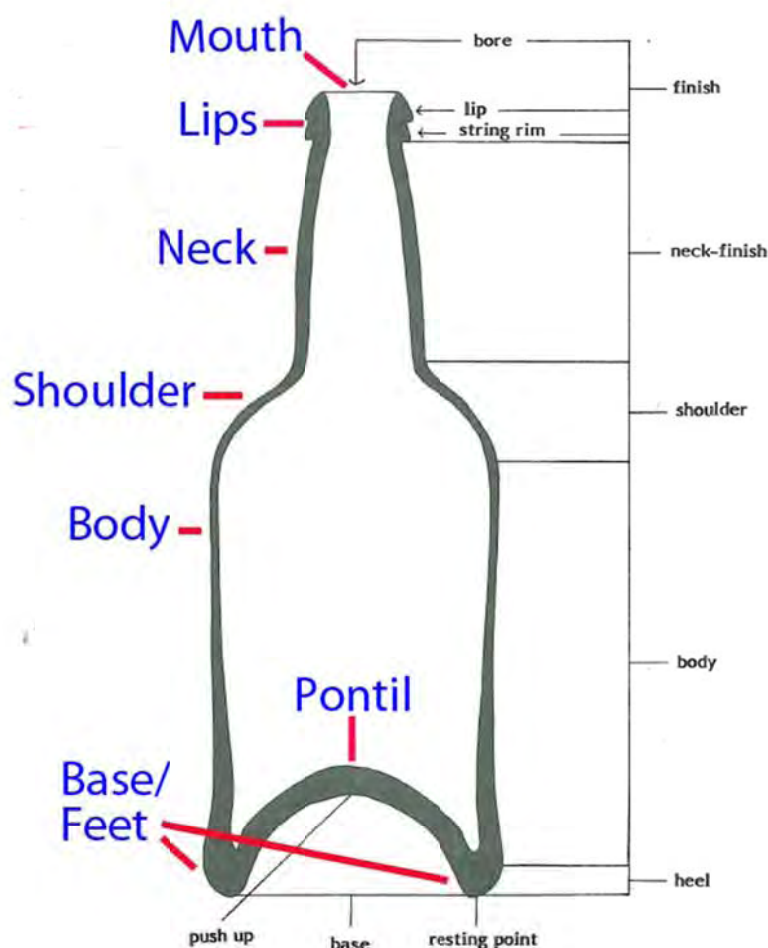


Figure 1. Bottle nomenclature. After Jones, 1985, Fig. 52, p. 77.

Figure 1 indicates the simple terms we use when referring to specific parts of a bottle. Our terms are indicated in blue, larger type on the left side of the image; the terms used by Olive Jones are in black type. (Jones and Sullivan, 1986, Fig. 52, p. 77.)

"Pontil" refers to what is also known as the "pushup" or "kickup" in the bottom surface of the bottle.

"Feet" refers to the outside of the base of the bottle, the part on which the bottle rests (what Jones refers to as the "heel") (Jones, 1985, Fig. 65, p. 94).

“Base diameter” is the maximum distance between these feet, as measured from the outside: it is the maximum width of the base, from far edge to far edge. This is a relevant metric because of “flaring” at the base of many bottles in the collection.

“Flaring” is our term for an expansion of width, from narrow to wider, either at the base of a bottle or inside the mouth. Fig. 2 juxtaposes a flared-base St. George artifact (left) with one that has no flaring at the base, i.e. the body continues straight down.



**Figure 2. Flared base compared with non-flared. Item 6000-1247 at left features a flared base, while item 0312-7546 at right, a taller bottle, presents no flared base.**

Another distinguishing characteristic discovered during analysis is what we call “turning” – striations or lines or “stretch marks” in the glass on the necks of the bottles, always running diagonally up/down the neck.

At first, these striations were interpreted as possible evidence of scouring but, as more bottles were analyzed, that diagnosis was soon abandoned for two reasons: 1) the marks appeared on perfectly pristine bottles with no such marks or evidence of possible scouring anywhere else, and 2) the marks began appearing with some frequency, always on the necks alone, and in the same fashion.

The striations clearly appear to be man-made. They appear on 85 of the 225 bottles examined. Our tentative interpretation: likely tool marks that might indicate which direction (either left-to-right or right-to-left) the bottle was turned by the bottlemaker when it was being made. If so, the marks could conceivably indicate whether the bottlemaker was right- or left-handed.

None of the experts we consulted have addressed this possible diagnostic.

## **Decision: Analysis without bias**

An important decision was made early on: the artifacts would be analyzed with the unbiased eyes of the investigator, without prior prejudice.

That is, to prevent bias -- be it conscious, subconscious, or even subliminal -- prevailing orthodoxies in archaeology regarding “types” or “typologies” of glass beverage bottles would not be consulted prior to examining the St. George collection. The eyes of the investigator alone would be the most important tool in the search for shared, common characteristics between and among the artifacts.

After recording, the experts were of course subsequently consulted, heavily, as to the interpretation of the data presented by the St. George collection. But no typology was consulted prior to analysis of the St. George assemblage.

The rationale for this approach is compelling.

First, the “typing” or categorization work that Dumbrell and Hume did was almost exclusively devoted to terrestrial material culture if not entirely so.<sup>3</sup> To our knowledge, none of their work included glass beverage bottles from a submerged, marine environment, which would obviously produce different diagnostic attributes than would a terrestrial environment of soil and sediment. The formation processes of land and sea are entirely different, of course.

Second, in archaeology, one often senses a “rush to type” artifacts and material culture according to pre-existing typologies of material culture that may appear similar. There seems to be a tendency or need to “fit” unrecorded artifacts into those typologies of similar artifacts, even against the evidence at times and even though those “similar” artifacts may not be so similar at all.

As a result, the investigator who has dutifully absorbed the prevailing typologies and orthodoxies prior to analysis often “sees” a “type” in the artifact before him during initial analysis where, in fact, no such correspondence exists. We “see” shared diagnostic attributes or common characteristics between artifacts where none actually exist -- simply through the power of prior suggestion, predisposition and preconceived notions.

It is akin to standing in an art museum trying to decipher a modern abstract painting and the person next to you says “Can you see the frog on the bicycle?” You start looking for the frog on the bicycle.

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<sup>3</sup> Only Jones included bottles from a wrecksite in his typology: he analyzed almost 100 glass beverage bottles from the “Yorktown Fleet”, which was lost in 1781.

This risk was studiously avoided. The determination was made to let the bottles speak for themselves, to let the investigator's own eyes and cognitive abilities be the primary diagnostic tools, and to take the data from the bottles on their own merits – all without prior prejudice.

A third reason the bottles were analyzed and recorded first on their own merits before consulting the prevailing typologies: those prevailing typologies may not be statistically relevant.

For example, if a “typology” for the St. George collection were defined here, what would it represent? The typical assortment of glass beverage bottles used the British Royal Navy at sea during the period the St. George was afloat? The typical assortment of glass beverage bottles from Royal Navy second-raters during the same period?

Could any future archaeologist or historian confidently say of a bottle found on another wreck: “Aha – this is an X-type bottle because it is the same as one in the St. George typology?”

No. Archaeological typing and typologies, to be useful, must have enough critical mass, enough quantity or volume of comparative artifacts, to be sound.

If we were to analyze, using the same methods, the less-extensive bottle collections from comparable wrecks and sites (there are several from the same general period as the St. George's time of service; some are published, some not), and combine the data together with that from the St. George, only then would we feel comfortable offering a “typology” in the traditional, orthodox sense of the archaeological term.

That data would present some statistically significant evidence with substance. The data might be instructive as it would represent the majority of known artifacts within the glass beverage bottles category from a certain period.

But even then, that typology would be very limited in what it could safely claim to represent, e.g. a sampling of glass beverage bottles associated with the British Royal Navy in the late 17<sup>th</sup> and early 18<sup>th</sup> centuries.

Finally, another compelling reason we are loathe to try and force-fit the St. George assemblage data into existing typologies: some of those typologies attempt to “measure the immeasurable” and are simply not transferable to another investigator.

The extraordinary enthusiasm, energy and effort, the spectacular attention to detail, that Olive Jones poured into his study of glass beverage bottles, for example, evidently led him to try to measure everything about a cylindrical glass bottle it seems – even things that aren't truly measurable.

For example, in explaining his method for measuring the diameter and height of a bottle neck, Jones says that he measured the neck in three different places – near the mouth, in the middle of the neck, and where the neck “ends” and the shoulder “begins.”

Fig. 3 is Jones’s illustration of his method. The difficulty should be obvious: where do the neck and shoulder “begin” and “end”? It is a subjective judgment of the investigator – not transferable to other investigators. The answer is in the eye of the beholder. How does one measure where a curve begins and ends?

More to the point: how do you instruct another investigator where a curve on a bottle begins and ends? Every investigator would identify different starting and ending points for measuring a bottle’s neck and shoulder. The method is not transferable to other investigators.

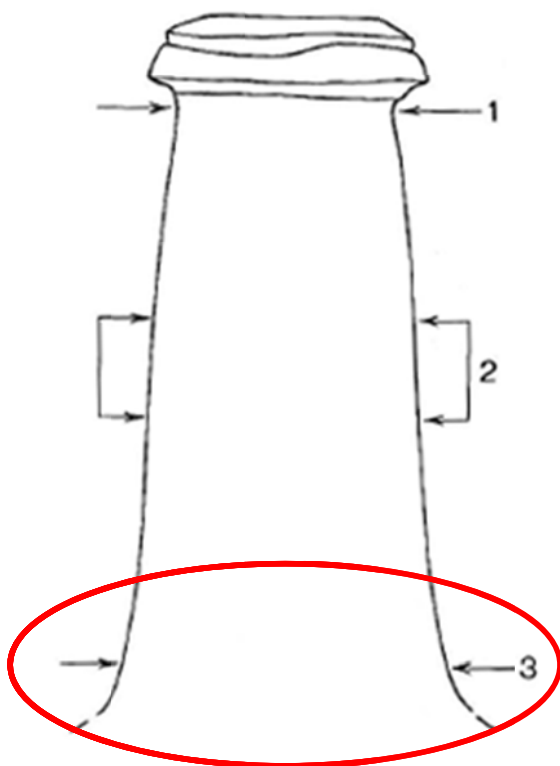


Figure 77. Neck diameters.

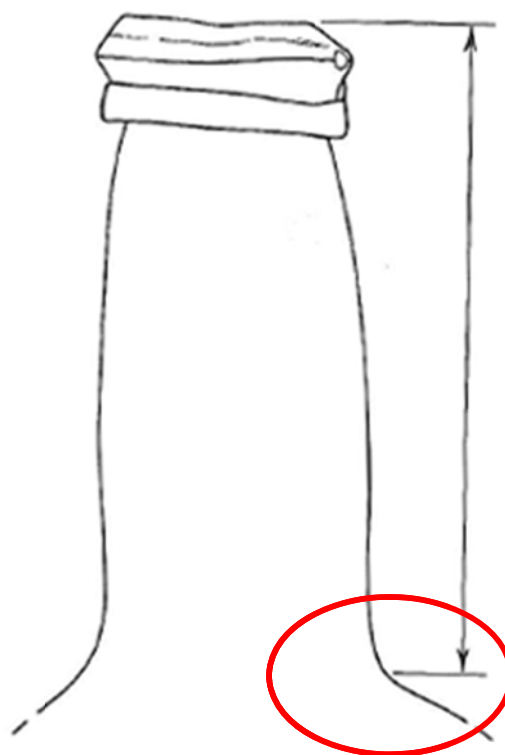


Figure 78. Neck height.

Figure 3. Where do the neck and shoulder “begin” and “end?” After Jones, 1986, Fig. 77 and Fig. 78, p. 126.

For these reasons, this investigation was not an exercise in “typing” these artifacts. In fact, we avoid using the word “type” at all because of what that word may connote; we use the terms “style” and “design theme” and “family.”

These things said, similarities and common characteristics between bottles are of course present in the data. The data are presented as they are, categorized according to what makes senses to us as being most useful to other investigators. Readers are left to draw their own conclusions.

### **How findings are presented**

Our canvas begins with a background of the historical context of the St. George, life aboard ship, and bottlemaking during its time of service (1785-1811). Against that backdrop, the archaeological context of the St. George assemblage is then reviewed.

The narrative continues with a brief overview of similar material culture from comparable wrecks, both published and unpublished -- ships that were afloat either before, during, or after the years of the St. George’s years of service:

- HMS Invincible 1747-58
- HMS Swift 1763-1770
- HMS Pandora 1779-1791
- Mardi Gras shipwreck (early 19<sup>th</sup> century)
- Cornwallis’s Yorktown fleet 1781

Against this historical and archaeological backdrop, the artifacts themselves will then be reviewed and, where space allows, highlighted. Where possible, design themes will be compared and contrasted against the literature.

## II HISTORICAL CONTEXT

*“In 1807 Britain faced possible exclusion from the Baltic after the extension of French hegemony to the north of Europe put Napoleon’s war against her on a continental basis. Over the next six years, a ceaseless battle was fought to keep the Baltic open to British commerce and the subject the Baltic trade to the principles of the British maritime code. The Royal Navy won that battle.” (Ryan, 1959, p. 466)*

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In archaeology, we are fond of repeating the aphorism to ourselves: “It’s not the pot; it’s the Indian *behind* the pot.” The people, times, and events behind the St. George assemblage are instructive as we pursue our thesis questions.

Moreover, as will become clear, the archaeology of the St. George collection is quite weak, at least by today’s standards. To help us truly begin to understand the collection, the historical background that frames it, we must therefore rely heavily on relevant historical documentation ... because that documentation is quite strong. We plunge forward here into historical archaeology.

When the St. George was lost, the world around it was anything but boring. Nelson and Trafalgar were national legends and Britannia arguably ruled the waves.

The Age of Reason was giving way to Romanticism. Voltaire and Rousseau were dead, as were Lord Tennyson, Mozart and Catherine the Great. Beethoven was in his prime, though going deaf. The Industrial Revolution was raging.

Steam was emerging as a source of locomotion at sea and on land – in the form of “steamboats” and steam locomotives. But the world at large and the Royal Navy were still firmly in the Age of Sail. The Royal Navy had more than 1,000 ships in operation in 1810 and 140,000 men – more than half that force operating in foreign waters. (MacDonald, 2004, p. 7).

The penal colony of Australia had been receiving fleets of prisoners from England for years. England had lost the “colonies” of America more than 20 years earlier but the United States, which had already doubled in size, were causing trouble again. A new war between the two nations would erupt less than six months after the St. George was lost.

The erstwhile French Republic was under the rule of a bellicose, Corsican conqueror who had seized power in 1799, proclaimed himself Emperor at Notre Dame in 1804, and who would change Europe forever with his military aplomb and sheer audacity.

Wine and spirits, as well as glass bottlemaking, were established, mature trades both in Britain, in her overseas colonies, and in continental Europe.

The variety of the St. George collection is one of its most striking features. It is a mix of the common and the exceptional. It contains a sizeable proportion of what appear to be standard-issue, cylindrical, heavy, dark green or “black glass” bottles known to have come from British glass kilns of the period.

However, many bottles seem decidedly un-British in their design and style. These reflect what appear to be continental Europe design preferences, especially French and lowlands (Dutch-Belgian) influences.

As we will see, against the historical backdrop of the St. George and its times, especially its past year of service, this variety makes perfect sense.

A primary thread of inquiry here is the possible origins of these artifacts – their “biographies” -- particularly how they might possibly have come to be on board the St. George in the months, and perhaps years, prior to her loss.

Exploring the St. George’s access – either directly or indirectly -- to continental European wine and spirits markets during her last years of service is important to understanding the assemblage.

Obviously, archival research would be the ideal method of exploring these topics, starting with Admiralty records in The National Archives at Kew, London. Especially critical would be Victualling Board documents, such as minutes, correspondence, bills of lading, orders to contractors, deliveries, receipts, etc. – all the paperwork involved in provisioning the Baltic Fleet.

Unfortunately, those records were not accessible for this investigation. However, a great quantity of Royal Navy documentation is available in the Danish National Archives: captured documents from British warships during hostilities between Denmark and Britain in the period 1805-1812. Included are documents from captured or wrecked Royal Navy warships, including the St. George.<sup>4</sup> These speak directly to the possible provenance of at least some of the St. George bottles.

Because archaeology and history are interdependent, we make no apologies for relying heavily on historical documentation when it is loquacious and the archaeology is rather mute on artifacts such as the St. George assemblage. To address our thesis questions, we simply want to understand the artifacts as best we can.

Historical research was focused on three areas: 1) the Baltic Fleet (1808-1811), of which the St. George was a part, 2) the state of glass bottle-making during the St. George’s time of service (1785-1811), and 3) the role of spirits aboard Royal Navy ships while at sea.

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<sup>4</sup> Along with more than 1,300 bodies, the St. George documents washed up on shore near the wrecksite on Christmas morning, 1811. The documents have been in the possession of Danish government authorities ever since.



Aside from the documents in the Danish National Archives, several other sources were helpful.

For the Baltic Fleet, its role and service, and a general understanding of what was going on in the world of the HMS *St. George* during her last years of service on station in the Baltic, A.N. Ryan's scholarship seems without peer. A half-century has not dulled the shine of Ryan's work, which is the primary foundation of our investigation into the history behind the bottles.

For the next level of investigation, the assemblage's possible origins, most useful were David Raymond's insightful Ph.D. dissertation, "The Royal Navy in the Baltic from 1807-1812" (Raymond, 2010), Roger Knight and Martin Wilcox's "Sustaining the Fleet (Knight and Wilcox, 2010), and James Davey's Ph.D. dissertation victualing the Royal Navy on overseas stations, especially in the Baltic (Davey, 2009).

For the state of glass bottle-making during the life of the *St. George*, the standard works of Ivar Noel Hume, Olive Jones, and Roger Dumbrell provided what we need to know...and Van den Bossche, McNulty, Henkes, Bartels and others provide a little more.

For the role of spirits in life aboard ship, most relied upon were: Janet McDonald's "Feeding Nelson's Navy" (MacDonald, 2004), Frederick H. Smith's "The Archaeology of Alcohol and Drinking" (Smith, 2008) and the 1808 issue of the Admiralty's Regulations and Instructions Relating to His Majesty's Service at Sea (Admiralty, 1808).

### **Artifact biographies: possible origins of the bottles**

We start with the obvious questions...

Where did these bottles come from? Where did they originate? When, where and how were they put aboard the *St. George*? How long had they been aboard when the *St. George* was lost? Why is there such a variety in the collection?

Imagine buying a hot dog from a street vendor in Manhattan. You get a US one-dollar bill as part of your change.

You may have an easier time back-tracing the travels and history of that one-dollar bill, its "biography" since the day it was put into circulation, than you would tracing the origins and history of the bottles in the *St. George* collection. And, unlike that US one-dollar bill, our bottles do not have serial numbers, dates, or the places of manufacture imprinted on them.

To trace these bottles' origins, one would think that we would need to work backwards, following the paper trail (if such exists) through Admiralty records to the wine and spirits merchants who sold to the Admiralty, and then to the bottle-maker who sold the bottles to the wine and spirits merchants. Further, it is likely that the Admiralty bought supplies of empty bottles itself – another line of inquiry – and bottled wine and spirits from casks.

However, many, many other reasonable possibilities exist for the bottle's origins.

The HMS St. George was a British ship of the line that spent 26 years at sea at the height of British naval power – the last five or six years in the midst of the huge foreign marketplace that was the Baltic Sea in the years 1807-1812. Many of the bottles from the St. George could have come from virtually anywhere in the Western world and very likely originated from several places. And each bottle has its own story, its own biography – just like a US one-dollar bill.

Indeed, it could be argued that the St. George, like so many ships going back to antiquity, was actually a crucible of archaeological diffusionism ... that her material culture represented her travels and adventures ... that the bottles themselves are eloquent testimony to those travels and adventures and intermingling of cultures.

It is indeed tempting to view the assemblage as a unique reflection of the St. George's cultural contact during her service. One need only look at where she went during that service.

### **St. George Operational Service -- Ports of Call**

Along with captured documents from the St. George, Karadimos (2010, pp. 23-26) and Winfield (2007, p. 20) provide a chronology<sup>55</sup> of the St. George's service that powerfully illustrates this point:

|                |   |
|----------------|---|
| Oct. 8 1787:   | commissioned, but no captain appointed (Winfield)   |
| 1793-1796:     | first mission near Toulon, <b>France</b> with Hood's Mediterranean fleet  |
| April 14 1793  | helped take the 20-gun privateer <i>General Doumuorier</i> and its Spanish-registered prize the <i>St. Jago</i> off <b>Finisterre</b> |
| March 8 1795:  | laid off Leghorn (Livorno), <b>Italy</b>  |
| March 13 1795: | sailed to Spezzia Bay, <b>Italy</b> for repairs   |
| July 13, 1795: | present at naval battle, Hyères Islands (near Toulon, <b>France</b> )   |
| 1795:          | after repairs, sailed to San Florenzo, <b>Italy</b>   |
| 1796:          | on the river Tagus in Lisbon, <b>Portugal</b>   |
| 1797:          | grounded on the Cathop Shoal, repaired at Lisbon, <b>Portugal</b>   |
| 1799:          | on duty in the Channel, <b>England</b>  |
| July 7 1799:   | in <b>Minorca</b>   |

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<sup>55</sup> Where Winfield and Karadimos differ, it is noted parenthetically.

|                   |   |
|-------------------|---|
| ca. 1800:         | returned to <b>England</b>  |
| April 15 1800:    | ordered to Torbay, <b>England</b>   |
| March 12 1801:    | sailed from Yarmouth, England for Copenhagen, <b>Denmark</b> , under flag of Horatio Nelson, Vice Admiral of the Blue                 |
| 2 April 1801:     | saw action at Battle of Copenhagen, <b>Denmark</b>  |
| June 1801:        | returns to <b>England</b> from Baltic   |
| November 1801:    | ordered to <b>West Indies (Jamaica)</b> “having provisions for five months” (Karadimos, 2010, p. 25; Goodwin, 2002, pp. 202-205)      |
| June 16 1803:     | returned to <b>England</b>  |
| April 1804:       | Began repair and refit at <b>Plymouth</b> (Winfield)  |
| November 1804:    | Recommissioned for Leeward Islands, <b>Jamaica</b> (Winfield)   |
| November 21 1804: | on duty at Halifax, <b>Nova Scotia</b> station (Karadimos)  |
| June 19 1805:     | ordered to have rigging repaired at <b>Port Royal, Jamaica</b> (captured document, Danish National Archives, box 1005)                |
| July 15 1805      | off <b>Carlisle Bay, Barbados</b> (captured document, Danish National Archives, box 1005)   |
| August 18 1805    | in Halifax, <b>Nova Scotia</b> (captured letter, Danish National Archives, box 1005)  |
| November 1805     | many French prisoners put on board from prison in Halifax, <b>Nova Scotia</b> (captured document, Danish National Archives, box 1005) |
| December 8 1805:  | discharged 99 French prisoners into prison in <b>Jamaica</b> (captured document, Danish National Archives, box 1005)                  |
| 1806:             | redeployed with Channel fleet off <b>Ushant (French coast)</b>  |
| 1808:             | ordered to <b>Baltic</b> <sup>6</sup> (Karadimos)   |
| 1809:             | sent back to <b>England</b> for refitting (Karadimos)   |
| February 1810:    | Started refitting at <b>Portsmouth</b> (Winfield)   |
| April 1810:       | Completed refitting (Winfield)  |

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<sup>6</sup> Raymond (2010) does not include the St. George in his list of the Baltic Fleet gathering for the first time in April-May 1808, although it is unclear if his list was intended to be an exhaustive muster list.

|                   |  |
|-------------------|--|
| 1810:             | ordered back to <b>Baltic</b> (Karadimos)  |
| May 8 1811        | anchored at <b>Anholt, Kattegat/Baltic</b> (captured document, Danish National Archives, box 1004)   |
| October 29 1811   | Admiral Reynolds certifies a court martial on board the St. George at <b>Hano Bay, Sweden</b> (captured document, (Danish National Archives, box 1004) |
| November 1811:    | anchored with merchant fleet of 110+ vessels at <b>Hano Bay, Sweden</b>  |
| November 15 1811: | anchored at Zealand, <b>Denmark</b>  |
| December 1 1811:  | anchored at Gothenburg, <b>Sweden</b>  |

When we compare the St. George assemblage to this remarkable service record, we can perhaps begin to understand the biographies of the bottles ... perhaps not their “type” or “style” but the context as to their possible origins ... which certainly would speak to their design heritage. The variety presented by the collection makes it safe to posit that the bottles very likely did not all originally come from the same place or at the same time.

The bottles may have been acquired at any of these ports of call and remained as part of the St. George’s permanent stores for years. We cannot disprove this theory without archival research at Kew.<sup>7</sup>

How did these glass beverage bottles come to be aboard the St. George? And when? Based on our investigation, the most likely possibilities:

- Some bottles could have been part of standard Royal Navy provisioning and victualing both when the St. George was in England and when she was on Baltic duty.
- Some could have been purchased at any port she visited during her 26 years of service, including the Baltic ports open to British trade during her service there.
- Some could have been the personal property of officers or seaman – either brought aboard with them or acquired abroad as souvenirs of service.
- Some could have been captured as prize compensation for the officers in earlier conflicts and kept as personal property throughout these officers’ naval service.
- Some could have been purchased from any of the thousands of merchant ships she was protecting in the Baltic during her service there, including the merchant convoy that gathered in Hano Bay, Sweden for the return trip to England after the 1811 trading season.

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<sup>7</sup> Davey confirms that at least one ship’s log of the St. George exists in Admiralty records, as “TNA, ADM 51/2345, Log of the St. George, June 1811.” (Davey, 2009, p. 220). Oddly, no ship’s log from the St. George appears to be in the Danish National Archives, with one exception: a 10-month period in 1810.

- Some could have been traded with officers and seamen from other Royal Navy ships with which she served.
- Some could have been gifts -- from officers of other ships, including those of officially hostile nations, from local officials in various ports, or even from family members and friends back home in Britain.

Of course, the entire assemblage could have been on board the *St. George* as permanent ship's stores when she left England for what would be her final season in the Baltic in 1811.

We are not completely at a loss, however. Available historical records grant us the right to speculate reasonably.

### **What is going on in the world of the HMS *St. George*?**

When the HMS *St. George* was lost that fateful Christmas of 1811, she was returning from a full season on convoy duty as part of the semi-permanent Baltic Fleet, a formidable fleet of sail of the line, frigates, sloops, and gun brigs, etc.

The British Empire was approaching its zenith in reach and power. The Baltic Fleet, critical to protecting Baltic trade lines – convoys -- that supplied England with raw materials, especially naval stores, had been on station since 1808<sup>8</sup>, returning with most of the fleet to winter in the UK. (Ryan, 1962, p. 125).

By 1811, Britain was critically dependent on the Baltic for foreign goods, especially raw materials such as Baltic timber and Russian hemp and flax to sustain the Royal Navy and the globe-trotting British merchant fleet. "The ships bound for Britain from the Baltic were laden for the most part with naval stores." (Ryan, 1959, p. 465)

As Ryan explains, the Baltic was especially critical to the Royal Navy:

*"The Baltic region was still the principal source of naval stores. The best timber for medium sized masts came from Russia; Baltic oak was widely used by British shipbuilders for underwater planking, Russian fir deals for the decks of vessels. Alternative sources could supply these particular needs, but the timber obtained therefrom was certainly inferior in some respects, and the substitutes were generally regarded with disfavour in the navy.<sup>2</sup> For their supplies of hemp, the navy and the merchant marine relied upon importations from Russia, the source of over ninety per cent of Britain's total hemp consumption."* (Ryan, 1959, p. 444)

It is not an overstatement to argue that Baltic trade was Britain's and the Admiralty's economic lifeblood in these years; if so, then the seasonal convoy system developed by the Admiralty was the heart pumping that blood and the Baltic Fleet was the heart's protection.

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<sup>8</sup> We refer here to the second version of the Baltic Fleet, which resumed operations in 1807-1808.

At first glance, the Baltic was a hostile, dangerous, potentially explosive environment in 1811. Sweden, Denmark-Norway and Russia were all officially at war with Britain. Prussia was a French client-state, with French troops garrisoned throughout the land.

Russia and its “client-state”<sup>9</sup> Denmark-Norway were ostensibly the greatest threats to trade with England in the Baltic – Russia, because it was the largest naval power in the region with its fleet far to the east, Denmark-Norway because of its hostility to Britain and its strategic geography astride the gateway between the North Sea and the Baltic.

Yet, as we shall see, trade with Prussia, Russia, and Sweden thrived throughout the years 1808-1812 – even while the latter two nations were officially at war with Britain, having been unwillingly bullied into that position by Napoleon, as some historians suggest.

Denmark proved the most dangerous military threat, but only in its waters and rarely against larger warships of the Baltic Fleet.<sup>10</sup> There were the Gunboat Wars, there were relatively minor actions against Russian warships, and there were losses to French privateers along the southern Baltic coast but, by and large, Britannia ruled the waves of the Baltic Sea in these years.

The Napoleonic Wars were as much an economic war between England and France as it was a hot, shooting war. Having been soundly defeated on the water at Trafalgar in 1805, Napoleon’s influence by 1808 “ceased at the water’s edge,” as Ryan phrases it, and “...he was powerless to control the movement of ships once they had put to sea.” (Ryan, 1959, p. 464).

All Baltic ports were supposedly closed to British shipping as a result of Napoleon’s continental system ... his famed Berlin Decree of November 21, 1806, designed as an economic siege of the British economy that banned British trade with any nation allied with France or under Napoleon’s influence.

Britain’s official response to this attempted siege was an 1807 Orders in Council ordering the blockade of any port refusing to trade with British merchants. (Davey, 2009, p. 9).

Britain’s unofficial response, however, was to continue Baltic trade at all costs; robust trade continued in the Baltic in spite of Napoleon’s continental system -- to the point of making a mockery of it. The *St. George* and the rest of the Baltic Fleet were the “muscle” to protect that trade; it was the Fleet’s primary mission. Flow of trade was paramount – and we believe that deeper archival research would prove that wine and spirits were a significant staple of that trade.

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<sup>9</sup> Raymond’s term, 2010, p. 84.

<sup>10</sup> As an illustration of Baltic trade throughout the centuries, the Danish name for Copenhagen, “København,” literally translates into English as “buying port” or “trading harbour.”

Thanks in large part to the Baltic Fleet, Napoleon's attempted economic siege of the Baltic became, in fact, a sieve. It created a thriving marketplace. The Royal Navy did indeed win this battle – and this robust trade raises interesting possibilities as to the possible origins of many bottles in the St. George collection.

As Ryan says: "The Scandinavian and Baltic ports, the last in Europe to come under French influence, were never firmly closed even when Napoleon's continental system was most effectively enforced in 1811." (Ryan, 1962, p. 123).

Our review of the evidence leads us to speculate that the two most likely sources for the *majority* of bottles in the St. George assemblage are, first, the Royal Navy victualing system for sustaining the Baltic Fleet and, second, purchases made while on station in the Baltic, perhaps through officially sanctioned cunning and deceit. We will explore the latter possibility first.

### **Legerdemain, smuggling, and a thriving black market**

On file at the Danish National Archives are captured, secret Admiralty orders that were aboard the St George and other Royal Navy warships. These orders detail a vast and complex game of wartime disinformation and dissimulation that include fraudulent paperwork, cover stories for ships' officers and crews, bribes to customs officials, and supposedly "neutral" merchant ships – all designed to beat Napoleon's continental system. (Archive 151943, "Ordrer m.m. 1811", Søkrigskancelliet (Søetaten): Papirer fra erobrede eller strandede engelske skibe, 1805-1812, box 1007).

These orders make clear that the St. George and the Baltic Fleet were protecting, essentially, a huge black market of smuggling in defiance of Napoleon's attempt to strangle British trade. That black market was designed to protect British trade by protecting all who traded with Britain – while punishing those who didn't.

As Ryan says: "Ships bound from Britain for the Baltic always carried papers, forged with great attention to detail, by which it appeared that they had cleared from a port in amity with France and were sailing in accordance with the French decrees." (Ryan, 1959, p. 464)

In Ryan's words, the role of the St. George and Baltic Fleet was "...the unrestricted use of maritime power to force a trade where France had forbidden it, to import from the North cargoes needed by Britain, and to throw over the enemy's wall, with the aid of the enemy's subjects, goods which he had ordered to be kept out." (Ryan, 1962, p. 128)

France theoretically controlled the entire southern coast of the Baltic Sea, from Denmark to Russia. Northern Europe, up to the Baltic Sea coast, was officially hostile territory for British trade – but trade was robust throughout the Baltic for British merchants in a thriving black market that was essentially *created* by Napoleon's continental system.

The St. George assemblage, because of its variety, is quite possibly a reflection of that black-market trade.

The year 1811 was the fourth season on station for the St. George and the Baltic Fleet, led by Admiral James Saumarez, who proved himself to be England's "ambassador afloat" in the Baltic. (Anthony Ryan, "An Ambassador Afloat: Vice-Admiral Sir James Saumarez and the Swedish Court 1808-1812.")

The year 1811 was also the St. George's second year serving as flagship to a Rear Admiral of the Red – Saumarez's second-in-command, Robert Carthew Reynolds, who first raised his flag on the St. George the year prior. Reynolds was the ninth Admiral (including Horatio Nelson) to hoist his flag on the St. George since 1791. Earlier in 1811, Captain Daniel Oliver Guion had been assigned to the St. George as Reynolds's flag-captain.

Under the Fleet's arms, British and foreign traders laden with British goods would sail in convoys from the UK, arriving on station in the Kattegat (the strait between Denmark and Sweden) usually in March or April, after the winter's ice had begun to disappear.

These convoys, sometimes numbering more than 100 merchant ships, would then disperse into the Baltic, constantly under watch by squadrons of the Baltic Fleet, for vigorous trading all summer long and into the fall before returning home in October before the notoriously vicious Baltic winter set in.

Convoys of merchant ships, carrying false papers (and good cover stories) with their holds full of Baltic goods, would return to the UK periodically throughout the summer, while most others would arrive with holds brimming with British goods ... and money in hand. The trade – supply and demand -- was two-way; apparently traders in the Baltic could not get enough of British exports. Our guess is that spirits, if not also wine, was one such export.

By 1809, Ryan says: "The result was that the Thames, the Humber, the Tyne, the Firth of Forth, the Clyde and the Mersey were filled, according to some infested, with German, Scandinavian, Dutch and Russian ships." British ship-owners began to complain "[t]hat the Royal Navy should convoy foreign, indeed enemy, vessels to and from ports closed to the British flag." (Ryan, 1962, p. 128)

Ryan details the story of the Prussian ship *Johanna*, which sailed with a cargo of flax and linseed in June 1811 from Riga to Hull, where she then loaded salt for the Baltic. When captured (we assume by French privateers) off the coast of Danzig in September, the master produced papers and took an oath to the effect that the *Johanna* was bound to Riga from Arendahl in Norway. (Ryan, 1962, p. 138)

Similarly, the *Natalia*, flying the Russian flag, went from Riga to Hull, laden with hemp and flax in the spring of 1811. From Hull she went to Leith, loaded a cargo of herring, and cleared for Gothenberg. There a new set of papers, including a forged Prussian consular



certificate, was taken aboard. The *Natalia* then put out under British convoy for Pillau and was also captured by a privateer. (Ryan, 1962, p. 138)

Riga, Danzig, Malmo, Gothenberg, Konigsberg, Hano, Karlskrona, Matvik, Memel, the Gulf of Finland... evidently, these and other ports were all open Baltic trading centers for surreptitious, “off-the-books” British trade. (Ryan, 1959, p. 449)

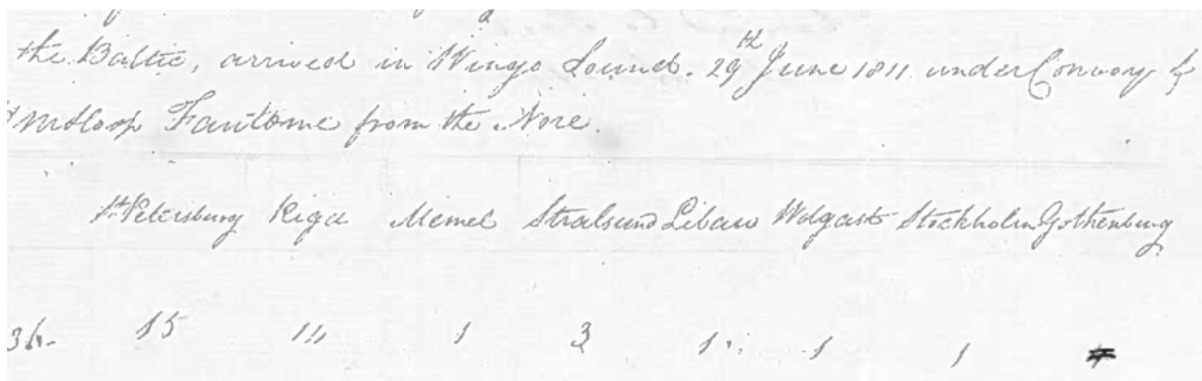


Figure 4. Captured list of Baltic ports for which an arriving Baltic convoy was destined in June 1811. (Danish National Archives).

Fig. 4, a captured document from a Baltic Fleet warship<sup>11</sup> illustrates the point. It is a handwritten listing of the number of ships in a Baltic convoy that “arrived in Wingo Sound 19<sup>th</sup> June 1811 under convoy of HMS Sloop Fantome from the Nore.”

The document then lists the number of merchant ships destined for specific Baltic ports: St. Petersburg, Riga, Memel, Stralsund (Prussia), Libau (Russia, current Latvia), Wolgast (Prussia), Stockholm, and Gothenburg. (Archive 151948, Søkrigskancelliet (Søetaten): Papirer fra erobrede eller strandede engelske skibe, 1805-1812, box 1003)

The point should be manifestly clear: many of the bottles of the St. George collection could have arrived on board via literally hundreds of merchant ships from not only any Baltic power but from anywhere in Europe *via* these Baltic ports. We are looking at robust maritime trade here between many cultures, a few them officially at war with one another.

As second in command of the Baltic Fleet, Admiral Reynolds could have had his pick of the finest wines and spirits aboard any of those merchant ships ... including, significantly, French champagne.

The St. George Champagne Family of 33 completely intact bottles makes it simply irresistible to imagine Admiral Reynolds hosting dinner guests aboard the St. George in the Baltic and toasting Napoleon with French champagne.

## Projection of power and trading routes

<sup>11</sup> Although the HMS Fantome is mentioned, it is not clear exactly from which warship this document was recovered.

As best we can tell from conflicting sources, the *St. George* was on duty with the Baltic Fleet in 1808, 1809, 1810 and 1811 – at least four of the six years the Baltic Fleet was on station protecting trade, 1807-1812.<sup>12</sup> She apparently spent the winter of 1810-1811, along with the bulk of the Baltic Fleet, in the UK for refitting. (Raymond, 2010, p. 201)

This is significant because it is possible she was completely free of stores and provisions during retrofitting, i.e. any beverage bottles may have been removed and the ship resupplied when she was ready to sail again. Or, the collection of bottles may have been returned to her when retrofitting was complete and she set sail again for the Baltic in the summer of 1811.



Figure 5. Baltic Fleet disposition/dispersal, 1808. After Davey. (Davey, 2009, p. 69.)

Fig. 5 is Davey's representation of the dispersal -- the strategic positioning of the Baltic Fleet -- in 1808.<sup>13</sup> As a ship of the line, the *HMS St. George* was likely in the westernmost part of the Baltic much of the time, protecting the arrivals and departures of merchant convoys from the North Sea through the Kattegat. But captured documents suggest the

<sup>12</sup> Davey, Raymond, Ryan and others are not consistent as to when the "Baltic Fleet" was actually reconstituted and arrived on station in the Baltic – either in 1807 or 1808.

<sup>13</sup> Note the extreme outposts in the Gulf of Finland – perhaps a British blockade of the Russian navy, which had its main anchorage at Cronstadt, near St. Petersburg. (Raymond, 2010, p.88)

St. George was all over the Baltic during her time of service. The most dangerous region for the Baltic operations was most certainly the Danish Sound and Belt.<sup>14</sup>

This representation is most stimulating, however, because of the “convoy trade routes” Davey identifies with the red lines.

Many of the bottles could have come aboard the St. George via merchant vessels plying those trade routes. Many simply could have been purchased directly by the St. George ship’s master from any friendly wine merchant in any port accessible to the St. George.

Göteborg (known in Admiralty communications as “Wingo Sound”) and the island of Hano were probably the two most important trading bases for British merchants during the Baltic campaign of 1808-1812. They were certainly the nerve centers for the Baltic Fleet. (Davey, 2009 thesis, p. 157)

Hano was the nerve center for trade in the Baltic Sea proper, where multinational (British, Prussian, Russian, Swedish, etc.) convoys would gather for supplies of fresh water and muster for the trip to England, while Göteborg in the Kattegat was the friendliest port available for convoys arriving from the North Sea or leaving for it and Britain. Göteborg was essentially the Baltic Fleet’s “home away from home,” given Admiral Saumarez’s superb diplomatic skills and relationships with Göteborg’s governor.

Other Swedish ports, such as Malmö, Landskrona, and Karlskrona, also appear to have been open, quietly, to British trade. But what about the ports along the southern Baltic coast – Prussian and Russian ports that had once thrived with trade with Britain?

We do not know all of the specific Baltic ports that were, in fact, trading with Britain in the years 1807-1812. We have identified many -- Riga, Danzig, Malmö, Göteborg, Königsberg, Hano, Karlskrona, Matvik, Memel, the Gulf of Finland – but our understanding is not complete. And it is relevant as we consider where the bottles in the St. George collection could have come from.

Prussia, at the time the St. George was guarding convoys in the Baltic, was a French client-state and thus its Baltic ports were ostensibly closed to British trade. But we know Prussian trade with Britain was vibrant.

One set of captured orders from the St. George dated February 3 1808 is entitled: “St. George 3 Feb. 1808 Instructions relative to neutrals.” The orders specifically mention leaving Prussian ships alone if they are deemed “neutral” merchant ships, i.e. British traders or friendly Prussian traders. (Archive 151943, Søkrigskancelliet (Søetaten): Papirer fra erobrede eller strandede engelske skibe, 1805-1812, box 1007).

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<sup>14</sup> Davey identifies a documented “plan for the protection of trade” from May 6 1809 wherein two ships of the line were “To receive Convoys from the Belt between Femern and the Frindelen, and to take convoys from the point of Rendezvous to Nyborg.” (Davey, 2009, table 3, p. 68).

The erstwhile Polish parts of Prussia were French allies – featuring military integrations such as Polish officers serving in the French Army -- during the St. George's Baltic service. Did this prevent British trade with Danzig merchants? Did the British system of fraudulent papers, etc. for merchant ships beat any gauntlet of French interdiction along the Polish coastline?

The "Free City of Danzig" is another provocative example as a possible source of some of the bottles. One single Baltic port alone, such as Danzig, could have supplied the St. George with essentially every wine and spirit available to continental Europe.

Captured by Napoleon's forces in 1807 in the famed Siege of Danzig, and subsequently declared by Napoleon to be a quasi-independent "free" city-state, Danzig could be quite relevant to the origins of some bottles in the St. George collection.

Danzig was a marketplace and, significantly, a key trading port for British merchants prior to the Napoleonic wars and the attempted embargo of British trade with continental Europe. It is likely that many business relationships between those merchants and Danzig traders continued throughout the St. George's service in the Baltic.

British merchants (and Baltic Fleet ships' pursers) buying goods in Danzig would almost certainly have had access to spirits from all over Europe, regardless of Napoleon's Continental System. If so, those spirits could very well have made their way onto the St. George.

Davey confirms that Danzig was open to British trade at least as of 1809 when the town was investigated as a potential source of wood and water "...and to gain intelligence on its suitability as an anchorage for merchants" (Davey, 2009 thesis, p. 156). The nearby Vistula River was a significant trade route connecting the Baltic nations and the rest of Europe; the Bydgoszcz Canal, completed in 1774, connected the Vistula with the River Oder.

We know trade with Russia remained brisk, even while Britain and Russia were at war. Robust trade between England and Russia had thrived since the days of Ivan the Terrible in the 16<sup>th</sup> century. However, with his defeat of Russia in 1807, Napoleon could (and did) force Tsar Alexander I to sign the Treaty of Tilsit, which specifically forbade maritime trade with England.

Tsar Alexander I also, most likely to appease Napoleon and at least delay an invasion of Russia by Napoleon's army, declared war on England after the 1807 British assault on Copenhagen, as Denmark was a Russian client-state. The Anglo-Russian War, as it became known, was a bit hotter than the Anglo-Swedish "war" of 1807-1812 but it too was largely a paper war, i.e. a war to appease Napoleon's contempt for Britain – a "nation of shopkeepers," in a phrase attributed to Napoleon by some. Trade with Britain continued.

In fact, Russia seems to have been Britain's most important trading partner and favorite wholesaler in the Baltic, supplying critical naval stores such as timber, flax and hemp. (Ryan, 1962, p. 125). Indeed, more than 90 percent of all Russian hemp went to Britain; Ryan says that, while the British had tried for years to develop their own source of hemp and failed, "good quality hemp could only be obtained from Russia." (Ryan, 1962, p. 135).

Ryan goes so far as to say that the Napoleonic War "...was not a struggle for markets. It was a fight for political survival. Britain could not survive as a great power without imports of naval stores." (Ryan, 1962, p. 125) And those naval stores came from largely from Russia.

One remarkable document in the Danish National Archives is a handwritten list entitled "Statement of Goods generally exported from Petersburg to Britain and other ports now in the possession of the enemy, together with necessary instructions." It is a lengthy rows-and-columns inventory of specific goods ranging from flour to hemp with column headings such as "Always exports," "sometimes exports," and "almost never exports" and "ports." It is meant to identify which specific provisions were exported and to which Baltic ports. (Archive 151943, Søkrigskancelliet (Søetaten): Papirer fra erobrede eller strandede engelske skibe, 1805-1812, box 1007).

Trade with Russia is quite relevant to the St. George assemblage, particularly the collection of 33 bottles that appear to be of the French-champagne style. It is easy to conceive of these bottles coming to the St. George through Russian traders or fellow naval officers. Russia was, after all, an official ally of France in this period.

Before we leave Danzig, Poland and Russia, we would be remiss if we did not mention the strong possibility that another distilled spirits was bottled in some of the St. George assemblage: vodka.

Trade with Russia and Prussia (which occupied most of Poland at the time) was brisk. Danzig was a capital of Polish vodka production. Russian merchant vessels appeared regularly at British ports during the Napoleonic Wars.

Vodka was a well-established distilled liquor in Britain and throughout Europe, with Poland home to several hundred vodka distilleries and Russia not far behind in production.

It is speculation but reasonable speculation nonetheless: many of the St. George bottles could have been used to transport, store and/or serve vodka.

Proof that trade was not only lively and multinational in the Baltic but may have directly involved Royal Navy warships as sort of Britain afloat is a May 31 1811 letter from Admiral Samaurez to Admiral Reynolds informing the latter that the Portuguese Ambassador to the Court of Petersburg was on board the HMS Fiskard (a French fifth rate frigate captured March 9, 1797). (Archive 151952, Søkrigskancelliet (Søetaten): Papirer fra erobrede eller strandede engelske skibe, 1805-181, box 1004)

Other visits to British warships by the Portuguese Ambassador to the Russian tsar are recorded in other documents in the Danish National Archives. (Archive 151952, Søkrigskancelliet (Søetaten): Papirer fra erobrede eller strandede engelske skibe, 1805-181, box 1004)

Portugal, of course, was not only allied with Britain against Napoleon but was also a hugely important source of wine for Britain in this era – especially Madeira wine and Port wine. The St. George assemblage features a design theme that we have identified as the Port Family. These bottles made have originated in Portugal.

If British trade with Sweden, Prussia, Russia – essentially every Baltic power except Denmark-Norway -- during the St. George's Baltic Service was as vibrant as is documented, then we can rest our case: the wine and spirits markets of continental Europe were open for business with the St. George.

That some or many of the non-British bottles *could* have come aboard the St. George via these ports remains, of course, a theory. We are confident that deeper research would probably reveal a paper trail – bills of sale and exchange, for example – proving the theory correct.

Nonetheless, the evidence leads us to conclude: 1) that the Baltic was a vast, multicultural marketplace for British trade in spite of Napoleon's continental system, 2) virtually no port outside Denmark-Norway was actually closed to British trade, and 3) all of Europe's fine wines and spirits were most likely available to the Baltic Fleet and the merchants they protected.

Indeed, historians would be hard-pressed to identify a Baltic port (outside of Denmark) that was indeed actually "closed" to British shipping.

Most Baltic ports seem to have been definitively open to British trade – if not in British ships then in "neutral" ships that had been issued false papers or reflagged expressly for the purpose of beating the continental system.

The market depended on the armed protection of free-market economics and opportunism: "Any merchant flying any flag, except French, was open to trade with Britain." (Ryan, 1959, p. 127) Those merchants trading with Britain were given the protection of the Royal Navy.

Conversely, British policy carried consequences for merchant ships operating in the Baltic that refused to do business with Britain. It was a "do business with us or not at all" approach: "Any ship intercepted on course for a hostile port, that is a port from which British ships were excluded, without having first cleared from Britain, or not bound for a British port, having cleared from a hostile port, was subject to capture." (Ryan, 1959, p. 127).

The policy worked beautifully. It depended on a “vast pool of foreign shipping [that] was made available for the carriage of cargoes to and from the Baltic.” (Ryan, 1959, p. 462). “Trade was very largely carried in foreign ships and with false papers, customs officials were bribed, systematic smuggling was organized.” (Ryan, 1959, p. 443).

Ryan describes an environment – indeed a vast, bustling maritime marketplace – where subterfuge, fraud, and legerdemain were the coin of the realm. Trading with the so-called “enemy” (e.g. Sweden, Prussia and Russia) was the way of doing business. It was economic warfare.

French consuls in hostile ports were “careless, if not corrupt – local authorities, uncooperative;” “cunningly forged papers” for all “neutral” ships trading with Britain demanded that their crews rehearse and align their stories about their ports of origin and destination in the event they were captured and interrogated by the French. (Ryan, 1962, p. 138).

“Ships clearing from Britain to the continental ports always carried papers by which it was made to appear that they sailed from a neutral, a French, or French-allied port. On arrival at the port of destination the crews had to be ready to swear that they had neither cleared from, nor touched at, a British port. The use of false papers by highly skilled professional forgers made it difficult for the enemy to obtain legal proof that a ship had come from Britain.” (Ryan, 1962, p. 138).

Conversely: “Ships bound for Britain from the continent always cleared officially for another continental port; those sailing from Scandinavia and the Baltic usually named the Netherlands or France as their destination. The trade could not survive without forgery and perjury.” (Ryan, 1962, p. 138).

Trade in the Baltic presented unique problems for the Admiralty, challenges not faced in other theatres of operation such as the Mediterranean and the West Indies.

When Napoleon decreed all Baltic ports “closed” to British shipping, the Admiralty found an effective way around this: either reflagging British merchant vessels under the flags of “neutral” nations, or by issuing false papers to merchant vessels (both “neutral” and British). (Raymond, 2010, p. 2).

In Raymond’s words: “British officials were actively providing falsified documents such as licenses and certificates of ownership in violation not only of the Continental System, but Britain’s own Navigation Acts, which required all British trade to be conducted in British ships.” (Raymond, 2010, p. 2).

Several of those blank licenses, shipped to RN warships for distribution, are in the Danish National Archives, as are instructions to ship’s captains on how to use them. (Archive 151943, Søkrigskancelliet (Søetaten): Papirer fra erobrede eller strandede engelske skibe, 1805-1812, box 1007).

In fact, Admiral Samaurez enclosed several blank licenses in a letter to Admiral Reynolds dated July 13 1811, with instructions to pass them along to a Mr. Gibson in Königsberg – the capital of East Prussia. (Mr. Gibson appears to have been a welcome British trading agent in Königsberg.) (Archive 151943, Søkrigskancelliet (Søetaten): Papirer fra erobrede eller strandede engelske skibe, 1805-1812, box 1007).

This obviously compounds the difficulty in exploring how and where the St. George collection came aboard ship, not to mention the origins of the bottles, with any certainty. Britain not only sanctioned but encouraged, facilitated and protected smuggling efforts by both British and non-British merchant ships. (Raymond, 2010, p. 4).

At the same time, however, it excites our imaginations as to the possible sources of many of the bottles. Many of the St. George bottles could have come from any of those merchant ships or any non-Danish Baltic port during the years the St. George protected trade in the Baltic.

That wine and spirits were extremely popular and profitable trade goods in Europe during this period is well-known. Supply and demand for wine and spirits – especially demand from the Baltic Fleet -- in these years is also well-documented.

Surreptitious, unofficial trade continued with Sweden throughout the Napoleonic Wars, even while Sweden was officially at war with Britain. However, although Sweden could not supply adequate quantities of bread, spirits, or wine, she could and apparently did provide a beverage called “Prize Brandy.” (Davey, 2009, p. 70)

Davey, quoting a 13 July 1808 letter to Lord Mulgrave (then Lord of the Admiralty) from an anonymous “Observator” officer who was very much concerned about supplying the Baltic Fleet in its early days on station, gives us a provocative clue as to the possible provenance of at least a few of the St. George bottles:

*“Sweden is unable to afford the necessary supplies our Ships are accustomed to have, & of the same quantity. Bread especially being of an extreme coarse quality, Spirits exported from this country chiefly Prize Brandy, and very dear. Wine from the Mediterranean hardly any to be got, these my Lord are material Articles, and in Victualling of the most consequence...”* (Davey, 2009, p. 70, grammar and punctuation as reported by Davey).

When reviewing Continental Family of artifacts, we must remember this contemporary reference to “Prize Brandy” supplied by Sweden, which was “very dear.” We must also remember the Observator’s somewhat forlorn lamentation that wine from the Mediterranean was “hardly any to be got” in the first year of the Baltic Fleet’s operation. (This latter problem was solved quickly.)



It is against this tapestry that we begin to understand the St. George assemblage, especially as we try to ascertain, if not the origins of the bottles, at least where and how they may have been brought on board the St. George.

### **Victualing the Fleet: procurement, transport...and too much lemon juice**

Another primary source for much of the St. George collection is the most likely the Admiralty itself.

Sustaining the Baltic Fleet, on station for months at a time, from Royal Navy ports and dockyards required ingenuity, remarkable planning and administrative skills, and superb logistical prowess. It was also, in Davey's words, "...a game of subterfuge and intrigue for the Royal Navy." (Davey, 2009, Intl. Journal of Maritime History, Vol. XXI, No. 2, p.243.)

"Every winter the Baltic froze for two or three months, bringing further problems as the majority of the fleet sailed back to England, leaving a number of smaller ships to be victualed in dock...One anonymous officer wrote to the Lord of the Admiralty Mulgrave expressing his fears; while Sweden could supply water, he noted, it could not provide bread, spirits or wine, and the sheer size of the fleet required more food than Scandinavia could supply."<sup>15</sup> (Davey, 2009, IJMH, p. 244).

In earlier, far-flung conflicts such as the American War and Seven Years War, Britain had learned the hard way what an unreliable provisioning system could do to a blue-water Navy and Army far from home. It had learned much by the time of the Napoleonic Wars.

Although in the early years of the Baltic Fleet there were certainly hiccups in the logistical system supplying it, such as in 1808 and 1809; by the time of the St. George's season on station in 1811, however, the supply chain had been improved and worked smoothly.

Davey tells us a story that, while supremely relevant to our research, is a bit unclear when it comes to the punchline.

In November 1809, apparently still on station in the Baltic, Admiral Saumarez wrote what Davey terms "a forceful letter" to the Victualing Board "representing that the Squadron under his command being very much in want of a supply of Spirits." (Davey, 2009 dissertation, p. 226).

What precipitated this letter was a significant shortfall in the shipping of spirits to the Fleet in 1809 – only some 538,720 pints had been transported of a total of 809,600 pints needed to maintain the official ration for the Fleet. (Davey, 2009 dissertation, p. 226).

Saumarez responded to the shortfall not only with his letter to the Victualing Board but with directions to Mr. Robert Gamble, purser of the Victory to purchase between 4,000-5,000

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<sup>15</sup> This is apparently the same anonymous "Observator" officer Davey refers to in another 2009 publication. If so, then this officer contradicts himself in his letter(s) to Lord of the Admiralty Mulgrave. Compare this report claiming that Sweden could not provide spirits to the earlier report about Prize Brandy from Sweden.

gallons of rum. But from where and from whom would Mr. Gamble find such quantities of rum at such short notice?

Davey does not say. But rum was almost certainly delivered to the Fleet through Deptford-Yarmouth. After all, rum was a principal import-for-export from the West Indies (e.g. Jamaica). It is very likely that rum was a prime item for sale among the vast flotillas of British merchants that the St. George watched over in the Baltic ... which raises a very interesting possibility for the St. George collection.

Admiral Saumarez's purchase order through Mr. Gamble could, of course, have been filled by one or more spirits merchants servicing the Royal Navy through Deptford and the rum then shipped to the thirsty Fleet.

But suppose Mr. Gamble simply issued a call for rum to all merchants *then in the Baltic*? It is quite possible that short-notice purchase orders like this could simply have been issued to the floating marketplace that each merchant convoy in the Baltic represented. And this was a purchase order directly from the Admiral of the Fleet.

We must also remember that the St. George carried the flag of the Baltic Fleet's second-in-command, Rear Admiral Reynolds. Because of this, we believe the St. George had significant "purchasing power" in the Baltic. We will return to this, as it is perhaps the most important factor that distinguishes the assemblage from other comparable collections.

### **Bottles as standard Royal Navy provisions**

The victualing system was the likely source of the majority (at least 56 percent, the Wine Family) of the St. George assemblage. These bottles are likely a reflection of that provisioning system, just as the other designs or styles (e.g. the Continental Family) are likely a reflection of the thriving black market that the St. George helped protect.

In the Mediterranean, it was common practice for the Royal Navy to procure supplies locally. Not for the prodigious appetite of the Baltic Fleet in the inhospitable Baltic. Trade was indeed robust but the feeding and watering of roughly 15,000 seamen on station required massive amounts of provisions on a consistent basis ... a wartime supply chain that was dependable, sustainable and capacious. Neither Sweden nor any other Baltic power could manage such a supply chain for such a huge force.

Although deeper archival research would likely yield some certainty, we can surmise that a large proportion of the St. George collection did indeed either leave the UK aboard the St. George or was delivered to it through the victualing system. The preponderance of historical documentation we have seen makes this highly likely.

Davey says that in European waters, while it was cheaper to send out provisions to the Baltic Fleet from Plymouth, Deptford and Portsmouth, perishables such as meat and "...weighty and bulk supplies such as water..." were obtained locally through the Baltic

campaign. But the sources of provisions were dependent largely on the “wink-and-a-grin” arrangement with the Swedes ... and the local pipeline simply could not reliably or sustainably produce the quantities demanded by the Fleet. (Davey, 2009 dissertation, p. 193.)

The Admiralty depended on two Boards to procure and deliver provisions, including spirits, to the Royal Navy in the Baltic – the Victualing Board and the Transport Board, respectively. The former would procure the necessary provisions, from the private sector if necessary (and it was), while the latter would be responsible for delivery to the fleet, including securing the necessary tonnage and vessels to do it. (Davey, 2009 dissertation, p. 129).

The Admiralty’s role in the provisioning process was two-fold. First it informed the Victualing Board of the fleet’s needs and then it supervised the organization of a convoy with the Transport Board once the transports were fully laden. Victualing transports were added to trade convoys heading to the Baltic on a weekly basis. (Davey, 2009, IJMH, Vol. XXI, No. 2, p. 245)

The Admiralty decreed that the Baltic fleet were to be provisioned initially with six months’ provisions. Resupply would take place via additional convoys throughout the trading season. (Davey, 2009 dissertation, p. 177)

Davey argues that this wartime supply chain – provisioning or victualing the Baltic Fleet from the UK – was *the* critical success factor for the Royal Navy defeating the continental system in the Baltic. “By 1810 a fleet lying in the Baltic was as well supplied as one lying off Deptford, significantly widening operational capabilities,” he argues. (Davey, 2009 dissertation, p. v).

Again, the St. George collection contains a sizeable proportion of what appear to be of the dark-“green” cylindrical, heavy-glass beverage bottles known to have come from British glass kilns of the period. At minimum, the Wine and Beer families appear to fit this source. They are certainly the most common variety of the period according to Jones, Hume, Dumbrell, and other experts.

If these bottles are indeed of that lineage, then they may very well have come aboard the St. George by way of Deptford, the central victualing yard for the Royal Navy during the Napoleonic Wars.

Provisions – including spirits, “always the most popular of victuals” – were delivered to the Baltic Fleet by a supply chain of regular transports from Deptford, Plymouth and Portsmouth in the years 1808-1812. (Davey, 2009 dissertation, p. 226).

This remote-supply strategy – “convoys of victualers” -- was as much a tenet of Britain’s war policy as the show of force the Baltic Fleet itself represented: “Remote supply removed fleet dependence on local politics and climates that could not be guaranteed, and

allowed victualing decision making to be centralized in London.” (Davey, 2009 dissertation, p. 62).

Thus it is probable that at least half of the St. George assemblage is British in origin – made in England, and perhaps procured by the Royal Navy through its Victualing Board (headquartered at Deptford), delivered to Deptford by the contracting spirits agent(s), and then transported by convoy to the St. George on station in the Baltic.

### **Too much lemon juice**

The victualing system worked so well that by 1810, the Baltic Fleet was *oversupplied*, leading the Victualing Board to ask the Admiralty for permission to suspend shipments. (Davey, 2009 dissertation, p. 188).

In fact, the physician to the Baltic Fleet, one Dr. Jamison, wrote to the Transport Board in 1811 complaining that the fleet had too much lemon juice – a “lavish” supply in fact that could cause health problems for seamen due to overuse. (Davey, 2009 dissertation, p. 189).

Our questions: how was this victual of lemon juice (and perhaps other non-alcoholic liquid provisions such as vinegar, etc.) shipped to the Fleet? The answer may help us understand how wine and spirits were shipped to the Fleet as well.

Davey lists “38,500 lbs.” of “lemon juice” included in a June 7, 1808 victualing delivery to the Fleet.<sup>16</sup> (Davey, 2009 dissertation, Table 5, p. 128). The Admiralty’s choice of the term “lemon juice” as opposed to “lemons” on this order leads us to believe that the juice itself was the victual shipped rather than the loose fruit.

This order alone would equate to roughly 4,800 gallons of lemon juice, making shipping them in gallon-or-smaller bottles seem impractical.

However, Davey presents us with a provisioning order from October 1808 destined for Flemish Roads, Gothenburg that includes a line item for 19,110 “lemon juice bottles” in addition to a separate line item for 76,464 lbs. of “lemon juice.” (Note the reference to juice in “lbs” rather than a liquid measure such as gallons.) Our guess is that the lemon juice was most likely shipped in bulk, as juice in casks and bottled somewhere in theatre for distribution to the appropriate ships.

Bottling in theatre may be important, as we shall see.

### **The fountainhead of victualing the Baltic Fleet: Deptford**

Efficient provisioning would continue until the Baltic Fleet ended operations in 1812.

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<sup>16</sup> Unlike lemon juice, Admiralty records usually list wine, rum, vinegar and spirits in liquid measures, usually gallons.

The Deptford Victualling Yard on the Thames was the nerve center of provisioning for the Royal Navy. The Victualling Board ran other large yards at Plymouth, Portsmouth and smaller operations at Chatham and Dover.<sup>17</sup> Massive amounts of foodstuffs and supplies, including spirits, for the tens of thousands of men on station in the Baltic came through these yards and onto the Baltic aboard victualling fleets.

By 1808-09, the Baltic fleet was primarily supplied from the British “out-port” of Yarmouth, as it was deemed “more accessible” to the Baltic in terms of sailing time and distance than was Deptford. (Davey, 2009 dissertation, p. 184). Victuals still came through the central victualing depot of Deptford; those destined for the Baltic fleet were simply forwarded onto Yarmouth for loading onto transports. (Davey, 2009 dissertation, p. 185)

Importantly, warships were not used for supplying the Baltic fleet: private transport vessels were contracted by the Transport Board. These sailed to and from the Baltic in large, protected convoys – the primary artery supplying the Fleet.

For example, Davey lists 11 transport ships, totaling roughly 1600 tons of provisions, for a single convoy that was contracted and laden with provisions -- all in a nine-day period in July 1808. The convoy arrived in the Baltic in late August. (Davey, 2009 dissertation, p. 129).

More to our purpose: Davey identifies a June 13 1809 victualing delivery to the Baltic Fleet that included 28,952 gallons of “spirits ... which will serve 12,000 men this number of days,” the number of days listed at “38.”<sup>18</sup> (Davey, 2009 dissertation, p.132).

Similarly, in 1811, Admiral Samaurez, after requesting from the Victualling Board “...that the Spirits and Bread destined for Wingo Sound be hastened as much as possible,” soon thereafter that, along with the bread, “...three Tons of Spirits...” had been received on station at Wingo Sound. (Davey, 2009 dissertation, p. 186).

These are huge amounts of spirits, of course. And the Royal Navy sustained this pipeline through dozens of multi-vessel victualing convoys to the Baltic Fleet from 1808-1812.

**Table 1. March 1810 victualing order for Baltic Fleet. From “Sustaining the Empire” website, Greenwich Maritime Institute and National Maritime Museum, 2012.**

|                |                     |
|----------------|---------------------|
| Bread          | 45,192 pounds       |
| <b>Wine</b>    | <b>1412 gallons</b> |
| <b>Spirits</b> | <b>706 gallons</b>  |
| Flour          | 4842 pounds         |
| Suet           | 403 pounds          |

<sup>17</sup> (GMI website, <http://www.rmg.co.uk/researchers/research-areas-and-projects/sustaining-the-empire/>.)

<sup>18</sup> Based on the estimated capacity of the St. George collection, this single shipment of spirits to the Baltic is roughly 50,000 times that capacity.

|                    |                    |
|--------------------|--------------------|
| Raisins            | 807 pounds         |
| Pease              | 100 7/8 bushels    |
| Oatmeal            | 75 5/8 bushels     |
| Sugar              | 1210 pounds        |
| Butter             | 1210 pounds        |
| Cheese             | 2426 pounds        |
| <b>Vinegar</b>     | <b>134 gallons</b> |
| Tobacco            | 538 pounds         |
| <b>Lemon juice</b> | <b>941 pounds</b>  |
| Sugar              | 941 pounds         |

As an example of a typical victualing shipment to the Baltic Fleet, the Greenwich Maritime Institute and the National Maritime Museum published in 2012 on its website a list (Table 1) of the types of provisions shipped in a March 1810 order.<sup>19</sup>

Table 1 is a list of a single shipment to the Royal Navy garrison of 450 sailors and Royal Marines on the tiny Island of Anholt (in the center of the Kattegat, the strait between Denmark and Sweden). It includes more than 2,000 gallons of “wine” and “spirits.”

As the vast majority of the St. George assemblage are apparently quart-sized and smaller-capacity bottles, this would translate into enough wine and spirits to fill roughly 6,000 – 8,000 glass beverage bottles.

These huge quantities return us to the question: how were all these bulk quantities of beverages shipped from Deptford? Surely not in bottles?

If not, how then did the bottles themselves get to the Baltic? Was empty bottles part of the victualing supply chain from Deptford? Were the bottles procured locally? Or did they travel with the St. George from the UK as part of its normal, seagoing stores and provisions?

Davey, while helping us greatly with the “upstream” supply chain from the UK, does not address the downstream storage and distribution methods used in the Baltic for victualing the fleet on station. That is, by thoroughly reviewing Victualing Board, Transport Board and other records from the “back office” of the supply chain, he identifies orders and shipments of bulk provisions to the Fleet -- but not how those materials were distributed to individual ships once they arrived “downstream” in the Baltic “front office.”

The literature (e.g. MacDonald, Davey, Raymond) suggests that, under normal circumstances, wine and spirits were often shipped in casks of varying sizes and then the

<sup>19</sup> (GMI website, 2012, <http://www.rmg.co.uk/researchers/research-areas-and-projects/sustaining-the-empire/>).

contents de-casked and bottled in theatre at Royal Navy victualing ports. (We are reminded of Nelson's corpse being preserved, initially, in a cask of brandy upon its return to England from the Mediterranean in 1805.)

But the Royal Navy operated no victualing ports in the Baltic.

Further, as Smith points out, some casks were tailor-made for dry goods, including bottles: "dry coopering" (also known as "slack work") produced casks suitable for the transport of bottles. "Wet coopering" (known as "tight work") produced reasonably watertight casks capable of transporting liquids such as wine, spirits, water, beer, jams, syrup, vinegar, etc. (Kimberly Smith, 2009, p. 226)

Thus, the role of casks in victualing the Baltic Fleet presents another possibility: the bottles could have been shipped empty in casks from the UK and then filled on station, as was done for lemon juice. But de-casking and bottling on station in the Baltic theatre presents the obvious questions of "where?" and "how?"

### **Warehousing and bottling: Anholt, Hano, and Heligoland?**

How did the wine and spirits (and perhaps other beverages) get from casks into the St. George bottles? Where were the spirits bottled?

It is likely that each ship carried its own supply of bottles and filled them from casks it carried in its hold. MacDonald clearly believes that this is the case – that wine, beer and spirits were largely transported in bulk and in casks and served directly from those casks while at sea. (MacDonald, 2004, p. 76).

Another tantalizing possibility exists, however.

Although the Royal Navy had no official port or base of operations in theatre for the Baltic Fleet, it did maintain at least three terrestrial stations in the region: the islands of Anholt and Hano in the Baltic, and Heligoland in the Waddensea (the North Sea coastal region of Germany).<sup>20</sup>

These served as forward operating bases for the Fleet– and could conceivably been venues for de-casking wine and spirits for bottling and then distribution to individual ships.

After all, we are referring here to vast amounts of wine, beer and spirits to sustain roughly 15,000 men on station for several months each year – aboard an armada of dozens of warships. Downstream (i.e. in the Baltic) distribution of provisions from the supply convoys would have been a Herculean task.

By 1807, the island of Heligoland was a sort of forward operating base and important trading hub for British merchants doing business with north German ports and in the Baltic.

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<sup>20</sup> Other islands mentioned by Davey include Gothska Sandön and Nargen Island, which would prove to be important sources of water for the Fleet. (Davey, 2009 dissertation, p. 157).

Warehouses were built on the island for the purpose of storing cargoes to and from the Baltic. (Raymond, 2010, p. 90-91).

The island soon became a smuggling hub for British merchants and “neutral” traders. Some of the St. George bottles could have passed through the warehouses on Heligoland after being filled with the various beverages from Yarmouth-origin casks.<sup>21</sup>

Similarly, the island of Hano, just south of the Swedish town of Karlshamn, was also a major forward operating base for the Baltic Fleet. Here too the Royal Navy built warehouses “for the benefit of ‘neutral’ traders.” (Raymond, 2010 dissertation, p. 141). Hano could also have been a de-casking and bottling center for the Fleet. Davey confirms that Royal Navy ships were supplied and provisioned through Hano. (Davey, 2009 dissertation, p. 220).

The island of Anholt<sup>22</sup>, lying midway between Sweden and Denmark in the Kattegat strait, essentially the entrance/exit to the Baltic, seems the most important of the three forward operating bases. Davey says the island played “...a crucial role for the British Fleet in the Baltic.” It was captured from the Danes in May 1809, primarily as a source of fresh water for the Fleet, and garrisoned with Royal Marines. (Davey, 2009 dissertation, p. 155).

Spirits were unquestionably delivered to the Garrison on Anholt through the victualing system. We do not know without deeper research if Anholt also featured warehouses for those spirits but it seems likely given the permanent presence of British troops there and the strategic, relatively safe position of the island.

Again, Table 1, outlining one shipment of provisions to the Anholt garrison, indicates its role as a forward operating base for the Royal Navy. Davey also identifies further shipments to the British troops stationed there, as the island was a year-round outpost for the Royal Navy. Provisions were to be provided for the troops, “their Wives and Children,” and approximately 100 local Danish inhabitants. (Davey, 2009 dissertation, p. 156).

Anholt seems a perfect example of the Royal Navy planting the British flag, as it were, any place it could in the Baltic – though not for the sole purpose of conquest but simply to have access to land and fresh water. It could have played a role in the biographies of the St. George assemblage of bottles: indeed, it could conceivably have served as a bottling center.

“The acquisition of this island,” wrote Saumarez, “will prove of considerable importance in furnishing supplies of water to His Majesty’s Fleet and affording a good anchorage to the

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<sup>21</sup> In December 1807, a delegation of British merchants even applied to the Royal Navy to establish a brewery on the island so as to satisfy the thousands of thirsty seamen on duty in the Baltic. (Raymond, 2010, p. 90-91).

<sup>22</sup> Anholt’s value to the RN was as a lighthouse for navigation and a source of water. Soon after its capture, the island was actually commissioned by the Admiralty as a stationary “warship,” the HMS Anholt, with a “crew” of 450 sailors and Royal Marines.



trade of the Country coming or going from the Baltic.” (Davey, 2009, Intl. Journal of Maritime History, Vol. XXI, No. 2, p. 248).

Anholt was the only true forward operating base in the Baltic under the British flag; Hano and other Swedish islands were accessed with the quiet, pragmatic cooperation of the Swedish government in defiance of Napoleon.

Continuously sustaining roughly between 10,000 – 15,000 men, women and children aboard dozens of warships for six or seven months at a time in a hostile theatre of war was a titanic administrative and logistical challenge. Again, the Royal Navy had no bases in the Baltic, no home port, and all Baltic ports were ostensibly closed to British ships of any kind.

Common sense tells us that *terra firma*, no matter how small or seemingly insignificant, would be greatly valued for such a massive naval presence – especially if it could also consistently provide fresh water and “a good anchorage to the trade of the Country coming of going from the Baltic.”

These forward operating bases could also have serve as in-theatre distribution points for provisioning the fleet. They could have been bottling centers for many of the St. George assemblage.

We posit that the majority of the assemblage came to the St. George from British kilns through the victualing system. We *theorize* that the remainder may have been personal stores of the officers and came aboard the St. George in the Baltic during her service there.

## Beverages Aboardship

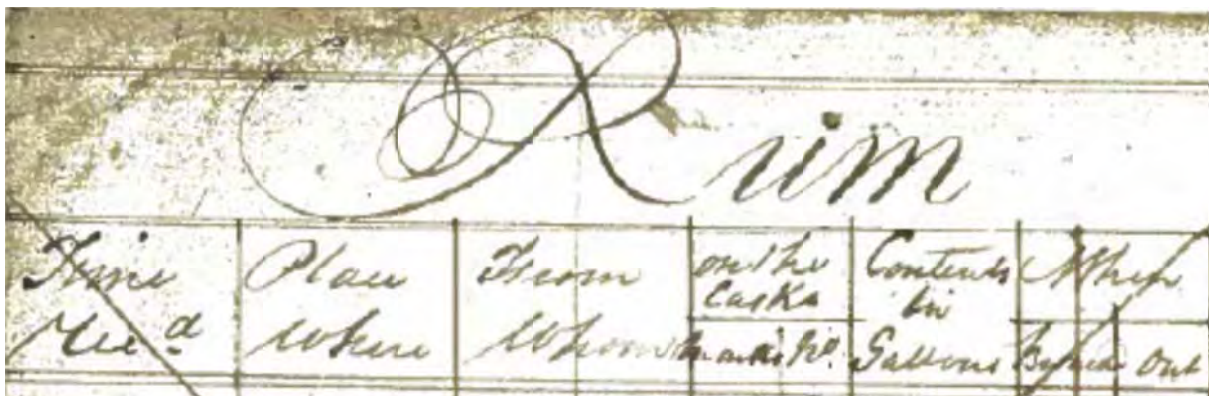


Figure 6. Page heading of “Rum” from an inventory list of provisions, HMS Turbulent, a Baltic Fleet brig captured as a prize by the Danes June 9 1808. (Danish National Archives, 151932 Søkrigskancelliet (Søetaten): Papirer fra erobrede eller strandede engelske skibe, 1805-1812, box 999)

The obvious questions...

What was in the bottles? What alcoholic beverages were officially victualled to the St. George by the Royal Navy? Where were these beverages stored and how? How were wine and spirits treated aboard ship?

We have reviewed the historical context of the bottles with an investigative eye towards their possible sources, and introduced a likely cask-to-bottle transport theory. We have looked at the glass-bottlemaking industry during the St. George's final years.

In her book, "Feeding Nelson's Navy," Janet MacDonald appears to have thoroughly and reliably reviewed the eating and drinking regimens and habits of British seamen and officers during the St. George's time of service. What MacDonald tells us is best compared and contrasted against, first, available historical documentation and, second, Royal Navy Regulations that likely would have governed life and behavior aboard the St. George during her Baltic service.

The Admiralty published its first formal set of Regulations in 1733. They included a basic diet-ration for each seaman, which did not change substantively until after 1847 when the Admiralty finally accepted the new technology of canning food. (MacDonald, 2004, p. 9).

By the start of the 19<sup>th</sup> century, "...the Admiralty and Victualing Board had methods and processes in place to ensure that the food provided for naval seamen was both good and plentiful, and that it was issued with scrupulous fairness." (MacDonald, 2004, p. 12).

We will look at the 1808 Regulations here, the first year of the St. George as part of the Baltic Fleet.

These Regulations must be viewed with a codicil, however. The St. George in 1811 was a flagship for a Rear Admiral who was second-in-command of the Baltic Fleet. His command style and personality very well have influenced how strictly those Regulations were observed, especially so far from home.

Rear Admiral Reynolds may very well have been a strict, no-nonsense, by-the-book officer, demanding that his flagship set the example for the rest of the Baltic Fleet. Captain Guion, who had just become flag-captain of the St. George in February 1811, may have been determined to present his crew's best to Rear Admiral Reynolds while he was aboard.

The crew of the St. George may have been a bit sharper, a bit more on their toes, than other crews of the Baltic Fleet. The St. George's decks may have been swabbed a bit cleaner than other ships. Regulations may have been observed not just to the letter but to the spirit of their intent.

Conversely, because rank certainly had its privileges in the Royal Navy, Reynolds and Guion may have been a bit more relaxed with the crew.

Beer, rum, grog, champagne, brandy, arrack and claret, burgundy, port, sherry, white wines...these are the various “species” (to use Royal Navy victualing terminology) of alcohol most likely consumed by the officers and crew of the St. George. The bottles of the St. George collection could have held any of these alcoholic beverages and many more<sup>23</sup>. Some bottles could also have been used to serve lemon and lime juice and vinegar.

Grog deserves a special word here. It is unlikely that the St. George bottles contained grog, a mixture of rum, water and weak beer that had been a standard refreshment for Royal Navy seamen for almost 70 years at the time of the St. George wrecking.

Unlike beer, grog appears to have been the exclusive province of the crew, and rationed directly from casks on deck. The 1808 Regulations include specific instructions for the mixing of grog (Section IX, Chapter One, Article XXII), with the mandate that “spiritous liquors always to be served mixed with water.” The Regulations index (p. XV) lists these instructions and mandate as “GROG to be mixed before Spirits be issued;” therefore the “spirituous liquors” mentioned is almost certainly rum.

*”As it is of very pernicious consequence to suffer the Seamen to drink, in drams, the allowance made to them any kind of spirituous liquor in lieu of beer; and it having been found by experience, that the serving of it mixed with water is very conducive to the preservation of their health; every Commander is therefore strictly charged, never to suffer any kind of spirituous liquor to be issued by itself to the Company of the Ship or Vessel under his Command, but to cause the allowance for all the Officers and Company to be every day mixed with a due proportion of water upon deck in the presence of the Lieutenant, and two other Officers of the watch, who are to be strictly charged to take care that the men be not defrauded of their allowance; and he is also to give strict Charge to all his officers to be very careful in their respective watches, to prevent spirituous liquors of any kind being conveyed on board the Ship, and to use all possible diligence to prevent drams being drank by any of the Ship’s Company.”* (Admiralty, 1808, p. 301)

All this to say, principally, that “drams” – small drinks or what we would refer to in modern times as “shots” – of rum strictly prohibited for Ship’s Company. The St. George herself provides the rationale for this strict control: several courts-martials for “drunkenness” were held aboard the St. George during her service in the Baltic. (Archive 151952 Søkrigskancelliet (Søetaten): Papirer fra erobrede eller strandede engelske skibe, 1805-1812, box 1004).

In essence, we are leaning here towards two theories: 1) first, that the bottles in the St. George assemblage were likely the exclusive province of her officers, and 2) that these class-conscious officers were unlikely to have imbibed in anything as pedestrian and

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<sup>23</sup> One interesting possibility is absinthe, which was just emerging as a fashionable distilled spirit in France at the end of the 18th century.

common as grog – particularly when there was apparently a quite rich inventory of higher-quality and rarer alcoholic refreshments available to them.

### **Wine, beer, rum and brandy: official provisions**

Of all the possible beverages, we have no doubt that at least four – wine, beer, rum, and brandy -- were almost certainly stored in and/or served from at least some of the St. George bottles.

Astonishingly well-preserved documents from the St. George and other Baltic Fleet ships indicate that these four specific beverages were official Royal Navy victuals or provisions for the Baltic Fleet.<sup>24</sup> (Many such documents, from either captured or wrecked British warships, were reviewed at the Danish National Archives.)

For example, several documents from the HMS Turbulent offer evidence of rum as a common victual for the Baltic Fleet. (A 12-gun brig, she was captured by Danish gunboats on June 9 1808 during the so-called “Gunboat Wars” just off the coast of Saltholm, between Copenhagen and Malmo. She was serving as an escort for a convoy of 70 merchantmen and was taken by the Danes as a prize.)

Captured documents from the Turbulent include victualing reports that list rum deliveries to the brig. Figure 6 is an image of a page heading from an inventory of provisions from the HMS Turbulent. The page indicates that Rum was stowed in casks but measured in gallons.

The dates for entry for these rum deliveries to the Turbulent run from May 6 – July 20 1807, just weeks prior to the Second Battle of Copenhagen, which began on or about August 16 1807, and in which the Turbulent participated.

A later “Report of Survey” from the Turbulent, dated May 21 1808 – less than three weeks before her capture – includes a line item “Spirits” in the amount of 160 gallons. (Archive 151952 Søkrigskancelliet (Søetaten): Papirer fra erobrede eller strandede engelske skibe, 1805-1812, box 1004). This was very likely 160 gallons of either brandy or rum and it was very likely transported and stowed in casks of varying sizes.

Indeed, a captured handwritten inventory (“survey of provisions”) from the HMS Pandora dated May 1808 - March 1809 includes entries such as “Rum, seven hundred and two gallons in one hogshead, twelve barrels with four hundred hoops” and “wine, Forty gallons in two half hogsheads, sixteen iron hoops.” The survey also includes an inventory of “casks by denomination: leagers, butts, puncheons, Hhds [abbreviation for “hogsheads”], kilderkin, Barricadoes of 10 gallons.” (Archive 151948, Søkrigskancelliet (Søetaten): Papirer fra erobrede eller strandede engelske skibe, 1805-1812, box 1003).

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<sup>24</sup> These documents appear again and again in the Danish National Archives; there are far too many to reference here individually.

Other documents from the National Archives also confirm that rum and brandy were officially victualled spirits for the Baltic Fleet, along with wine and beer: for example, pre-printed inventory or victualing forms from several ships include those four alcoholic beverages, with the amounts measured in “days.”<sup>25</sup> The ship’s purser would most likely have completed this inventory. Figure 7 is an image of the relevant section of this inventory.

|     |                         |       |
|-----|-------------------------|-------|
| 557 | Total Number Victualled |       |
| 44  | Bread                   | Days  |
| ..  | Beer                    |       |
| ..  | Brandy                  |       |
| 60  | Wine                    |       |
|     | Rum                     | Weeks |
| 13  | Beef                    |       |
| 13  | Pork                    |       |
| 13  | Peale                   |       |
| 13  | Oatmeal                 |       |
| 9   | Flour                   |       |
| 9   | Suet                    |       |
| 9   | Fruit                   |       |
| "   | Butter                  |       |
| "   | Cheese                  |       |
| "   | Rice                    |       |
| 9   | Sugar                   |       |
| 10  | <del>en</del> Sugar     |       |
| 10  | Vinegar                 |       |
| 115 | Tons of Water           |       |

Figure 7. Part of a victualing inventory from HMS Turbulent. (Archive 151952 Søkrigskancelliet (Søetaten): Papirer fra erobrede eller strandede engelske skibe, 1805-1812, box 1004).

<sup>25</sup> Other records at the Danish National Archives usually list wine, rum and brandy as being in casks but measured in gallons.

## Rum

It is important to remember here that the *St. George* herself spent time at the fountainhead of rum in the age: the West Indies – Port Royal, Jamaica to be exact. The Danish National Archives again provide documentation for this: a letter from the *St. George* captain at the time, Hon. Hon. Mich. de Courcy, "given under my hand on board HM Ship the *St. George* at Port Royal in Jamaica this 17th day of June 1805." (Archive 151952 Søkrigskancelliet (Søetaten): Papirer fra erobrede eller strandede engelske skibe, 1805-1812, box 1004).

It is entirely possible, if not likely, that rum (and perhaps other hard-to-come-by-in-Europe spirits, such as Canadian whiskey) was brought aboard in bottles during the *St. George*'s time in the West Indies and the Americas in 1805.<sup>26</sup> Many years earlier, during the American War for Independence, what had started as a reward for hard duty became a normal ration of 1/3 of a pint per day, "...justified as being necessary to purify the water." (MacDonald, 2004, p. 11).

That rum was a popular spirit for the Royal Navy is not in dispute. Various rum-based concoctions seem to have been common, according to MacDonald. Rum, water, sugar and nutmeg mixed together was known as "Bumbo." Rum or brandy mixed with beer and sugar and then heated with a hot iron was called "Flip." In the officers' wardroom, similar mixtures with lemon juice and hot water were made into punch. (MacDonald, 2004, p. 42.)

## Beer

Beer was the most common beverage of all for ship's crew, although it did not travel well in the summer months. MacDonald indicates that beer was the "official drink for seamen" in the Royal Navy. (MacDonald, 2004, p. 40). The daily allowance was one gallon<sup>27</sup> but it was very weak beer at roughly 2-3 percent proof. The Victualing Board even brewed its own beer for the express purpose of serving such a large force of thirsty seamen. (MacDonald, 2004, p. 53)

"When the beer ran out," MacDonald says, "and on stations where it was not available, the official preference was for wine, although this was often fortified with brandy to improve its keeping properties." (MacDonald, 2004, p. 41).

That beer was primarily a ration for the crew certainly does not preclude beer from having been served at the officers' messes. Nor does it preclude bottles in the *St. George* collection from having been used to either store small quantities on board or to serve portions at officers' messes.

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<sup>26</sup> 1805 was a busy year for the *St. George* in the Americas: documents from the Danish National Archives indicate she was also "off Carlisle Bay, Barbados" on July 15 and in Halifax, Nova Scotia on August 18. ([151952](#) Søkrigskancelliet (Søetaten): Papirer fra erobrede eller strandede engelske skibe, 1805-1812, box 1004).

<sup>27</sup> The Royal Navy "gallon" was known as a "wine measure" – about five-sixths of today's British gallon.

Like the other official victualled alcoholic beverages, beer was likely far too common (and voluminous) for mass storage in glass bottles; we reiterate our view that these victuals were brought on board in casks and then bottled.

Included in the artifacts from the *St. George* at the Stranding Museum in Thorsminde, Denmark are several, apparently multi-gallon, ceramic or clay jugs that have been diagnosed by the museum staff as beer containers for the crew. They appear to be smaller-sized storage and serving jugs for beer. We interpret these as the likely primary, transit-serving containers for beer – from cask to jug to crewman's/officer's mug.

## **Wine**

In the age of the *St. George*, wine continued to be largely transported in bulk – in casks, which presented problems because of wine's perishability. We here turn to Gough for some interesting insights.

In the 18<sup>th</sup> century, Gough indicates: "The enormous flood of French wines that washed each year into British ports, for example, began turning to vinegar about nine months after the vintage. The wooden barrels in which they were traditionally stored and shipped were porous; wines evaporated from within, air penetrated from without, and unless the barrels were 'topped up' (kept full) the wines, especially the more fragile varieties, quickly deteriorated." (Gough, 1998, p. 80)

More expensive wines in the 18<sup>th</sup> century had begun to be stored and shipped in corked bottles, which "... were far beyond the means of ordinary wine drinkers to purchase in quantity." (Gough, 1998, p. 80).

"After 1728, when Parliament banned the importation of wines in 'flasks, bottles, or small casks,' British consumers were obliged to have all their wines - even the most expensive and fragile ones - imported in barrels. If they wanted to preserve their wines for the long term, they had to have them bottled in Britain - a boon, no doubt, to the burgeoning British glass industry, as well as to falsifiers, fabricators, and adulterers of wine." (Gough, 1998, p. 81)

Oddly, in 1728, the very year that the British Parliament banned the importation of wine in bottles, the first book devoted to wines from Bourgogne, France was published in London. In that book, French wine merchants were being encouraged to ship special vintages to England in bottles: "Burgundy wines were notoriously fragile; they did not travel well. Arnoux, early in the century, had prudently advised his readers to ship fine Burgundy wines to England in bottles." (Gough, 1998, p. 99)

Interestingly, Gough notes that, in France, the cost of bottles near the end of the 18<sup>th</sup> century were probably "...far beyond the means of the ordinary Frenchman. For most ordinary wines, the cost of the bottle would have been greater than the value of the

contents. Ordinary people undoubtedly possessed bottles, but to convey liquids, not to store them.” (Gough, 1998, p. 81, footnote 15)

From this and other literature, it could very well be that possession or use of any glass bottle was a sign of class status across European cultures of the time. In the extremely class-conscious Royal Navy, where officers were clearly a breed apart from ordinary people, we must remember that the St. George was flagship to a Rear Admiral. There may be a relationship between that fact and the extraordinary variety and sheer volume of glass bottles (some 300) in the St. George assemblage. Rank in the Royal Navy in this day and age certainly had its privileges.

## Brandy

Brandy was almost certainly served from some of the St. George bottles. As Gough explains, it too was already a huge French export when the St. George was launched:

*“By the early 18th century, brandy, a substance that had scarcely existed a century before, had found a world market, largely through the agency of the enterprising Dutch. Everywhere the basic raw materials - wine grapes and cheap, abundant fuel - were available, brandy was produced in increasingly prodigious quantities. From the Mediterranean port of Seta alone exports of brandy rose nearly thirtyfold between 1698 and 1755, from the equivalent of about three hundred thousand bottles to the equivalent of nearly nine million. The abbe Francois Rosier, a famous agronomist of the period, reported in 1770 that yearly exports of brandy from the port of Bordeaux amounted to about 16,000 tonneau, or the equivalent of about twenty million 750-milliliter bottles. As techniques improved prices fell, and few were driven by poverty into dreary lives of chronic sobriety.”* (Gough, 1998, p. 86)

Much more relevant documentation exists in the Danish National Archives that illuminates the official victualing system for wine and spirits to the Baltic Fleet – far more than can be detailed here. However, another purser’s report demands mentioning.

The aforementioned handwritten inventory from the purser of the HMS Pandora includes a column for “bottles.” Although the column is empty, meaning none were received during the period (May 1808 – March 1809), it is significant as it clearly identifies “bottles” as an official provision for a Royal Navy warship that was serving contemporaneously alongside the St. George as part of the Baltic Fleet. (Archive 151948, Søkrigskancelliet (Søetaten): Papirer fra erobrede eller strandede engelske skibe, 1805-1812, box 1003).

This means, of course, that the St. George likely received provisions of bottles during her Baltic service.

MacDonald flatly states: “With the exception of bread, which was packed in bags, all the provisions were packed in casks.” (MacDonald, 2004, p. 54)



We reiterate our guess that some of the St. George bottles, especially the Wine and Beer families, were either on board the St. George when she sailed from Britain for her final tour in the Baltic in 1811 or that they were shipped to her as official provisions while she was on station in the Baltic. They could have been shipped to the St. George packed in casks and completely empty. We simply don't know at this point.

However, given the formidable administrative prowess of the Admiralty and Victualing Board during this period, we are confident that, if bottles were shipped to the St. George as official provisions, then they are accounted for somewhere in archived records.

Beyond the four official victuals of wine, beer, rum and brandy, we have little evidence of other specific beverages issuing forth from the St. George bottles.<sup>28</sup>

We are not comfortable, however, speculating as to what these probable "VB-issued" bottles contained while aboard the St. George, as bottles in this age were the Royal Navy equivalent of the amphorae of antiquity: they were utilitarian commodities used and reused and reused again and again to transport and store liquids. They could have contained anything from wine to rum to vinegar to beer and just about everything in between.

### **Who would know the most: the Master and the Purser**

If we could choose to speak with one person aboard the St. George to get the best understanding of the assemblage, it would be either the Master or the Purser. Either would know essentially everything we need to know about the assemblage – probably down to how much of what kind of wine or spirit was left in each bottle at any given hour.

Either would also know which bottles contained ship's provisions and which were private property of the officers.

The Master was responsible for the receipt and stowage of provisions and liquids. He supervised the opening of casks on deck to demonstrate fair distribution of rations. (MacDonald, 2004, p. 102). He was responsible for where and how provisions were kept and needed great skill in keeping the trim of the ship optimized.

He had direct responsibility for the security of the locked spirits room and was required to make daily reports to Captain Guion. (MacDonald, 2004, p. 75).

The purser<sup>29</sup> was responsible for the purchase, distribution and accounting for provisions. He spent most of his time on provisions and was personally responsible for them financially. He could sell certain items to the crew and make a commission. He was a warrant officer, meaning that unlike commissioned officers (who could follow their senior officers' patronage from ship to ship), the purser tended to stay with one ship for many

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<sup>28</sup> Claret, champagne, and port wine excepted, as is explained in a later chapter.

<sup>29</sup> Documents from the Danish National Archives indicate that the purser of the St. George may have been a man named James Sanders.

years. The higher rated the ship, the money he would make in salary and commissions. (MacDonald, 2004, p. 91)

The purser had to keep very tight records – including “...a book detailing every cask or package of provisions brought aboard” and “...receipts for, and details of, purchases and issues of ‘necessaries.’” (MacDonald, 2004, p. 93) When abroad, he would create Bills of Exchange, drawn on the Victualing Board, for paying local merchants, which would have to be countersigned by the local governor. (One thinks of the friendly local governor of Gothenberg here.)

Thus, more than anyone else aboard, both the Master and Purser of the St. George would most certainly have been well acquainted with the glass beverage bottles she was carrying.

### **The Spirits Room**

The location of the famed “spirits room” is critical to our understanding of the archaeology of the St. George assemblage. At this date, such a room on the St. George has not been definitively identified; the archaeologist who recovered most of the assemblage in 1984 says it was found in a “wine cellar” on the orlop deck. We will address that in the next chapter.

MacDonald says that spirits and wine were treated much differently on board: wine was kept in casks in the hold, spirits in the spirits room. She says the spirits room was usually situated aft, under the cockpit; as well as being locked, it would have had a Marine posted to guard it. (MacDonald, 2004, p. 78). “Thus spirits were less easy than wine or beer for the unauthorized to get at.” (MacDonald, 2004, p. 76).

For the St. George, we have reason to question MacDonald’s correlation between the cockpit and spirits room (the latter being “under” the former); the cockpit on the St. George was more likely situated closer to amidship than aft, and both the cockpit and the spirits room were most likely both on the orlop deck.

Based on Longridge’s sheer plan of the “inboard works” of the HMS Victory, that ship’s cockpit was located on the orlop deck just forward of the main mast – roughly some 21 feet (seven meters) from where we believe the St. George’s spirits room was located. (Longridge, 1980, p. 14).

Admittedly, comparing plans of the St. George and the Victory may be entirely illegitimate. Further, we do not know precisely where the St. George cockpit was located. Thus our objection to MacDonald here is timid.

However, MacDonald further indicates that, because of the explosive risk of fire, the Regulations required the spirits room to be “...fully lined and plastered and lit from a separate room... [n]o lights were allowed in the spirit room itself, and spirits were only

allowed to be served on the open deck, in daylight and with no candles in the vicinity.” (MacDonald, 2004, p. 77).

It seems hard to believe that this serving policy (“only allowed to be served on the open deck”) included all officers at all times, especially in regards to their private stores of alcohol. The officers ate and messed together within feet of the spirits room (although often two decks above, in the wardroom), which we believe was on the orlop deck of the St. George.

Further, Rear Admiral Reynolds and Captain Guion both likely kept their own tables in their quarters or perhaps together in the wardroom – all of these rooms were at the extreme aft of the St. George. It is unlikely that having a glass of brandy or poured at a meal in the wardroom required a trip to the deck. Perhaps the bottles themselves were filled on deck at certain intervals and the bottles then used for serving in the officers’ mess areas.

Finally, the 1808 Regulations do not proscribe the “spirits room” that MacDonald describes as “lined” and “plastered.” They do, however, give us reason to believe that that spirits room was in the hold of the St. George. Many Royal Navy experts have argued that the ship of the line’s spirit room was indeed in the hold of the ship.

In outlining the Master’s duties, the 1808 Regulations stipulate:

*“He is to keep the keys of the after-hold and spirit-room, which, when they are wanted, he is to deliver to one of the Master’s Mates only, strictly charging him not to suffer a light to be carried into the spirit room; to attend himself, without quitting on any account, either the spirit-room or after-hold while it is open; to see it properly secured when the service for which it was opened is executed, and to return the keys to him when he has done so.”* (Admiralty, 1808, Section IX, Chapter II, Master, Article X, p. 185).

If it existed at all, the spirits room on the St. George was very likely in the after-hold, probably just next to the fish room – still within close, *vertical* proximity to the Master and Purser, as well as the Marines berths but quite aft. Access to the spirits room on the St. George was very likely simply a matter going up and down stairs abaft.

We further believe that the archaeologist’s description of this St. George “wine cellar” may very well be this spirits room – but in the hold of the ship rather than on the orlop deck.

## **Casks**

MacDonald makes repeated, definitive references to wine, beer and spirits being largely transported in bulk and in casks and served directly from those casks while at sea. (MacDonald, 2004, p. 76).

This is significant for our investigation, as the hold of the St. George (where the casks would have been stowed), has yet to be excavated (unless the “orlop deck” has been misdiagnosed). The contents of the hold very likely remains buried in sand and silt at this

writing. The hold may very well still contain corresponding material culture to the St. George bottle collection – such as casks of bottles.

The role of casks vis-à-vis the bottles of the assemblage raises an interesting possibility: many of the bottles could have simply been used as serving bottles for the officers, especially the most common style in the collection, the Wine Family. It is also quite possible that these bottles could have been filled from casks while at sea.

Meals or “messes” were significant social occasions, often the highlight of the day of all aboard. Given the very real and distinct class stratification in English society and the Royal Navy, officers and men did not mess together. Officers usually messed together in the wardroom or in their own private cabins.

Figure 8 is an image from the HMS Victory. It is apparently a replica or reproduction of how a cask of beverages would be suspended and “...how the officers’ beer or wine would be kept in the wardroom, with a tap fitted to facilitate pouring.” (MacDonald, 2004, p. 96.)



**Figure 8. Method of suspending a barrel of wine or spirits in a wardroom. From MacDonald, 2004, p.96. This method was perhaps used in the St. George wardroom for supplies of wine or beer.**

Our interpretation of the historical evidence leads us to posit that rations for the crew were issued directly from casks, while rations for the officers may have been bottled and stored. The 1808 Regulations indicate not just a strict and fair rationing of spirits, but a proscribed regimen for their distribution:

*"Whenever any of His Majesty's Ships or Vessels are supplied with rum, brandy, or other spiritous liquors, in lieu of beer, the same is to be sent on board in casks of such sizes as can be most conveniently stowed: but as the keeping as well as the issuing of the said liquors is liable to dangerous accidents, if proper care be not taken for preventing the same when the said liquors are wanted, either to be issued to the Ship's Company, or to be started into smaller and other casks, they are to be hoisted on the upper deck; and, whilst this is doing, proper sentinels are to, be placed to prevent candles being brought near the hatches while they are open, or near the liquors while they are serving or starting, neither of which is ever to be, done but by day-light."* (Admiralty, 1808, Section IX, Chapter One, *Of the Provisions*, Article XXI, p. 300).

MacDonald also declares: "Wine was obtained from Italy and Sicily and from France or Spain when Britain was not at war with them." (MacDonald, 2004, p. 41). But what about Portugal? And port wine? MacDonald's research focus seems to have been the Royal Navy in the Mediterranean; she seems to have either overlooked or been unaware of the access to wine and spirits enjoyed by the Baltic Fleet.

### **Port wine**

Port wine is unquestionably represented in the St. George assemblage: the Port Wine exists solely because several of bottles present corks with wax seals featuring the word "PORT" stamped into the wax. These bottles may not have held port wine when the St. George was lost but they very likely did at one point.

MacDonald says that Nelson's pursers in the Mediterranean purchased not just red but also white wine from Portugal, Italy and Sicily on the spot in the Mediterranean. They "bought locally and drunk whichever color [of wine] was available." (MacDonald, 2004, p. 41).

Further, MacDonald confirms that most ships carried spirits as well as wine and beer. However, she probably is again superimposing the Mediterranean experience onto the Baltic Fleet when she writes: "The type of spirit drunk depended on where they were and what was *made locally*." (italics added, MacDonald, 2004, p. 42).

Our interpretation of the evidence – including the hard evidence of the bottles – would lead us to alter that sentence to end with "...what was *available* locally."

Clearly, MacDonald has established for us a Royal Navy habit of procuring wine and spirits while on station in foreign waters – a habit in place years before the St. George's Baltic service.

We believe that, because of the robust, multinational trade in the Baltic that raged for five years against Napoleon's attempted blockage of British trade, just about any wine or spirit available to Continental Europe was also available to the St. George and the rest of the Baltic Fleet – not limited to only those spirits produced in the Baltic nations.

Interestingly, MacDonald does not explore glass beverage bottles as part of “Feeding Nelson’s Navy.” In fact, she hardly mentions them. “Glass was not a practicality of general ship’s victualing on a large scale...” Yet, through cursory investigation, we recall the October 1808 provisioning order for 19,110 “lemon juice bottles” destined for the Baltic Fleet at Flemish Roads, Gothenberg -- a single order among hundreds. We also recall the HMS Pandora’s purser’s inventory with a column listing “bottles” as a standard provision.

### **Personal stores of liquor**

The St. George assemblage contains several unique, one-of-a-kind bottles that were very likely private property, probably of the officers. Some are even imprinted with initials either in the glass itself or in the wax seals atop their corks. These are included in the Continental Family and in the Anomalies grouping.

MacDonald says that “Depending on the captain, they [the crew] might be allowed to buy alcohol.” (MacDonald, 2004, p. 119). She goes on to indicate that, alcohol could have been smuggled aboard, despite the severe penalties – but in what type of container could it have been smuggled? And where would that container have been stored? It is unlikely that any illicit, unaccounted-for spirits would have been stored in the spirits room.

MacDonald relates an interesting tradition or custom concerning officers and alcohol that is supremely relevant to the St. George assemblage: that of officers pooling their resources or clubbing together to buy their own wine, spirits and food for their own messes. (MacDonald, 2004, p. 121)

“One of the members of the mess would be appointed ‘caterer’ for an agreed duration, of several months if not indefinitely, and he held the mess’s money and bought whatever they needed when they touched shore.” (MacDonald, 2004, p. 122)

Pooling their funds, these officers would very likely have had their pick among all the continental European wine and spirits carried by the thousands of merchants plying the Baltic in the years 1808-1811.

Because of where the majority of the St. George bottles were apparently discovered and salvaged, this tradition is significant. Many of the bottles may have been private property of several of the officers. It all depends on if the archaeologist’s “wine cellar” was an officer’s store-room on the orlop deck (against Admiralty regulations) or was the proscribed spirits room in the after-hold.

Again, Captain Guion and Admiral Reynolds likely kept their own tables while the St. George’s other officers formed their own messes. MacDonald says: “There were two officers’ messes on a ship of the line: the wardroom, where the commissioned officers, the marine officers and certain of the warrant officers such as the surgeon and master ate; and the gunroom, where the other officers ate...Pursers, masters and surgeons were considered ‘wardroom officers’ and joined that mess.” (MacDonald, 2004, p. 122).

It seems likely that many bottles in the St. George assemblage would have been regular visitors to both officers' messes. However, if these bottles were indeed stored and discovered in an officer's store-closet on the orlop deck, rather than in a bona fide spirits room built to Royal Navy specification in the hold, we interpret this to mean that many of the bottles in the collection were the personal stores of St. George officers.

Some of these bottles may have been prize possessions of the officers – either captured as part of a prize, taken as a souvenir from a foreign station, received as a gift, or the like. Some may have travelled with their owners for years throughout their Royal Navy service and been stored in the spirits rooms of many ships at one time or another.

### **Admiral Reynolds**

Admiral Reynolds and Captain Guion also likely had their own private stores of alcohol represented in these bottles. Again, Reynolds was second in command of the entire Baltic Fleet and quite likely would have done some entertaining aboard the St. George. He was, after all, aboard a ship of the line that only a few years earlier had been Nelson's flagship in these very waters.

Many private and personal papers of Admiral Reynolds survived the St. George disaster. The Danish National Archives include letters to him, some apparently from his children ("My dearest father..."), as well as official accountings of his shares in prize money, invitations to dinner while in Portsmouth in the 1810-1811 winter, and financial statements from his personal banker or accountant – many dating back to 1797. (Archive 151948, Søkrigskancelliet (Søetaten): Papirer fra erobrede eller strandede engelske skibe, 1805-1812, box 1003).

Admiral Reynolds apparently brought his personal papers on board when he raised his flag in 1810 on the St. George. This begs the question: if he brought aboard private letters and financial statements dating back more than 10 years, did he also bring aboard a few favorite beverage bottles, perhaps souvenirs or sentimental favorites as part of his personal stores?

Admiral Reynolds had participated in the capture of several French prizes earlier in his career. He had spent a year (Jan. 1797 – Jan. 1798) as a prisoner of war of the French. In 1811, he was second in command of the Baltic Fleet, in its fourth year on station, which perhaps carried with it certain privileges – such as buying wine and spirits wherever they were available. He may have had a special affinity for French wine and spirits.

One of Admiral Reynolds' private letters indicates that he may indeed have been a customer for private or personal shipments of wine...and perhaps potatoes for his own table.

Dated April 17, 1811, it is a brief, private note from someone, apparently a very solicitous merchant or non-naval acquaintance<sup>30</sup> based in Harwich reporting to Reynolds a delivery of “five sacks of potatoes of the best sort” and “...begging to be commanded on all occasions either of this Port Yarmouth or Harwich without hesitation and at all times.”

The last sentence of the brief note reads: “I can send out wine, [illegible] or any thing else without any trouble whatsoever from either place or from London.” (grammar uncorrected, Archive 151948 Søkrigskancelliet (Søetaten): Papirer fra erobrede eller strandede engelske skibe, 1805-1812, box 1004).

One would think that with the huge, bustling bazaar of the Baltic at hand, which likely featured all the finest wines and spirits of Continental Europe, Admiral Reynolds chose to source his wine and spirits locally. If not, he evidently had sources in England for his own private victuals such as wine and potatoes.

A final footnote about when these bottles, or at least many of them, came aboard the *St. George*.

Papers from the *St. George* currently on file at National Archives in Copenhagen include correspondence to and from several previous captains of the *St. George* – men who served on her years before Captain Guion and Admiral Reynolds. Letters and orders addressed to and from Thomas Bertie, Michael de Courcy and others dating back to at least 1804 were evidently part of the *St. George*’s official records.

We can make that claim because these documents washed ashore the Danish coast near the wrecksite on Christmas morning, 1811. They were turned over to Danish authorities then and have remained in Danish state custody ever since.

Apparently, a Royal Navy ship’s captain left behind all his correspondence about that ship on that ship when he left it for another command. Why else would letters to and from Captains Bertie, de Courcy and others – regarding routine matters in Halifax, Nova Scotia and Port Royal, Jamaica in the years 1804-1805 -- still be aboard the *St. George* when it wrecked?

The point for us: were many of the *St. George* bottles also considered part of the ship’s official stores? That is, did the Admiralty consider them Royal Navy property and part of the *St. George*’s permanent stores? Were bottles as much a part of a ship’s stores as its anchors and rigging, for example – removed and replaced only when necessary?

If so, then it is quite possible that some of these bottles stayed with the *St. George* since she was first launched in 1785. Jane Busch investigated 18<sup>th</sup> and 19<sup>th</sup>-century bottle recycling practices and concluded that “bottles could be kept for decades before they were discarded.” (Busch, 1987, p. 68).

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<sup>30</sup> The name is illegible.



Given the tight-fisted frugality of the Admiralty in these years, it is quite possible that these bottles were used and reused for as long as possible. It is further possible that some were part of the original provisioning of the *St. George*.

### **Glass bottle-making**

We feel reasonably confident now to tentatively declare that the bottles in the *St. George* collection likely came from two primary sources: 1) official provisions, and 2) “other,” i.e. private, personal stores of the officers. Provenance of the former would likely be far easier to trace than that of the latter.

We have grouped more than half of the *St. George* assemblage into a Wine Family. Figure 9 is a representative group image of six of these bottles in pristine condition.

Again, our guess is that the Wine Family bottles were standard-issue bottles to the Royal Navy at the time. If so, then these Victualing Board-issued bottles in the *St. George* collection would very likely have a paper trail behind them in Admiralty records – documents such as orders to bottle-makers and wine and spirits merchants, bills of exchange, and the like.



**Figure 9. Artifacts image of probable standard-issue "wine" bottles. A representative group image of six of what we believe to be standard-issue "wine" bottles issued to the St. George by the Victualing Board. Note the pristine condition of these bottles and the complete absence of any devitrification, scaling or decomposition.**

The literature on British "wine" bottles is prodigious, broad and deep; and the art and craft of glassblowing in the 17<sup>th</sup> and 18<sup>th</sup>-century is widely published. So we will not regurgitate

the basics of bottle production or construction and instead note only the highlights relevant to our investigation here.

Because he provides so much detailed empirical data in his work, we give preference here to the work of Olive Jones, especially his 1986 book “Cylindrical English Wine and Beer Bottles 1735-1850.” (In that work, Jones examined 211 cylindrical sealed and dated bottles and 127 complete undated bottles that he says were made between 1735-1850.)

Many of the bottles in the collection are distinctly unlike the Wine Family and grouped into other families. These are those that we believe to likely be the personal property of the officers of the St. George.

They appear to be of French, Belgian, Dutch, etc. – continental European -- influence or origin. The available literature on these kinds of bottles is much thinner (at least what is available in English).

The standard, British, “black glass” “wine” bottle is ubiquitous in archaeology for two simple reasons: 1) millions were made (and exported throughout the British realm) long before and during the St. George’s service, and 2) they were thick, heavy and durable – much more so than their fragile European counterparts.

These are the bottles that Jones refers to thusly: “Stopped with cork, the bottles made airtight, inert, and sturdy containers for wine, porter, ale, cider, distilled liquors, and other products.” (Jones, 1986, p. 9).

Across England and Scotland, the last half of the 18<sup>th</sup> and the first half of the 19<sup>th</sup> centuries was a period of dramatic changes in the design and production of utilitarian glass such as bottles. (Mitchell, et al, 2009, p. 11). Some of those changes may be reflected in the St. George collection.

During her service, 1785-1811, the manufacturing capacity of the British glass industry for this style of bottle was perhaps the largest in the world. The Industrial Revolution obviously included the British glass industry.

Indeed, by the end of the 17<sup>th</sup> century – more than a hundred years before the St. George archaeological assemblage was created by disaster – the bottle-glass market in Britain was so large that there were roughly 42 British glasshouses producing some three million single bottles. (Jones, 1986, p. 11) The capacity – and the demand from the market – only grew thereafter.

Increased demand placed stresses on the supply of these bottles: the St. George set sail during a period when that demand and those stresses accelerated production of bottles, which led inevitably towards mass production and more standardization – or, rather, more *attempts* at standardization.

One reason for that demand was the durability of the bottles, a strength caused by a move among English glassmakers in the early 17<sup>th</sup> century from wood – to coal-fired furnaces. This, and changes to furnace design over the years, created a new chemistry that led European bottlemakers to also begin using coal-fired furnaces. (Jones, 1986, p. 11).

One of the most important, recurring themes in the literature concerning these kinds of bottles from this period is their constant reuse. The common bottles were often manufactured (under the generic “wine” moniker) as simple utility containers without any specific contents in mind other than liquids, and then, when empty, they were reused over and over again for as long as they were structurally sound. (Jones, 1986, p. 14).

As Jones notes, many examples exist of merchants giving credit for returned bottles and offering to buy back used bottles or to fill bottles supplied by the customer. (Jones, 1986, p. 14). This style of bottle was clearly a commodity by the time the keel of the *St. George* was laid.

Another critical baseline understanding for us: while these bottles are commonly known and referred to by historians, archaeologists and collectors as English “wine” bottles, they could and did hold all manner of liquids, from beer to vinegar and everything in between.

There is nothing necessarily or by definition “wine” about the principal product of British bottle-glass factories in the 18<sup>th</sup> and early 19<sup>th</sup> centuries, especially their manufacture. We therefore will continue to referring to these English “wine” bottles generically, meaning the general design and style versus their possible contents or use. The word “wine” in that context will also be in quotation marks.

“Specific beginning dates are difficult to establish but there is no doubt that the dark green glass ‘wine’ bottle was used extensively for shipping, storing, maturing, and serving a variety of liquids.” (Jones, 1986, p. 17).

Jones indicates that the “...most common were alcoholic beverages, including wine, fortified wines, porter, ale...cider, and distilled liquors (brandy, rum, whiskey, arrack, and punches.” He also mentions other types of products likely to have been sold in bottles of this kind, such as vinegar, spa waters, and castor oil. (Jones, 1986, p. 17)

Jones also points out the abundant iconographic evidence of these cylindrical “wine” bottles used as serving bottles – although such evidence is silent as to what beverage was in the bottle. (Jones, 1986, p. 23)

The export market for these bottles has also been well documented. Indeed, Olive Jones based his entire research not on archaeological evidence from the UK or Europe – but on the vast quantities of British glassware found in North American archaeological contexts, i.e. the former British colonies of Canada and the United States, of the c. 1735-1850 period (Jones, 1986, pp. 9-10)

Jones cites an 1807 letter from Bristol glass manufacturers regarding whether to ship bottles packed or “stowed loose in the Vessels Holds in the same manner as Bricks and Tiles.” The shipment at issue was an order for “...Bottles exported from hence [Bristol] to Spain, Portugal and Ireland...” (Jones, 1986, pp. 13-14)

He adds: “By the late 17<sup>th</sup> century bottled beers, wines and other liquors were being shipped as far as India. For example, the *Rising Sun* sailed from Greenwich to India in 1703-4 carrying more than 5000 bottles of liquor, including 2500 bottles of beer.” Interestingly, Jones notes that these “...bottles were packed in chests complete with locks and hinges.” (Jones, 1986, p. 18).

Again we return to the issue of casks versus bottles. Jones, citing Hume (1961) and a 1778 Quebec Gazette newspaper article: “Bottled liquors were shipped or sold in chests, ...hampers, ...casks, and cases of various sizes.” (Jones, 1986, p. 19) He also cites a handful of American and Canadian newspaper advertisements from the period (1774-1784) offering bottled liquors such as whiskey and rum for sale, as well as a variety of wines, beers and ciders in bottles. (Jones, 1986, p. 19)

The St. George collection includes what appears to be a wicker wine hamper (Figure 10)<sup>31</sup>, as well as a well-preserved case of four square “case” bottles, often referred to as “Dutch-gin” bottles (Fig. 11)<sup>32</sup>

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<sup>31</sup> Bottles shown in Fig. 11 are representative only. We have no evidence any bottles were found inside the hamper *in situ*.

<sup>32</sup> We make no claim whatsoever that these bottles are “Dutch” in origin or that they once held gin, although it does seem likely. Strictly speaking, “Dutch-gin” is a common term among experts to describe a style, not necessarily the place of origin or the bottle’s contents.



Figure 10. Wicker hamper or basket from HMS St. George collection. The bottles are representations of the hamper's possible use, not a representation of the *in situ* archaeology of the hamper or the bottles.





Figure 11. “Case bottles” (commonly known as “Dutch-gin”) with their “cellar” or wooden case (minus lid), which was found intact on the St. George site, evidently with the bottles still encased upon discovery (excavation records are unclear about this, however.) Three bottles shown as representation. Case featured hinges and a lock.

Figure 11 is an image of the so-called “Dutch-gin” case and three of its four “case” bottles recovered from the St. George. Ivar Noel Hume says of these “case bottles:” “Molded, square-sectioned bottles have long been recognized as Dutch and loosely classified as being for gin, though they were actually used for a variety of liquors from rum to claret.” He gives no further evidence for the latter part regarding their use and possible contents. (Hume, 1974, p. 194.)

Hume adds: “Bottles of this type were made both in Europe and in England in the first half of the seventeenth century ... but by the 18<sup>th</sup> century they do seem to have been predominantly Dutch – and corked.” (Hume, 1974, p. 194)

“Although casks were used for the bulk of overseas trade, bottled English and Scottish porters and ales, Hereford cider, and assorted wines appeared regularly in North American newspaper advertisements. Many of these goods had obviously arrived already bottled.” (Jones, 1986, pp.18-19)

Directly relevant to the St. George assemblage and the question of shipping and distributing liquors to the Baltic Fleet, Jones says: “The problem of bulk in relation to value, so common with alcoholic drinks, can be lessened with the distilled liquors as they can be shipped at high proof and then watered down when sold at the consumer level.” (Jones, 1986, p. 19).

This point, we believe, is directly supported by the previously mentioned Admiralty regulations about watering down spirits before distribution to ship’s company. It is also directly supported by the documentary evidence we have discovered. Brandy, rum, wine and beer (the official Royal Navy victuals) were indeed shipped to the Baltic Fleet in casks; the St. George bottles were likely used for distribution and serving and convenient “local” storage (i.e. nearer to the officers than a cask in the hold of the St. George.)

Sizes and capacities of these bottles from this period seem to be limited only to small, medium and large – and every conceivable size in between. However, standard sizes emerged – gallons, pottles, quarts, pints, and half-pints. (Jones, 1986, p. 11). We will return to capacities of the St. George bottles later.

The cylindrical body was introduced in the late 1730s, mostly likely to improve horizontal storage and stacking for shipment (known in the day as “binning.”). (Jones, 1986, p. 9) But this development towards a standardized, general style still left an enormous freedom for hand-blowing bottlemakers to exploit, which they did when making these dark-green/black bottles.

Jones is but one of many to document what he calls “...a bewildering array of variations in body and shoulder shape, length of neck, and finish styles...” (Jones, 1986, p. 13) “A great variety of forms were blown in the dark green glass...[b]y 1677, a wide range of sizes and shapes of containers were in production...[b]y the mid-18<sup>th</sup> century the range had expanded considerably.” (Jones, 1986, p. 11)

The design and manufacture of cylindrical black-glass British bottles was not really standardized until the advent of the Ricketts mould in 1822. Prior to that, most were hand-blown, even though many moulded bottles were in circulation long before Ricketts received his patent.



Our diagnosis of these standard-issue bottles is that the vast majority were hand-blown rather than fully blown into a mould. (In fact, because of its telltale line-seam at the shoulder and tool-marks, we can only positively identify a single bottle that clearly was manufactured with a mould – artifact 6000-1252).

Some bottle-glass kilns may have used partial moulds for parts of the bottle, such as the neck or body – but the St. George collection presents anything but consistency, a consistency that would be evident if partial moulds were used for most of them.

We interpret this as meaning that these dark-green English “wine” bottles likely came from several suppliers of bottles to the Royal Navy – and probably from the hands of dozens of individual glass-blowers at many glasshouses.

Given the Admiralty’s personality in those days – traditional, suspicious of new inventions and experimentation, and always in search of the cheapest from its suppliers – we have no reason to believe that it experimented with a new manufacturing technique in glass bottle-making until that technique was common in the marketplace.

Because the St. George assemblage includes the Port Family, this deserves a special mention, as port is a fortified wine.

“Storing wine in bottles to mature is done both for vintage wines and fortified wines” says Jones. (Jones, 1986, p. 21) “The fortified wines (i.e. port, sherry, Madeira, Marsala, Malaga) are wines to which brandy has been added. This was probably done originally to keep the wine from spoiling as brandy raises the alcoholic content to a point where fermentation cannot continue. Some types are aged in casks, some in bottles.” (Jones, 1986, p. 21)

By the 1740s, it was common to add brandy to port wine. “By the beginning of the 19<sup>th</sup> century, the average maturation period for port in the bottle had reached three years.” (Jones, 1986, p. 21)

Period newspaper advertisements sometimes mentioned the vintage year or number of years the wine had been in the bottle:

*“About fifty dozen of rich, high flavoured Madeira wine that has been 10 years in bottle; 15 dozen of fine old port, bottled in 1803; and about 22 dozen of claret, bottled at the same time..”* (Jones, 1986, p. 21, quoting The Times, London, 10 December 1807).

What this means for us: the Port Family bottles on board the St. George at the time of her demise could have been unopened, which may explain why so many “port” corks have survived. The port in these bottles may not have been deemed “ready” or mature enough for consumption. These bottles could very well have been special in some way.

We are uncertain, however, if these port bottles are “VB-issued” or private property. We have not uncovered any documentary evidence that port wine (either in bottles or casks)

was a standard provision for the Royal Navy. Such documentation may indeed exist. Our guess is that the port wine bottles were part of the private stores of the officers.

Corks also deserve a special mention here because of the unusual number of corks found *in situ* (we assume – the excavation records do not say) with their “owner” bottles. Of the 229 artifacts examined in the St. George collection, 66 of them (29percent) feature corks, ten with legible lettering in wax seals.

Cork was the bottle closure of choice in this period. Cork compresses and will return to its former shape when the pressure is released. (Jones, 1986, p. 27). When pushed into the mouth of a bottle, the cork expands and presses against the inside of the mouth and upper neck forming a virtually airtight seal. As long as it is kept moist, it will stay in this position and evaporation of the bottle’s contents will be kept to a minimum. (Jones, 1986, p. 27)

Dry corks shrink and allow air (or, for a submerged bottle, water) to get into the bottle. Corks became widely used as closures in the 17<sup>th</sup> century concomitant with the increasing use of glass bottles. (Jones, 1986, p.27).

Interestingly, 20 of the 33 Champagne Family in the St. George collection feature what we will call “mushroom” corks (because of their resemblance). Only two corks have been sheared off, flat with the bottle mouth. We will explain these corks later, especially what they can tell us about the probably contents of these bottles but, for now, let us focus on a special diagnostic of these corks: 12 present extant traces of string or twine.

Jones declares flatly: “For storage, corks are held in place by being tied down.” (Jones, 1986, p. 27) This sweeping generalization does not apply at all to the many corks in the St. George assemblage that reveal no evidence whatsoever of anything being used to tie them down – extant corks in the Continental and Port families, for example.

Jones cites a description published between 1613 and 1631 that records the use of pack thread for this purpose. (Jones, 1986, p. 27) He then states: “Copper alloy wires were in use by the early years of the 18<sup>th</sup> century and *were used continuously after that until interest in other forms of closures developed in the second half of the 19<sup>th</sup> century.*” (italics added, Jones, 1986, p. 27)

Figure 12 is a group image of four “mushroom” corks from champagne-style bottles in the St. George collection. Each features extant pieces of thread, twine or string remaining in the imprint-grooves caused by the string. Twine, not wire, was used to tie down these corks – long before the “...second half of the 19<sup>th</sup> century” as Jones says.

As we will discuss later, the Champagne Family bottles could conceivably be British in origin.



Figure 12. Group image of four “mushroom” corks from St. George champagne-style bottles. Each cork features remnants of the twine used to tie down the corks.

To be fair, we must note here that Jones’s focus was in understanding *his database* – roughly 300 cylindrical *English* “wine and beer” bottles from archaeological sites in Canada and the United States. Yet, his sweeping statements about all corks being held in place by being tied down, and exclusively by wire during the St. George’s time of service, are belied by our own data from the St. George collection – including the many cylindrical (probably British) “wine” bottles that have corks with wax seals, yet present no evidence whatsoever of having been “tied down” in any way.

### Non-British bottles

Figures 13 and 14 are representative group shots of just a few of bottles from the Continental Family – the grouping that we interpret as probably being the personal stores of the officers. From what we can gather, these bottles seem to reflect continental European, rather than British, design attributes. The styles differ greatly from the majority, i.e. those we believe to be standard, VB-issued, British “wine” bottles.

Of course, bottle-making in continental Europe was also quite robust during the several decades preceding the loss of the St. George, which opens a Pandora’s Box of challenges that complicate discussions about the many different styles of bottles and addressing our thesis questions. As McNulty and others make very clear, to properly trace these design attributes back to their culture would require a years of research by a very focused investigator.

McNulty, in his work on 17<sup>th</sup>- and 18<sup>th</sup>-century Dutch bottles, succinctly summarizes the challenge facing us as we try to understand the many bottles of obvious varying and different designs and styles:

*“The field of 17<sup>th</sup> and 18<sup>th</sup> century bottles is a muddled one, as there has been very little archaeological excavation or serious scholarship in any of the continental countries unlike England, United States, and Canada. Thus, to identify ‘Dutch’ bottles, one has to learn about all countries’ bottles (production, design, technology) so one can eliminate the ‘imports’ and identify those that legitimately appear to have served the Dutch market or were made in what is now Netherlands or Belgium.”* (McNulty, 2004, introduction)

This observation sums up the frustration for any investigator who wants to “know” the biography of an artifact.

McNulty goes on and speaks plainly about another very real obstacle to the investigator, that of wholesale (and retail) technology transfer between cultures: “And as there was regular commerce and technology exchange between England and the continent, it was sometimes very difficult to determine which forms came first and which production details would indicate continental, as opposed to English, origin.” (McNulty, 2004, introduction)

It seems inescapable that the St. George assemblage could contain examples of French, Dutch, Belgian, Portuguese, Russian, Prussian, Spanish, Swedish, Danish bottles – all of these lineages, as well as others such as Canadian and even American.



Figure 13. Group image of one design theme present in the Continental Family.





Figure 14. Group image of several artifacts in the Continental Family (champagne-family bottle at left excepted).

### III ARCHAEOLOGICAL CONTEXT

The archaeological context of this assemblage, especially its submerged, *in situ* natural environment for more than 170 years, is critical to answering our thesis questions and interpreting the data presented by the bottles themselves.

The St. George assemblage of glass beverage bottles was evidently submerged in a littoral seawater environment from 1811-1983. It is central to our research questions to understand the nature of the collection's original deposition in that environment, the nature of the submerged environment itself, and, most important, what the collection itself tells us about both.

A variety of natural variables come into play here, e.g. wind direction, currents, water temperature, salinity and, most important, the sediments of littoral seawater environment the assemblage's deposition.

We believe the *in situ* environment of the assemblage before salvage and excavation, explains quite a bit about the bottles, e.g. why and how so many survived, why they are in such wildly varying states of preservation, etc.

The methods used for retrieving the site's material culture over many decades do not, unfortunately, tell us much about the archaeology of the assemblage. Other than historical documentation from archives, the most eloquent and definitive resource we have in hand come from the bottles themselves.

We are left to piece together much of the archaeological context of the bottles— so important to answering our thesis questions — by following a bread-crumble trail of tantalizing clues from a variety of sources.

Fortunately, to organize our thinking, we have a sensible template. With three simple questions, Maarleveld gives us an elegant framework for analyzing the archaeological context of the collection (Maarleveld, 2010, pp. 260-261):

*What happened originally?* (i.e. the wrecking event)

*What happened in the meantime?* (i.e. since deposition)

*What happened upon discovery?* (e.g. recovery of the bottles)

Understanding the forces of nature is fundamental to answering all of these questions -- as it is to our thesis. The same forces that *caused* the wrecking event itself played a huge role in the survival and preservation of our bottles, as well as their excavation.

Simply put: the archaeology of the St. George assemblage cannot be understood without understanding the formation processes at work on it prior to recovery.

### **What happened originally? The wrecking event**

As with other shipwreck sites, the wrecking of the St. George determined her material culture's original deposition. In turn, that original deposition has in our case greatly influenced the subsequent formation processes at work on the assemblage.

However, the wrecksite itself does not tell us much about the wrecking event per se. Nor do the excavation records, which are incomplete, confusing, cryptic, and certainly not up to the standards we would expect today. This reflects the times rather than the competencies of the people involved, of course.

We must therefore rely heavily on historical records of the wrecking.

The wrecksite is near Thorsminde Harbor, on the western (North Sea) coast of Denmark, very near the Strandingsmuseum St. George, which houses the bottles assemblage and other material culture recovered from the St. George and Defence.

For a researcher studying, from historical records, the events of 23-25 December 1811 and the some 300 glass beverage bottles that survived those events completely intact, the first question that leaps to mind is compelling: *how did so many bottles survive such an extremely violent wrecking event?*

Several factors must be considered to answer that question. The bottles' state when analyzed in 2011 must be understood in the context of wrecking event and the marine environment in which they somehow survived for almost two centuries.

Let's first understand the wrecking itself.

One, massive "storm of the century" over three days – 23-25 December 1811 – cost the Royal Navy more than 2000 men and three ships of the line.<sup>33</sup> In terms of ships and lives lost, it remains one of the worst disasters in Royal Navy history (Gosset, 1986), comparable to the Scilly disaster of 1707, (which claimed four ships, including three ships of the line, and more than 1500 lives.)

The Royal Navy's calamity of Christmas 1811 naturally caused a great sensation in England and an official inquiry – an inquiry that could have cost further lives, due to courts martial and execution, of those found negligent in their duties.

Eyewitness accounts from survivors are available and are herein afforded a measure more of credibility.

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<sup>33</sup> HMS *St. George*, HMS *Defence*, HMS *Hero*.



The most readily available of those survivor accounts come from John Anderson, aboard the *St. George* during the wrecking event, and Joseph Page, aboard the *Defence*. Also illuminating is the report from Capt. Charles Dudley Pater of the *Cressy*.

When those accounts are congealed into one narrative, as presented by Ryan (Ryan, 1964) and Grocott (Grocott, 1997), we seem to have at hand the most credible, well-reasoned account of the *St. George*'s final hours. (Extremely relevant to the wrecking event – indeed, the entire archaeological context of the collection -- are the many changes in wind direction in the ship's final 48 hours afloat.)

The story has been told before, of course ... but not from this perspective.

### **Context and Chronology**

To summarize the context of the wrecking<sup>34</sup>:

After several starts and stops, at least six weeks of delays, the loss of its rudder in the Baltic in a fierce gale on 15 November, and at least one aborted attempt on 20 December to enter the North Sea near the northern tip of Denmark (known as "The Scaw" to the British, off the present-day Danish town of Skagen), the *St. George* finally made way into the North Sea on the early afternoon of 21 December 1811.

The *St. George* made way under its own sails, no longer under tow from the *Cressy*. (The makeshift Pakenham rudder, made aboard the *HMS Cressy* after the 15 November storm, was not functioning well so the *Cressy* towed the *St. George* northwards through the Kattegat, (the body of water between Denmark's Jutland peninsula and Sweden's west coast.)

Ryan says of the aborted attempt to set sail into the North Sea the day prior: "This intention was thwarted by a mixture of changeable winds and baffling currents." (Ryan, 1964, p. 128) "Changeable winds and baffling currents." Indeed.

Figure 15 is a 1780 map highlighted with the *St. George*'s starting point in November 1811 and final resting place December 11 1811.

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<sup>34</sup> While the events of these days are well-published, historians are no consistent of precise times and dates. Ryan is given precedence here, cross-referenced with Raymond.



Figure 15. Red stars indicating starting point (off Hano Island, Sweden) of St. George's last voyage and wrecking event (off Thorsminde, Denmark); Bauche, Philippe 1780, *Carte Du Royaume De Danemarc*, printed 1780, Amsterdam.

With no disrespect to these officers, why Captain Guion and Admiral Reynolds made the decision to enter the North Sea with the St. George jury-masted and struggling with a seriously troublesome, jerry-rigged rudder this late in the year – a notorious season feared by every British naval officer and seaman who had experienced it -- will probably never be known. No judgment is made as it is not our business here to second-guess Royal Navy officers' decisions 200 years after the fact.

However, their decision to proceed into the North Sea is germane to the contextual archaeology of the St. George glass assemblage and, therefore, our thesis questions. It is as much a part of the narrative as the data from the bottles themselves.

In retrospect, it seems fair to say the St. George was simply not seaworthy for the North Sea at that time of year – as had been illustrated the previous few weeks. The St. George and the convoy struggled mightily simply to make it out of the Baltic. The stormy season had already, weeks earlier, announced its presence with violent authority. The convoy had already met with great calamity.

Perhaps these leaders simply felt that their primary duty as Royal Navy officers was to complete their mission and get the convoy home. Risk-taking was part of the job. The risk of trying to survive the winter in these latitudes – with no base – was probably considered unacceptable.

We must also consider the direction they received from Admiral Sir James Saumarez, commander of the entire Baltic Fleet.

In the spring of 1811, Saumarez had given orders earlier to Reynolds to leave on the homeward journey with the convoy no later than 1 November.

Yet, months later, on or about 1 December, after finally seeing the crippled St. George up close as it finally joined Saumarez's flagship Victory at anchorage in Wingo (Vingå) Sound near Gothenburg, Saumarez had second thoughts. He now raised the option of the St. George wintering at Gothenburg, the Swedes apparently now tolerant of such a plan so far north of Napoleon's Continental System. (Ryan, p. 126)

**“...with the assistance of another ship of the line...”**

Reynolds and Guion both objected – persuasively so. Reynolds argued that the St. George was “as fit to make her passage *with the assistance of another ship of the line* as any in the fleet.” (italics added, Ryan, p. 127) Saumarez acquiesced.

Yet the weather continued to argue strenuously in opposition to the idea. For a second time, Saumarez raised the possibility of the St. George wintering alone in Gothenburg. Reynolds and Guion stood their ground. They stood by the seaworthiness of the St. George – or, perhaps, their sense of honor as Royal Navy officers.

It is quite provocative to now read the codicil Reynolds attached to his initial declaration of faith in the St. George.

The phrase “...with the assistance of another ship of the line...” is an extraordinary admission from a Rear Admiral. Reynolds was in effect admitting that the St. George could not make the journey on its own, that it would need the “assistance of another ship of the line” – just as it had needed such assistance since being de-masted and de-ruddered on 15 November in the Baltic.

Since first gathering at Hano Bay in October, the St. George had seen little else but bad weather and bad luck. It had met disaster on 15 November, having lost its masts and rudder. It had been towed northward into Wingo Sound under tow from the Cressy to meet the commander of the entire fleet before the trip home.

Reynolds was now apparently admitting to the commander of the entire fleet that it would need the same assistance for the journey home.

### **Entered North Sea under her own power**

Yet, inexplicably, the St. George finally entered the “The Sleeve” (or *Skagerrak* to Scandinavians) – the body of water connecting the Kattegat to the North Sea -- on 21 December under her own power, no longer “...with the assistance of another ship of the line.” Yes, the Cressy and Defence stayed close until the tragic end – but the St. George made way for the North Sea under her own power and steerage.

It is far easier to understand why both Reynolds and Guion both would not want to watch the convoy and their countrymen leave them behind to winter alone in Gothenburg. Was there a precedent for a single ship of the line on duty with the Baltic Fleet wintering alone in those inhospitable waters? Further research may answer that question but it is not our business here.

The convoy had been divided into three divisions. Admiral Saumarez aboard the HMS Victory led the first group (which would reach England the very night the St. George was lost). The St. George herself followed soon thereafter, along with the Cressy and the Defence. The HMS Hero escorted the third division, including the convoy of 76 remaining merchantmen. (Ryan, 1964, p. 128; Raymond, 2010, p. 207)

The fleet left the Sleeve at last.

Figure 16 is from Ryan, with British place names for the final journey of the St. George. The wrecking site is noted just south of Bovenbergen.

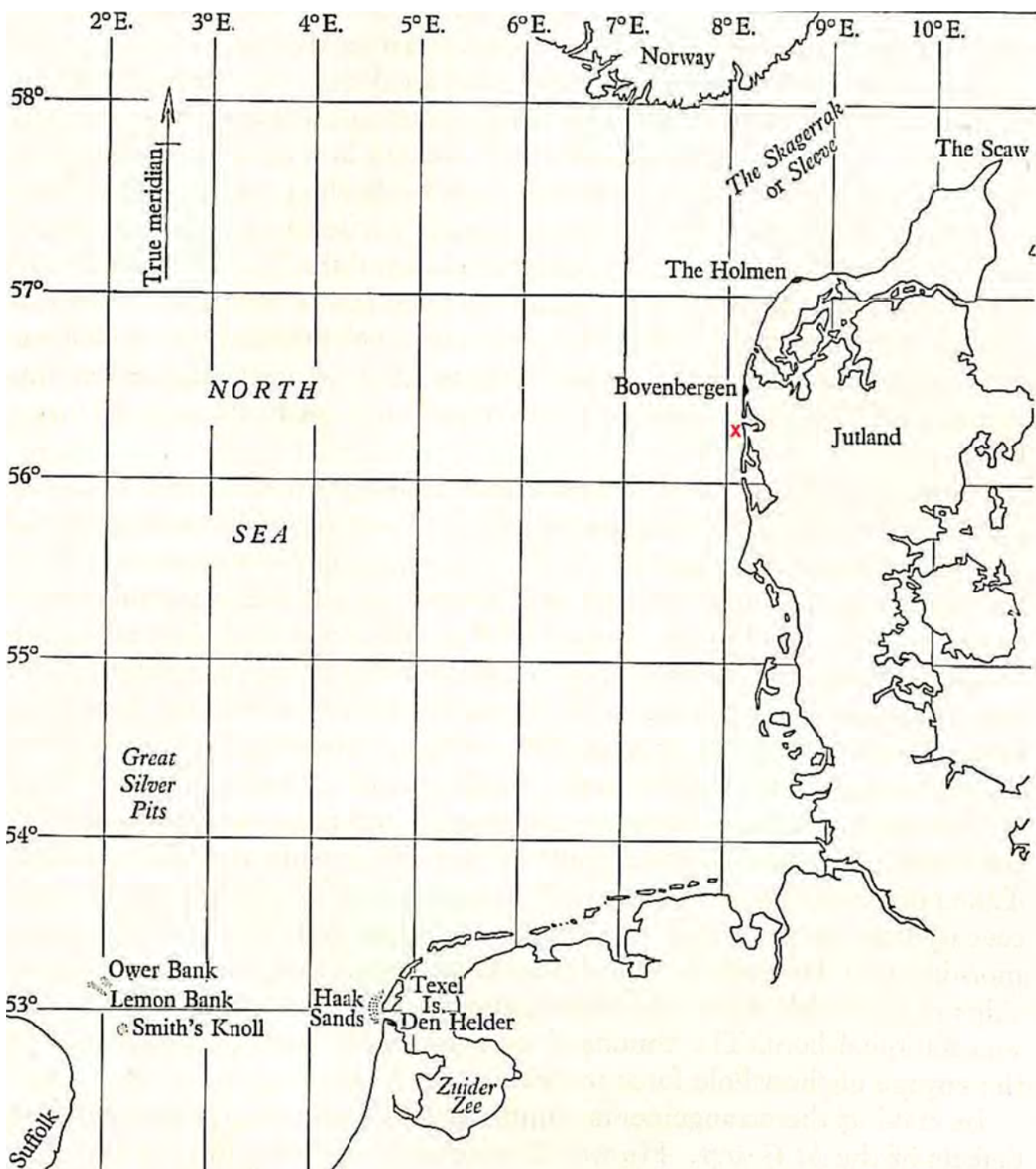


Figure 16. After Ryan, p. 125. British place names for the final journey of the *St. George*. "X" marks the approximate location of the *St. George* wrecksite.<sup>35</sup>

<sup>35</sup> "Bovenbergen" could also refer to today's "Bøvling" or "Bovbjerg" Denmark, both nearby in the same general area. Bovbjerg is slightly further north. Irrespective of the place name, the area of the wrecking site is south of all these places approximate to the "X."



### Chronology of “changeable winds and baffling currents”

A brief chronology of events -- and current and wind direction -- for the next 48-72 hours, as provided by Ryan and Grocott, using accounts from survivors Anderson and Page and from Capt. Pater aboard the Cressy, tells the story of the assemblage’s original deposition best. Please note: all wind compass directions (e.g. “N or NW or S/SE”) indicate the direction *from* where the wind comes, not the direction *to* where it was headed. [All italics added in these notes]:

- **21 December, 1p.m.** – As “...a wind of moderate force began suddenly *from the NE* [italics added] at about 1 p.m.,” St. George and the convoy enters the North Sea. (Ryan, 1964, p.128)
- **21 December** – Anderson: “...lying off Salls (Salo), *wind at WSW* made signal for a pilot, who came on board. The *wind chopped around to the N by E* stood off to sea, and shaped a course for England.” (Grocott, 1997, p. 330)
- **22 December** – Anderson: “Sunday 22<sup>nd</sup>, the *wind north by west* we continued our course.” (Grocott, 1997, p. 330)
- **22 December, 10 a.m.** – After continuing “our course all night through the Sleeve,” Capt. Charles Dudley Pater of the Cressy reports: “saw the land on the lee beam, distance eight leagues; made the same known to the St. George.” (Ryan, 1964, p.128) The St. George was headed south along the Danish North Sea coast.
- **22 December, 11:30 a.m.** – Pater records “...made the signal to the St. George for the Holmes bearing S.S.W. distance six or seven leagues.” (The “Holmes” is near *Hantsholm* in present-day Denmark.) (Ryan, 1964, p.128)
- **22 December, 4 p.m.** – Pater continues “...Bovenbergen bore south about seven leagues; stood to the westward all night; moderate weather, *wind about N. or N. by W.*” (Ryan, 1964, p.128) (“Bovenbergen” most likely refers to *Bøvlingbjerg* and/or the nearby *Bøvling Fjord* or *Bovbjerg Fyr* in present-day Denmark – all on the North Sea coast and less than 10 miles N/NE from the St. George wrecksite. See “*le Bovenberg*” and “*Torsk Mind*” just north of the wrecksite on the 1780 Boche map, Figure 15.)
- **23 December, 9 a.m.** – St. George observed “having trouble with her Packenham rudder.” (Ryan, 1964, p.128) Ryan: “It was a cloudy morning with a rising wind coming *out of the northwest*. There was every sign of a gale from this quarter.” (Ryan, 1964, p.128).<sup>36</sup>

There was clearly cause for great foreboding, “...*the more so because of the current set up by the northerly winds. It ran southward from the coast of Norway towards the Jutland reef and along the coast of Jutland towards Heligoland. Its effect was to increase the leewardly drift of ships, especially that of heavy warships.*” (italics added, Ryan, 1964, p.128)

<sup>36</sup> Raymond: “On the morning of the 23rd one of the fastenings securing the St. George’s temporary rudder had fallen off, hindering the ship’s already sluggish maneuverability.” (Raymond, 2010, p. 207)

Page, aboard the Defence, and Anderson, aboard the St. George, pick up the chronology (italics added):

- **23 December, 12 p.m. noon** – Page/Defence: “...*it was then blowing a strong gale from WSW...*” (Grocott, 1997, p. 332)
- **23 December, 3 p.m.** – Page/Defence: “...*wind NNW...*” (Grocott, 1997, p. 332)
- **23 December, 9 p.m.** – Anderson/St. George: “Monday evening *the wind came round to the WNW* blowing a strong gale, with a heavy sea, and then at nine o'clock, lost sight of the Defence...” (Grocott, 1997, p. 332)
- **23 December, 9:30 p.m.** – Page/Defence: “...we next hove to under storm staysails...” (Grocott, 1997, p. 332)
- **23 December, 11 p.m.** – Anderson/St. George: “About 11 o'clock *the wind changed to the NNW...*” (Grocott, 1997, p. 332)
- **23 December, 12:00 a.m. midnight** – Anderson/St. George: “...at twelve the admiral made signal to wear and stand to the westward...” (Grocott, 1997, p. 332)
- **23 December, 12:00 a.m. midnight** – Page/Defence: “...the watch and idlers turned up to wear ship.” (Grocott, 1997, p. 332)
- **24 December, 12:30 a.m.** – Page/Defence: “...the captain told Mr. Baker [1<sup>st</sup> Lieutenant of the Defence] that he would not wear till the St. George did, but would stay with her. Saw the St. George burning a blue light to leeward.” (Burning a blue light was a signal for distress.) (Grocott, 1997, p. 332)
- **24 December, 2:30 a.m.** – Page/Defence: “...*blowing a hard gale from the NW.*” (Grocott, 1997, p. 332)
- **24 December, 4:30 a.m.** – The Defence wrecks. Page/Defence “...the ship struck very easy, and looking to leeward, I saw the breakers. I mentioned to Ralph Teazie (one of the men saved) that the ship had struck, and just then falling into a trough of the sea, she struck heavy fore and aft.” (This is the wrecking event of the Defence.) (Grocott, 1997, p. 332)
- **24 December, 5-6 a.m.** – After losing the Packenham rudder sometime between midnight and 5 a.m., the St. George wrecks. Anderson/St. George: “All we had to trust to then [after losing the rudder] was our anchors. We immediately sent two watches below to arrange the cables, and kept one watch on deck to strike the lower yards and topmasts; finding we only had twelve fathom, let go the best bower, but by the time it was gone, she struck. *This was between five and six of the morning of the 24<sup>th</sup>*; orders were then given to cut away the masts, and sent hands down to the pump; but finding she gained so much water, all hands were obliged to fly to the poop, where they continued from the 24<sup>th</sup>, till we left the ship on the 25<sup>th</sup>, when the whole that remained were either dead or dying very fast. The sea ran so

high, it was impossible for boats to live to come to our assistance...” (This is the wrecking process of the *St. George*.)<sup>37</sup>. (Grocott, 1997, p. 331)

Teisen’s account of the final minutes is worth recounting here, although with the caveats that 1) his sourcing for this information is unclear and, 2) it contradicts Anderson’s account about all remaining hands flying to the poop early on the 24<sup>th</sup> and remaining there “till we left the ship on the 25<sup>th</sup>”:

“Just before *St. George* hit ground the remaining two anchors were released and the masts were cut away. This turned the bow into the sea...[T]he large hull of *St. George* worked itself quickly down in the sand and within half an hour she had filled with water to the orlop deck. Everything on the weatherdeck, except the long-boat, was smashed and washed away. When cutting the mizzen-mast no axes were available so the sailors used their knives. As it fell a wave washed it away along with the entire poop structure and all who were on it. The survivors who were still on board sought shelter on the deck by stacking the dead and unconscious in rows to make a barrier against the sea.” (Teisen, 1998, p. 261).

Thus was the *St. George* assemblage of glass beverage bottles deposited. Within roughly an 18-hour period during this massive gale, the *St. George* and *Defence* were lost, as was the *Hero*, which made it as far south as the Haak Sands on the Texel coast of the Netherlands.

### **Sun, Moon, Snow and Sleet**

It is not only our privilege as maritime archaeologists to imagine “what might have been” when studying a wrecking, it is often our responsibility as we search for explanations. It is the Indian behind the pot versus the pot itself. In our case, it is the people behind the *St. George* assemblage.

Two other features of nature that night tantalize us about the wrecking event of the *St. George*.

First, the men aboard the ships could see that night of 23-24 December 1811: there was quite possibly a full moon.<sup>38</sup> As Pater, Captain of the *Cressy* reported of the hours 9:30-10:30 p.m. (approximately), when he was trying to aid the *St. George*:

“Heavy and severe as the gale was, there was considerable light, as we had a moon; although not seen, yet it enlightened the atmosphere so as to enable us to see every mast, sail, or any object that was above her [the *St. George*’s] hammocks: we were so close in

<sup>37</sup> Teisen (p. 261) indicates that the *Defence* was “...wrecked just a couple of miles north of the *St. George*” though he does not explain how he knows this.

<sup>38</sup> The U.S. Naval Observatory, Astronomical Applications Department, reports phase of the moon on 23 December 1811 to be: “waxing gibbous with 58% of the Moon’s visible disk illuminated.”



passing, that we could in moderate weather, at such a distance, have conversed with great ease..." (Ryan, 1964, p. 129)

Far more important to their fate, however, is the possible effect of a full moon on the tides that night.

If the moon was indeed full on the evening of 23-24 December 1811, then the St. George could have found itself foundering in extremely low tides – known as spring tides, when the sun, moon and earth are aligned, causing extremes in high and low tides.<sup>39</sup>

This, then, would complete the "perfect storm" of misfortune that defines the St. George wrecking process.

Secondly, it was quite possibly snowing and sleeting during the wrecking event, although Anderson, Page and Prater make no mention of it. At those very hours of which Pater wrote of "considerable light," several hundred kilometers to the south, near Texel Island on the Dutch coast, the HMS Hero and HMS Grasshopper, part of the third division of the Baltic convoy, found themselves in a "...heavy squall of snow and sleet." (Grocott, 1997, pp. 334-335)

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<sup>39</sup> Complicating things even further, Natarjan, et al say that spring tides in the North Sea "are two days behind" a full moon, referred to as "the age of tide." NATARAJAN, M., MOHAN, K. & BALASUBRAMANIAN, T. 1953. Waves and Tides. *Nature*, 172, 268-281.

### Position, heading, distance from shore



**Figure 17. Approximate location of St. George wrecksite, clearly south of Ryan's "Bovenbergen."<sup>40</sup> Image courtesy of Google Earth. All rights reserved.**

The St. George made for the N/NE, back to the Sleeve and relative safety on 23 December. Grocott: "At the time the Cressy wore [10:30 p.m. on 23 December], the St. George and Defence were left with their heads on shore ENE under storm mizzen and trysail, with the land to the southward of Bovbjerg [Ryan's "Bovingbergen" and today's Bøvbjerg Fyr, Denmark] upon their lee beams and drifting on shore at the rate of three knots." (Grocott, 1997, p. 330)

It also seems clear that in the late hours of 23 December, the St. George was already very likely south of her final resting place, and almost certainly south of Bovenbergen – contrary to known "sailing directions" at the time<sup>41</sup>:

"Avoid going to the southward of Bovenbergen till you get well to the westward, that you may have it in your power, in case of being dismasted, to bear up for the Sleeve, and to take Norway, Sweden or the Sound. Turning out of the Sleeve with Westerly winds, keep

<sup>40</sup> Also south of Bøvling and Bovbjerg.

<sup>41</sup> Ryan refers to these as "contemporary sailing directions," yet is unclear where he gets them. He cites two possible published sources at the end of his piece – but both were published after the St. George wrecking event. One (Chandler) was published in 1815, the other (Norie) in 1818.

near the Norway coast, and do not stand to the southward of the edge of the Jutland reef, as the current always sets to the westward on that coast, but does not extend far from land; and **be particularly careful not to stand to the southward of Bovenbergen with a N.W. wind, for fear of getting embayed, and prevented from getting out, by the strong current that sets to the S.E. at the rate of two miles an hour, during strong winds from the N.W. which is the cause of so many ships being lost on that dangerous coast ...** I again say, keep the Sleeve open and your ship will be safe except she founders.” (italics original, bold type added for emphasis). (Ryan, 1964, pp. 128-129)

From all available historical evidence, it seems that the St. George was in the worst possible position along this coast, at the worst possible moment, under the worst sailing conditions, and in the worst possible condition herself to survive it all.

She was “southward of Bovenbergen”...and she was obviously facing “strong winds from the N.W.” She was on a northerly course, riding low in the water, fighting against a southerly current and a massive gale off her port bow slamming her towards the sandy shoals – all with a dysfunctional rudder and at night.

She was doomed.

Grocott, quoting a January 6 1812 report from Lemvig, Denmark (published in the Times on February 7 1812) tells us that, two days after the wrecking, (26 or 27 December) the St. George lay 300 fathoms offshore (Grocott, 1997, p. 331) – or roughly 600 yards (approximately 548m, one fathom equaling one British imperial yard and 1.8288 meters.)

Grocott’s interpretation of that report, describing the wreck immediately upon archaeological deposition of our bottles, is worth quoting in full:

“Two days later, with the wind offshore, two Englishmen (apparently survivors), went to the wreck which lay 300 fathoms offshore, to recover the bodies of the admiral and captain, but found the deck had been washed away by the sea, yet both ends of the ship were still visible, *supposed broken right athwart and held together by the ammunition and guns in her bottom.*” (Grocott, 1997, p. 331)

As we will soon see, the St. George was not “broken right athwart.” However, the very interesting description of the hull being “held together by the ammunition and guns in her bottom” is telling – because that is almost certainly where our bottles were...in the lower bowels of the St. George.

As we also soon shall see, the Danish coast near the wrecksite has receded dramatically since 1811, putting the wrecksite approximately one mile offshore today.

### **Key points about the wrecking**

The following key points about the wrecking event now emerge from the historical reports:

- After making the decision to exploit a wind from “N by E” (according the Anderson aboard the St. George) and enter the Sleeve on 21 December, the winds changed frequently and impetuously (e.g. from the W/SW at noon on 23 December to the N/NW three hours later) as the St. George entered the sleeve, finally staying constantly from the N/NW from 23 December at 3 p.m.
- She was on a NNE course when she struck sand, having worn ship and/or altered course on 23 December. (Significant because of the current hull disposition.)
- She was being literally blown eastward into the sandy shoals on her lee beam – while fighting a strong southerly current.
- She was far south of where she should have been ... and far south of safety.
- The seas – almost certainly carrying tons of sand, mud, sediment, and small pebbles -- were high enough to break over her gunwales and did, quickly destroying everything on the upper deck.

**“How could so many glass bottles have survived intact such a violent wrecking event?”**

As we can now begin to surmise, the natural elements surrounding the wrecksite, during the wrecking – wind direction, currents, and the natural environment of Danish waters “300 fathoms offshore” – have a great deal to do with answering our first-glance question about how so many glass bottles could have survived, unbroken, such an apparently extremely violent wrecking.

It is why so much emphasis has thus been placed on wind direction and currents in the hours preceding the wrecking event – because of their effect on a third natural element of the wrecksite, explored in a moment.

We are now much clearer on how the St. George assemblage rode out this storm and the wrecking itself.

First, unlike the horrendous tragedy that unfolded topside, the wrecking event was, evidently, not that violent for the bottles themselves.

The assemblage was almost certainly stowed deep in the bowels of the St. George – most likely either abaft on the orlop deck, near the purser’s station, or even lower in the ship’s hold.<sup>42</sup>

Second, the St. George was quite likely buried rather than sunk. Yes, she “wrecked,” meaning she got stuck in the shallow, sandy shoals or perhaps on a sandbar. Yes, she took on much water. And, yes, she was violently torn apart topside – her upper decks and poop deck being blasted away by the brown, sediment-laden waves.

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<sup>42</sup> Again, we are not sure as the excavation records do not indicate if all 229 artifacts were found together and in one place.

But she did not sideswipe an iceberg, crash into rocks, collide with another ship, or strike a reef. We have no evidence whatsoever – historical or archaeological – that the hull was penetrated by some hard, fixed obstruction below the waterline.

**“We only had twelve fathom...”**

John Anderson, aboard the *St. George*, says in his narrative that “...we only had twelve fathom...” when “...she struck...between five and six of the morning of the 24<sup>th</sup>....” (Grocott, 1997, p. 331). “Twelve fathom” equals 12 yards or 36 feet.

The *St. George* officially had a draught of a little more than four yards (12 feet 8 inches) amidships (17 feet 10 inches at the stern). (Winfield, 2005, p. 20). But that was as she floated empty – without a crew of 700 men, other passengers, stores, and provisions.

Early this Christmas Eve morning, during the wrecking process when the sounding that Anderson mentions was taken, the *St. George* was likely riding very low in the water: in addition to her crew and passengers, she was returning home for the winter after a season’s trading in the Baltic, probably laden with stores she didn’t normally carry. She was also flagship to a Rear-Admiral – carrying whatever excesses that may have meant.

Thus, on a surreal, freezing night – possibly in snow and sleet, possibly by the light of a bright moon shining through the gale, and possibly during an extremely low tide -- this rudder-less, 2,000-ton warship, laden with 98 guns, more than 700 people, and a few hundred pounds of glass beverage bottles, found herself aground ... and under attack.

**“A mountainous breaker...a thick brown mass...”**

Depending on her load, the *St. George* probably drew a freeboard of roughly between 8 – 12 feet (2.5 – 3.5 meters) in a calm sea. However, because she was very likely riding quite low in the water that night, her freeboard was probably between 6-7 feet ... before she struck and began taking on water.

That process of “taking on water” is what we must understand – because she was almost certainly taking on much, much more than just water.

Teisen, quoting Frandsen (Frandsen, 1961, 111 ff.) gives us a very provocative illustration of the wave action against the *St. George*:

“...at 10 am on 24 December, a mountainous breaker sucked up the very sea-bed itself, and, carrying sand, gravel and stones with it in a thick brown mass, crushed down on the *St. George*. Local fishermen [evidently eyewitnesses] estimated that this wave washed away 400 people.”<sup>43</sup> (Teisen, 1998, p. 261) (Anderson, the *St. George* survivor, does not mention this. (Grocott, 1997, p. 331)

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<sup>43</sup> Ryan, in contrast, says of that morning of 24 December: “Before sunrise both [the *St. George* and *Defence*] broke up.” (Ryan, 1964, p. 130)

In their accounts of the breakers, Teisen, Ryan and Grocott all use adjectives such as “huge...mountainous...tremendous.”

We can only speculate as to the actual height of these breakers; wind speed that night might help us but that too is a matter of conjecture.

There can be little doubt that the breakers were massive; they were obviously murderous.

We are reminded of Teisen’s account of the last hours of the St. George -- sailors protecting themselves from the breakers by trying to build walls with the stacked bodies of their dead and dying fellow seamen. This supposedly took place after the weatherdeck had been destroyed and the entire poop structure washed away. (Teisen, 1998, p. 261)

“Mountainous breakers” and a “thick brown mass” – these are enormous waves heavily laden with sand, small pebbles, and sediment, and moving at speed.

Understanding the basics of wave formation, bathymetry, topography and hydrodynamics, as well as the general natural environment along this coast greatly illuminate the wrecking process – and the formation processes that have preserved the St. George assemblage. We will return to this in more detail.

For now, though, to understand the deposition of the bottles with more clarity, we must turn to perhaps the most important dimension or characteristic of the wrecking process. It is largely unmentioned by historians and even the survivors themselves.

We must understand the role played by far and away the most ubiquitous ingredient in the shallow waters along this coast – quite fittingly, also the central ingredient used in making glass.

That ingredient is silica – known commonly as sand.

### **Event vs. process: “Wrecking” vs. “preservation by burial”**

Today, waves during storms along this stretch of the Danish coast are estimated to be at least 50 percent sand, silt, mud, sediment, and small pebbles (Mortensen, 2011, personal communication). Just a few five-meter waves carrying that much solid matter over its gunwales would have simply buried the St. George – while its hull was pounded into the bottom sand. Waves of this type over the gunwales were ship-killers.

Lest we forget the power of these blitzkrieg waves (“thick brown masses”) moving at speed: the Defence, a 1600-ton third-rater, within three miles of the St. George but likely further out to sea, was literally torn apart by these breakers in roughly 2-3 hours – a quite different wrecking event than that of the St. George.

Both were violent. Yet, we must ask ourselves: why did very little of the Defence survive while quite a bit of the St. George survive – in fact, enough material culture from the latter to justify a museum being built to house it?

The demise of the St. George seems more of a gradual wrecking “process” than an event such as what claimed the Defence; while the Defence and virtually all traces of her disappeared within 2-3 hours, it took much longer for the St. George to disappear beneath the waves and sand.

We recall that two days after “the wrecking” two survivors went to the destroyed remains of the ship to claim the bodies of Reynolds and Guion. They found the deck “...washed away by the sea but both ends of the ship still visible...” (Grocott, 1997, p. 331)

Gradual burial in sand: this is the likely means of deposition – and, as we shall see, the likely means of preservation -- of the St. George bottles.

Admittedly, we are entering the territory of theory here, as we have little reliable archaeological evidence to support that this is what actually happened to the St. George during its wrecking. But the explanation seems more than plausible.

### **Burial while sinking into the sand**

A crucial aspect to burial theory is the likely *removal* of sand from *beneath* the St. George’s hull during the wrecking event by a combination of “spilling breakers” and “plunging breakers”, as well as a probable rip tide that night – phenomena that claim the lives of holiday tourists every summer along this coast.

Natarajan, et al in 1953 described a “spilling breaker” as the “result from waves of low steepness (long period swell) over gentle slopes.” They add: “Such breakers gradually transport water towards the beach during groups of high waves. Rips running back to sea, transport this water *away* from the beach during groups of low waves.” (Natarajan, 1953, p. 35)

“Plunging breakers” on the other hand “result from steeper waves over moderate slopes.” Importantly, they continue: “The slope of a beach is not constant but may change with the tide. Some beaches are steep towards high tide, others toward low tide. A plunging breaker is ... greatly augmented by backwash from its predecessor.” (Natarajan, 1953, p. 35)

We do not have the expertise to accurately measure the gradient of the beaches near the wrecksite – i.e. whether they are of a “gentle” or “moderate” slope. All we can observe is that, today, they are very, very flat. At low tide and in calmer weather, the brave can walk out into the surf for more than a kilometer at some stretches along the beach.

It seems quite compelling, however, that, either plunging or spilling, as Natarajan call them, the retreating breakers that night, having broken, almost certainly transported sand *away* from *underneath* the stranded hull of the St. George.

Anyone who has stood barefoot in the waterline on this Danish North Sea coastline, with even the gentlest summer waves lapping over his toes, knows the effect of each wave: it gives and it takes away sand around your feet.

As each wave withdraws, it removes sand from under your feet, causing you to sink into the wet sand. As a new wave comes, it deposits new sand on top of your feet. Stand there for five minutes, and your feet become covered in sand while you literally sink *into* the sand upon which you stand.

Retreating waves remove sand from beneath your feet – especially the part of your feet facing the shore. If you stand facing the ocean on a relatively flat beach with a slight incline seaward, your heels will sink precipitously with each retreating wave, and they will sink more rapidly than your toes. If you face the shore, your toes will likely sink before your heels.

There is bi-directional action occurring with each wave: underneath the surface of each approaching wave is the current, moving in the opposite direction – away from shore – of the preceding wave. (This undercurrent is also commonly known as the “undertow.”)

Sand is simultaneously transported in each direction, on the surface and beneath the surface.

Were the same forces (although monstrously multiplied) at work on the St. George as she foundered? It seems likely.

We are reminded here of Ryan's description of the North Sea as the St. George attempted on 20 December to leave the Sleeve: “They were thwarted by a mixture of changeable winds and baffling currents.” (Ryan, 1964, p. 128) We are also reminded of survivors Anderson's and Page's chronology of those directional wind changes in the 24-48 hours preceding the demise of their ships.

We are further reminded of Ryan's reference to contemporary sailing directions of the time, warning mariners of a “strong SE current” along the coast:

“...be particularly careful not to stand to the southward of Bovenbergen with a N.W. wind, for fear of getting embayed, and prevented from getting out, by the *strong current* that sets to the S.E. at the rate of two miles an hour, during strong winds from the N.W. which is the cause of so many ships being lost on that dangerous coast.” (Ryan, 1964, pp. 128-129).

Add to this backdrop a simple understanding of the effect of air temperature, wind direction, and current on wave-formation dynamics, as supplied by Natarajan, et al:



*“Aside from just wind speed, the temperature is also a factor in creating waves. Warm air (which rises) moving over water has a less acute angle of attack on the surface than does cool air (which sinks). A cold front moving across open water will create much steeper waves and hence create breakers sooner than a warm front moving at the same speed.”*

*“Also, a change in wind direction over existing waves can create confusion and hence larger waves. If a wind has been blowing northeast over an open body of water for three days and suddenly switches to northwest over that same body of water, new wavelets will form within the existing system of waves. The energy of both systems will multiply to create larger waves.”*

*“When a wave system meets a current flow one of two things can happen. If the wind and current are both going the same direction, it tends to smooth out the waves, creating long swells. If the current and wind are moving in contradicting directions, it will create much steeper and more aggressive waves.”* (Natarajan, 1953, p. 37)

This explanation seems to complete the tapestry of how the bottles from the St. George were deposited 23-24 December 1811: at least a large part of the assemblage was buried in sand and sediment. The interment is also critical to understanding the formation processes on the site until the bottles were recovered.

### ***“What happened originally?”***

Our answer: while each monstrous wave over its gunwales deposited massive amounts of solid matter (sand, mud, silt, sediment, small pebbles, etc.) onto the deck of the St. George, another wrecking process was at work: retreating waves likely *removed* sand from underneath its hull – thereby simultaneously sinking and burying the ship ... with the bottles stowed deep in her hull near the stern. Topside was exposed to a blitzkrieg of sediment-laden waves for a much longer period of time than her hull, explaining the destruction of the former and the preservation of the latter.

This seems the most plausible and most logical explanation for “what happened originally?” to the St. George collection: the ship “struck” sand a few hundred yards offshore, settled into the sand with each retreating wave removing sand and sediment from underneath her hull, while each approaching wave deposited enormous amounts of solid matter on top of her.

### **What happened in the meantime?**

Since its deposition-by-burial, two categories of impact have influenced the assemblage and its *in situ* archaeological context: the ongoing formation processes of nature, and periodic interventions by man.

The natural formation processes at work on this assemblage over time seem paramount to answering the question of “what happened in the meantime?” Interventions by man in

modern times are certainly part of the answer, but we believe the bottles themselves, point to the natural environment as the Rosetta Stone for understanding “what happened in the meantime.”

We must therefore explore and understand the *in situ* environmental context of the assemblage, i.e. the submerged environment that was home to these bottles for more than 170 years. We will see that that environment and subsequent formation processes very likely constitute the real story behind these bottles.

Again, a potpourri of natural variables are central characters in this subplot, e.g. wind direction, currents, water temperature, salinity (perhaps), coastal erosion, morphology of the very shallow sea bottom at the wrecksite, etc. along with sedimentology terms such as “turbidity currents” and “mobile sand layers” and “suspended particle matter.”

All of these variables congeal into at least a theoretical explanation for the data presented by the bottles. As such, we must bravely peer over the fence into the sciences for a layman’s answers to our questions – understanding that we are out of our depth.

### **The *In Situ* Interface**

What matters most, of course, is the *interface* between the bottles and their immediate environment, i.e. the physical contact the bottles had with elements of that environment – in our case, either water, sand/sediment, air...or a combination of all three elements (or even more). (Florian, 1987, p.1). The interface determines, to a very large degree, the natural formation processes on the artifact.

For submerged artifacts, the environmental interface would determine a number of varying and different chemical, physical and even biological reactions. Florian presents a sound framework for understanding that interface -- usually a meeting of solid and liquid.

Florian identifies four possible interfaces for an artifact in a submerged environment (Florian, 1987, pp. 18-19):

- Artifact-atmosphere or seaspray (partially unsubmerged)
- Artifact-seawater (submerged)
- Artifact-sediment and seawater (submerged and partially buried in sediment)
- Artifact-sediment and interstitial water (submerged and entirely buried in sediment)

Figure 18 from Florian illustrates this classification regime that would apply to the St. George bottles assemblage.

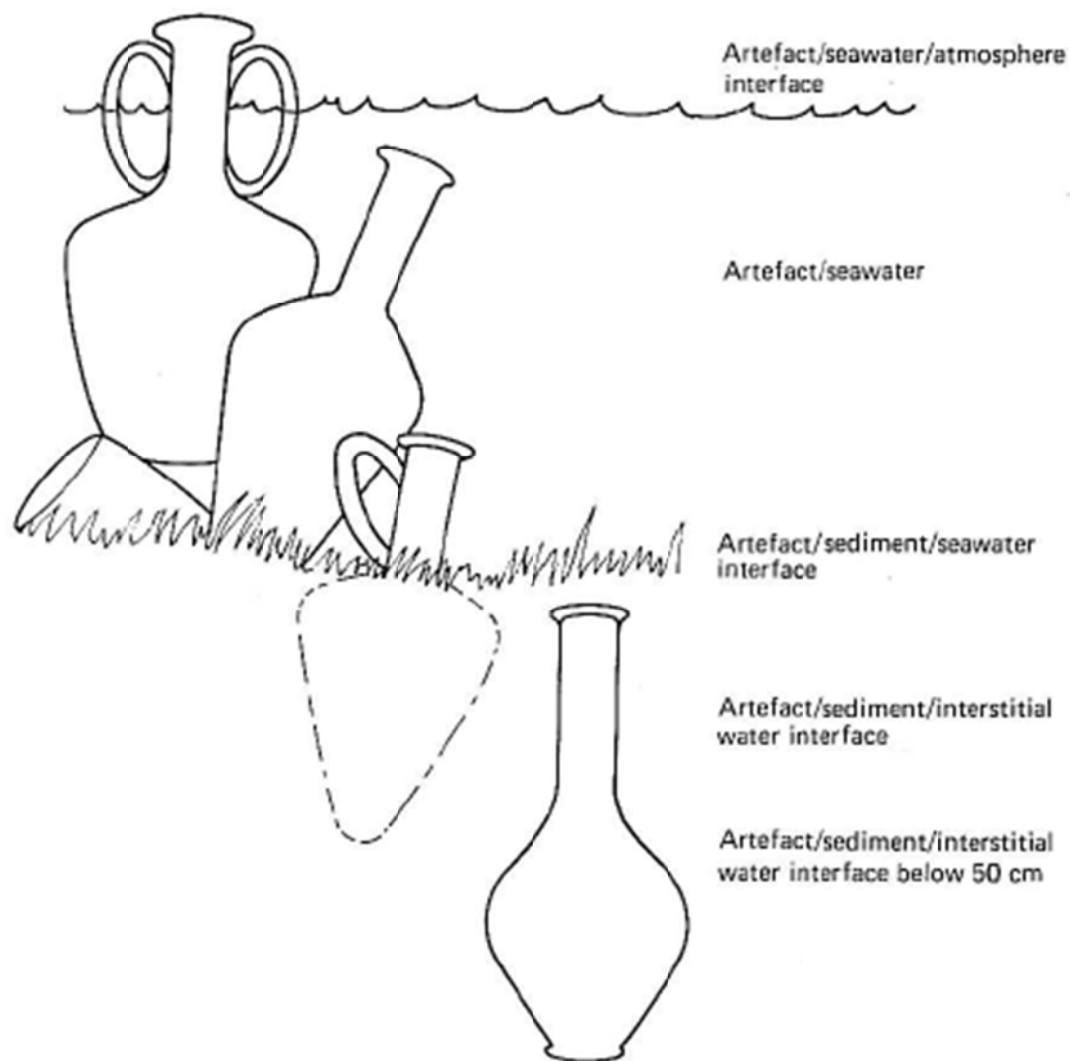


Figure 18. Artifact interfaces in marine environment. (From Florian, in Pearson, 1987, p. 19)

The relevance of the interface is clear: a glass beverage bottle would deteriorate or change – or not -- depending on the contact it had with the elements in each of these four different dispositions. The interface can determine not only *if* an artifact survives to the point of excavation, but also *how* (by what method) it survives, and therefore *why* it survives. (Florian, 1987, pp. 18-19)

While Florian focuses on decay, deterioration and change to the artifact catalyzed by its interface, the St. George assemblage could very well present compelling evidence of the *preservative* qualities of the interface.

For example, a bottle buried in sediment and interstitial water for 172 years will likely present different data and diagnostic characteristics than would a bottle simply lying in seawater on the sediment for the same amount of time. The buried bottle would not be exposed to scouring while the unburied bottle would be. (Florian, 1987, pp. 18-19)

Smith (2003), Hamilton (1998), Florian (1987) and others tell us that interaction with water, especially seawater, causes chemical instability in glass artifacts. (Smith, et al, 2003, *Glass Conservation Using Polymers*, p. 94). The submerged interface of these artifacts matter a great deal.

The St. George collection analyzed here is comprised of 229 glass beverage artifacts, almost all of them completely intact bottles. They represent a total of approximately 300 that have been recovered at this writing from the St. George wrecksite. It is possible, though not probable, that all 229 bottle-artifacts studied here experienced the same interface. We just don't know because we do not know how or where they were recovered.

It is also important to note here that the interfaces for these bottles *very likely changed* since their original deposition – and perhaps changed many times. Given what we think we know about the waters and environment of the wrecksite, it is folly to presume that these interfaces were static over some 170 years.

We have no evidence that any of the bottles were exposed above-surface to the atmosphere or seaspray, the first of Florian's interfaces. But it is certainly possible that many if not most of the bottles were, at varying times until salvage or excavation, either entirely buried in the sediment and interstitial water, or partially buried in the sediment, or submerged and lying on the sediment – the other three of Florian's's interfaces.

Further, the St. George assemblage presents an additional possible interface unmentioned by Florian: an artifact submerged in seawater, in direct contact not with sediment but with another artifact – such as another bottle, the wood of the ship, or the dunnage that may have been used to pack the bottles and prevent breakage. (We have no archaeological evidence of dunnage, however.)

A bottle in contact with iron (e.g. buried underneath a cannon) would react differently because of the chemical properties of glass and iron and their reactions with one another.

### **Starting point: December 24-25, 1811**

The formation processes of our bottles assemblage began as soon as they were submerged. Nature had our assemblage firmly in her grasp.

Everything that follows is relevant because of what followed that original deposition. It influences how and why so many bottles survived and their state of preservation when recovered, for example.

The theoretical wrecking process of the St. George (and therefore the original deposition of the bottles in our assemblage) has been explained:

- With its bow pointing either northward or westward (seaward), the hull of the St. George settled into the sands – buried within hours.

- The bottles, most likely stored aft and deep on either the orlop deck or in the hold, were immersed in icy salt water ... and quite probably in a significant amount of sand, silt, sediment and small pebbles.

We are reminded here of the disposition of the hull two days after its wrecking, according to eyewitness reports:

“Two days later, with the wind offshore, two Englishmen (apparently survivors), went to the wreck which lay 300 fathoms offshore, to recover the bodies of the admiral and captain, but found the deck had been washed away by the sea, yet both ends of the ship were still visible, *supposed broken right athwart and held together by the ammunition and guns in her bottom.*” (Grocott, 1997, p. 331).

Regarding the interface of the assemblage upon deposition, one lingering question is bothersome because it is relevant: what was the compass disposition of the hull that morning when “two Englishmen” went in search of Admiral Reynolds and Captain Guion?

### **Hull disposition: why it matters**

What was the compass heading for the ship as its hull was buried and settled into the sand? Was its bow northward? Southward? Facing west, into the winds and surf?

Because of the current(s) at the wrecksite, the initial disposition of the St. George hull in the early-morning hours of December 24-25 1811 is relevant to the interface of the assemblage and the subsequent natural formation processes.

Yet again, we must recall Ryan’s “strong SE current that sets to the S.E. at the rate of two miles an hour,” (Ryan, 1964, pp. 128-129), identified as what Ryan says indicates as common sailing knowledge at the time. (This current direction is disputed, as we shall see.)

If the littoral waters in the immediate environment at deposition are anything like they are today, then that “strong SE current” was a sediment superhighway – a freeway for mass sediment transport...sand, silt, small pebbles, etc. If so, then this current almost certainly began depositing even more sand and sediment onto the wreck and scouring whatever part of the ship was not already buried in the sediment.

So, in relation to this sediment transport, where were our bottles during the onslaught? What was the current’s effect on the assemblage? That depends largely on its final heading when she struck.

The hull’s disposition vis-a-vis the current would determine, to a large extent, the formation processes on the assemblage.

We believe the St. George was possibly on a NNW course when she struck sand. From John Anderson, the St. George survivor: “*About eleven o'clock [Monday, 23 December]*

*the wind changed to NNW; at twelve [midnight, 24 December] the admiral made signal to wear and stand to the westward...*" (Grocott, 1997, p. 330)

Did the St. George succeed in wearing ship? Did she stand to the westward? Or succeed in turning into the NNW wind? Anderson doesn't say. After Admiral Reynolds gave the order at midnight, Anderson and the crew struggled to survive for roughly five hours before the ship struck between 5-6 A.M on 24 December 1811. (Grocott, 1997, p. 330)

Given events of those five hours, it is anyone's guess as to the heading of the ship at the moment she struck. She was, after all, fighting for her life ... and unable to navigate properly due to the ineffectiveness of the Pakenham rudder at that late hour.

But her final heading matters. If the hull did indeed settle into the sediment with its bow northward, for example, and if our bottles were indeed stored aft (south, near the stern), the formation processes on the assemblage would be different than if, say, the hull was buried with its bow southward or even westward. The interface would probably have been different.

In other words, if the remaining bow portion of the hull took the brunt of the "strong SE current" and its sediment transport, the bottles, stored aft, *may* have received less (or more) sediment than forward parts of the ship. The bow may have served as a sort of "wind screen" or sediment screen for the after portions of the hull.

Conversely, if the bow was pointed southward and the stern northward, the after portion of the hull probably took the brunt of that sediment transport – and the sediment deposit onto the after portion of the wreck would have likely been much more significant than if the hull was deposited bow-northward.

Even more interesting: a bow-westward disposition. If the St. George struck with her bow facing the sea (westward), then her starboard side would have been facing north – taking the brunt of the southerly current...and therefore the brunt of the sediment transport. The starboard side would likely have taken on more sediment during the hull's burial than other compass dispositions.

This is significant as the majority of the assemblage was purportedly found on the starboard aft section of the orlop deck.

A difference in the volume of sediment on top of the assemblage – for example, one meter as opposed to a half-meter – would mean differing interfaces; such a difference in sediment volume could, over time, translate into huge differences in the formation processes at work on the assemblage – devitrification, for example.

The hull's disposition would determine, or at least greatly influence, the interfaces for the St. George assemblage and, therefore, the formation processes at work on the bottles. Different compass dispositions or headings would have produced different formation

processes on the bottles. The hull's disposition could even help us understand our larger thesis questions.

### **Natural formation processes: an eternal marine sandstorm**

The site's formation processes have not been monitored since 1811, of course. And it is only in modern times (since the 1980s) that the site has received any attention from archaeologists and heritage-management authorities.

Thus, we are again left to take what we know today and project backwards and then juxtapose that with the data presented by the bottles themselves. The best we can hope for is a theory that seems to offer a sensible explanation.

If conditions today reflect anything like the past 200 years near the site, and they apparently do, we can perhaps get a reasonable idea of what has happened to the collection of bottles since deposition and recovery – a period of at least 172 years *in situ*.

In fact, the waters enveloping the site today are perhaps best described as an eternal, perpetual, undersea sandstorm.



**Figure 19.** The beach near the wrecksite at Thorsminde, Denmark September 2011. Note the brown sediment in the approaching wave. Photo courtesy of Tommy Bay. (Strandingmuseum website, 2011).

There are very, very few rocks larger than a man's fist in these waters – probably less than five percent of all the stones within a five-mile radius of the St. George wreck. The vast

majority of stones here range in size from smaller than a child's marble to no larger than a ping-pong ball. Most are worn very smooth by the overwhelming main solid of the environment: sand.

Currents of 3-4 knots are the norm, creating very turbid waters almost year-round. This is a seabed that is constantly in motion, with turbidity currents and sands and channels along the seabed orchestrating change every moment of every day – change in the sea bottom morphology ... and therefore the *in situ* context of the assemblage.

As currents change and shift, they shape and reshape the sandy bottom, creating sandbars and spits near or above the surface and channels along the bottom ... and then destroying those sandbars and refilling those channels. Sediment, small stones and sand are constantly in movement, transported by currents, “mini-currents,” tides, surges, and storms.

As these channels and sandbars are formed and reformed, they, in turn, direct and redirect currents and mini-currents, which form new channels and sandbars *ad nauseam*. It is a symbiotic cycle of nature that never ceases in these waters. The currents and sand work in tandem to keep the bathymetry, morphology, and hydrology of the wrecksite constantly evolving.

As a result, underwater sites along this coastline are revealed and then, perhaps a week or even a few days later, again concealed under sand and sediment. Today, the St. George wreck remains fluctuate between 11-9 meters in depth – depending on the movement and collection of sand and sediment. (Lars Mortensen, personal communication, 2 May 2012).

One month a site can be “protected” by the natural environment by being buried in sand; the next month, it can be exposed and very much at risk of scouring by these dynamics.

In fact, “scouring” is perhaps far too timid a word: “sandblasting” seems more appropriate, given the solid-particle matter transported by the ever-changing mini-currents and tides of these littoral waters.

Add to this the tides, storm surges, and the fierce gales of North Sea winters, and the waters around the St. George wrecksite can easily be thought of as a living organism, most often in a bad mood.

Along the beaches near the St. George site, one can find on any given day, pieces of obviously hand-worked wood that have been subjected to this submarine sandblasting. Bits of old piers, jetties, docks -- even strakes of old wooden ships -- can be found with their cut-by-man edges completely rounded and smoothed by this formation process.

One can also occasionally find ships on the beach.

### **The Skallingen Example**



An example is the wreck known as the Skallingen, an 18-meter, 19<sup>th</sup>-century merchantmen deposited on the Skallingen barrier-spit beach about 60 miles south of the St. George site.

“Revealed” by the sea in late 2009, the wreck appears to have already gone through several cycles of burial, exposure, and reburial in sand and sediment due to tidal action and storm surges.

The “beach” where the Skallingen wreck lay is never truly static on this coast but perpetually in motion. It is “evidently losing sand” as Christiansen and Aagaard observed in 2004. (Christiansen and Aagaard, 2004, pp. 1-3)

Figures 20 and 21 show the Skallingen wreck at high tide and low tide, respectively, during both summer (fig. 20) and winter (fig. 21) between 2009-2011. We see all of Florian’s interfaces in these photos, with the addition of an ice interface in the second figure.

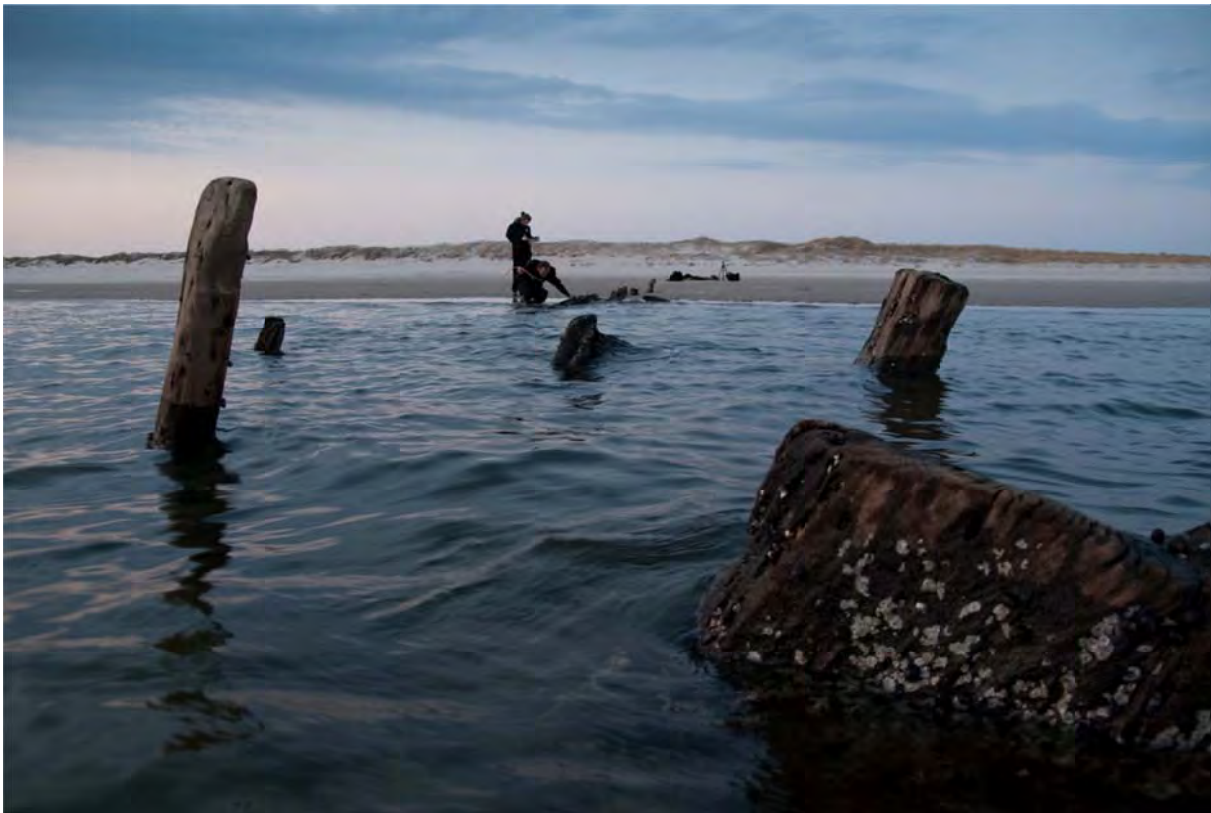


Figure 20. Skallingen wreck at near-high tide, April 2010. Photo courtesy of MAP, SDU.



**Figure 21. Skallingen wreck at low tide, winter 2009-2010. Note the ice interface on the exposed frames. Also note the gentle slope to the beach and the sand spit to the left, features that continue most of the way northward along the Danish North Sea coast. The beach near the St. George wrecksite is very similar to this. Photo courtesy of MAP, SDU.**

## North Sea

With the caveat that we are trying to interpret the past environment here using observations made today, let us briefly take a step back and grasp the big picture of the natural environment that hosted the St. George bottles assemblage for almost two centuries.

The North Sea's infamy is well-deserved. In Danish waters alone along Denmark's North Sea coast, there are roughly 6,000 known submerged archaeological sites – the vast majority of them shipwrecks. (Mortensen, 2010, personal communication)

Today, in modern times, the North Sea is notorious for its impetuous, raging temperament. This notoriety is not a modern phenomenon; as Ryan, Grocott and many others have documented, the North Sea commanded respect (and fear) from seamen in the age of Nelson.

Apparently little has changed since the night the bottles were deposited beneath the waves in 1811.

Then, as now, the North Sea seems to have been in a foul mood far more often than not, ready to explode into a destructive rage even during “calmer” summer months. But, as we shall see, the gales of winter were to be feared by every mariner.

Today, the North Sea hosts some of the busiest shipping routes in the world; most of Europe's larger seaports are situated on North Sea coasts and rivers. (OSPAR Quality Status Report 2000 for the Greater North Sea, 2000, p. 23)

Significantly, the North Sea is one of Earth's shallower seas, with depths no more than roughly 100 meters, which directly contributes to its volatility. See Figure 22.

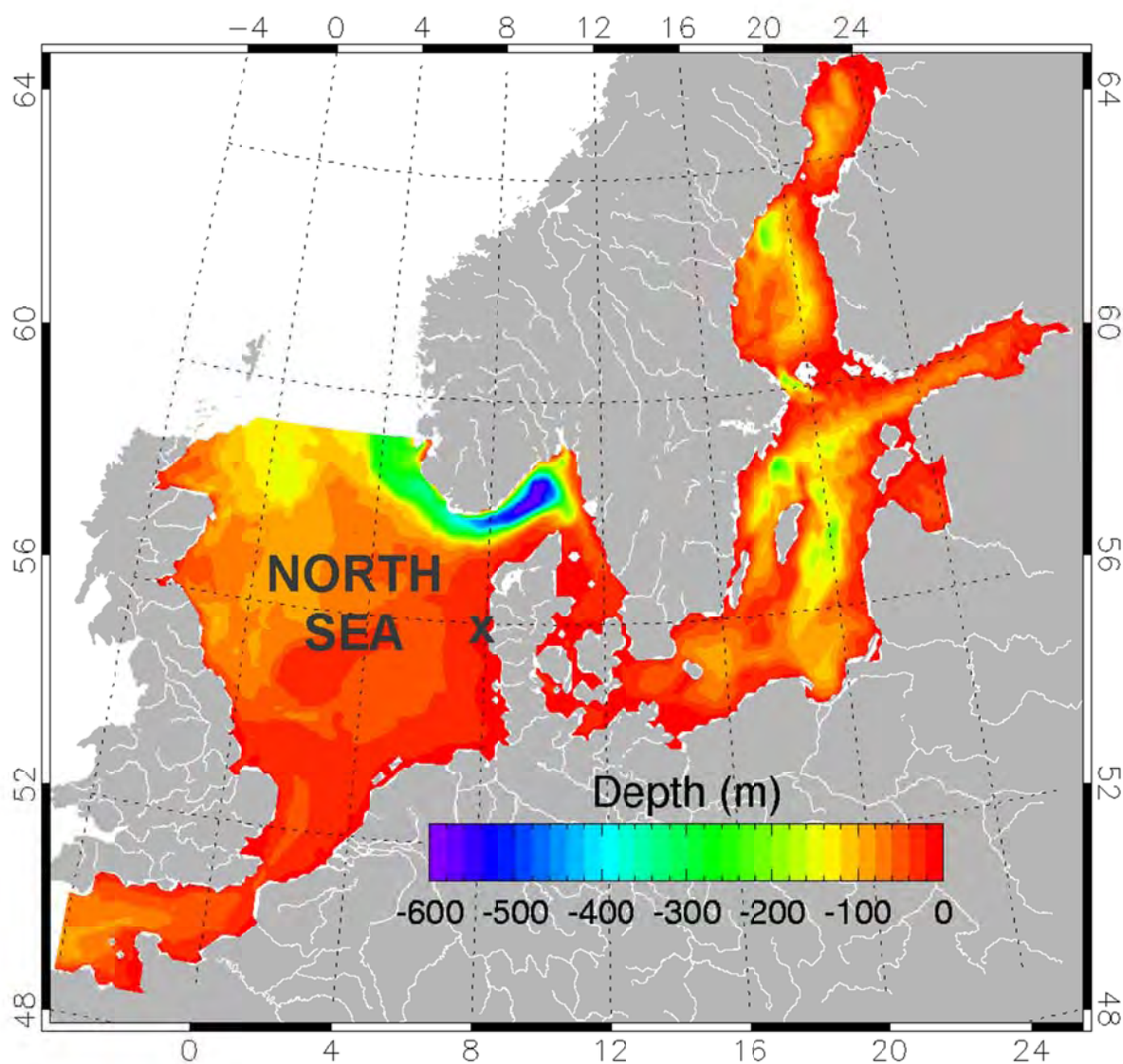


Figure 22. North Sea - Baltic Sea depths. "X" marks the St. George approximate wrecksite, in very shallow waters. (From Danish Meteorological Institute, Center for Ocean and Ice. [www.ocean.dmi.dk/models/bshcmod.uk.php](http://ocean.dmi.dk/models/bshcmod.uk.php))<sup>44</sup>

In very few places is this volatility more pronounced than in the littoral waters along Denmark's North Sea coast – a shallow (~40-50 meters at its deepest), very sandy, violent, unpredictable and radically dynamic environment.

<sup>44</sup> <http://ocean.dmi.dk/models/figs/bshcmod.png>



## The littoral environment

“The west coast has the reputation of being particularly exposed and windswept.” So says the MetOffice, the UK's National Weather Service, at the risk of gross understatement. (National Weather Service, 2012).<sup>45</sup>

The “typical” Danish North Sea coast is described as “sandy beach, in front of sand dunes ... highly exposed...micro-tidal sandy coast...wave-dominated sediment.” (Sisternans and Nieuwenhuis, Euroasion Report, 2004, p. 2).

The submarine environment of the St. George wrecksite is a perpetual, discordant cacophony of elements. Winds affect currents, which affect sediment transport, which in turn affects changes in current direction, etc. It is an impetuous, often tempestuous environment of “sandy subtidal sediments” and “mobile sand layers” and “turbidity currents” and “subtidal pumps” and “spit formations” and “shoaling bars.”

The waters of the wrecksite today are shallow, sandy, and eternally roiling. On some days, it is even conceivable to walk through the low tide to very close to the wrecksite – presently, about a mile from shore. The slope of the beach is very gentle, exacerbating the modest tidal range (less than one meter). (Sisternans and Nieuwenhuis, Euroasion Report, 2007, p.3).

Given frequent wind changes near the wrecksite, the environment is, by definition, eternally amorphous – especially the bottom topography.

## Winds

Winds near the wrecksite are almost constant – and almost constantly from the west. It seems always windy, sometimes fiercely so, with winds mostly from the WSW; those with the highest velocity come from the NW (Moller, 1992, p. 712). In fact, about 70 miles SW of the St. George wrecksite lies Horn's Reef, one of the world's first large-scale offshore wind farms.

Notably, wind-speed fluctuations in this area of the North Sea are more severe for westerly flows than easterly flows, and the most severe fluctuations appear in autumn and winter. (Vincent et al, 2011, p. 2) (Vincent, et al analyzed wind characteristics at Horns Reef.<sup>46</sup>)

These fluctuations translate eloquently into severe unpredictability for the St. George wrecksite environment, given the effect of westerly winds on waves and currents and sediment transport.

<sup>45</sup> [http://www.metoffice.gov.uk/weather/europe/denmark\\_past.html](http://www.metoffice.gov.uk/weather/europe/denmark_past.html)

<sup>46</sup> Vincent, et al's analysis is “highly site-specific,” i.e. her findings may or may not resemble similar wind vicissitudes near the St. George wrecksite. Also, the measurements taken were of wind speed and direction at a height of 43 meters.

Figure 23 indicates predominant wind directions at Horn's Reef from October 2001 – April 2002 ... almost 200 winters after the deposition of our bottles in these waters. (Tambke et al, 2004, p. 2).<sup>47</sup>

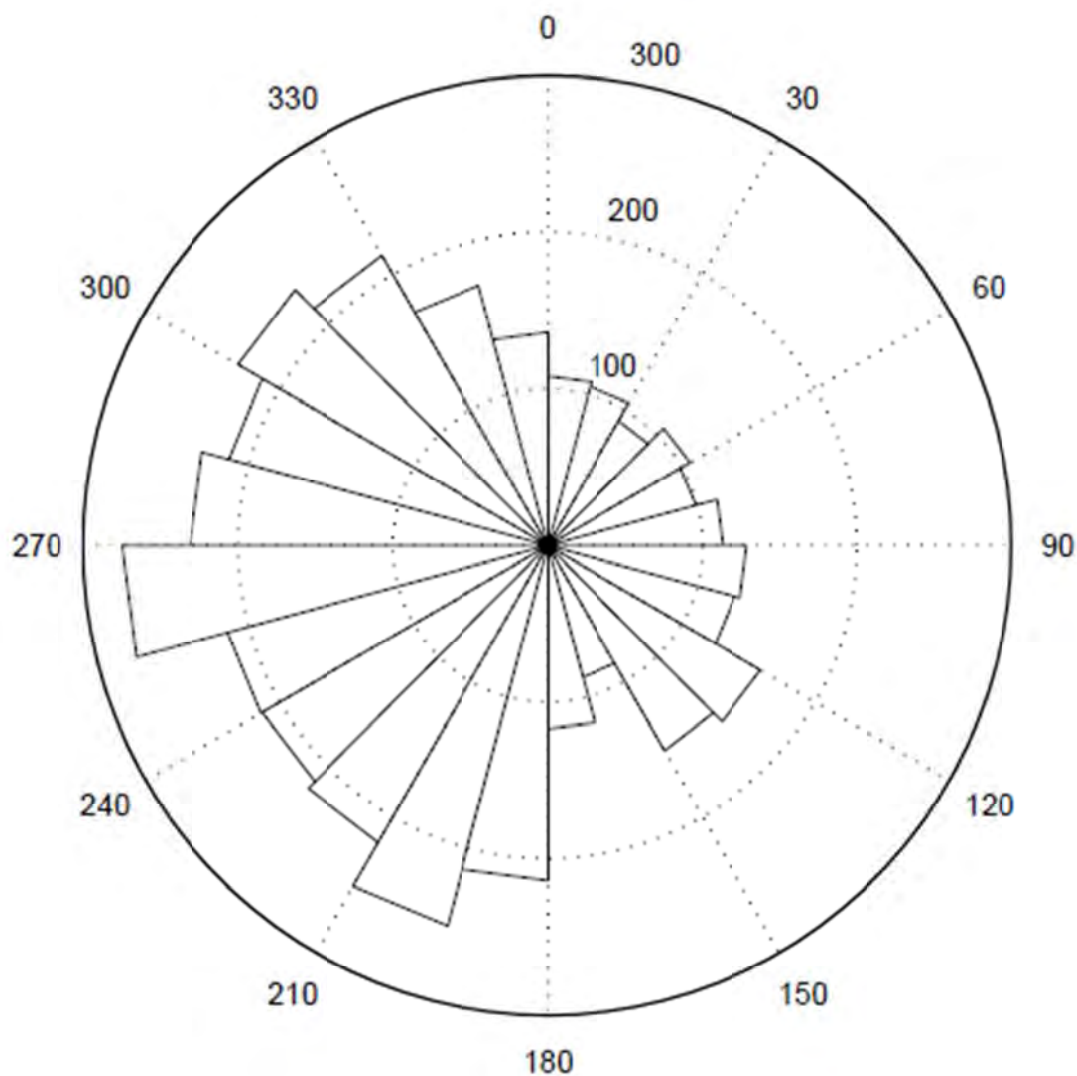


Figure 23. After Tambke. Wind direction at compass points at Horn's Reef, just a few miles SE of the St. George wrecksite, 200 winters after its wrecking.

### Current(s)

In the waters near the wrecksite, does the topography of the sea bottom control the currents or do the currents shape the topography?

The answer is “yes.”

<sup>47</sup> Wind directions and frequency as measured at 43 meters height.

As we have seen, the ecosystem of this environment is largely the product of wind, waves and the sea-bottom topography. That topography, combined with winds, affect currents and *changes* in currents ... which in turn affect changes in the topography of the sea floor. It is a never-ending cycle of action and reaction, cause and effect between interrelated elements.

What this dynamism means: sand, pebbles, silt, mud and other particles are constantly lifted from the shallow sea floor near the wrecksite and carried along by Ryan's "baffling currents" in a never-ending undersea blizzard.

At first glance, we are unclear as to the direction of the dominant current along the western coast of Denmark near the wrecksite, as the experts seem to differ.

The EuroSION Report of 2004 tells us that the "...Gulf Stream comes from the Wadden Sea and moves northward" along the coast near the wrecksite. (Sisternans and Nieuwenhuis, 2004, p.3).

Interestingly though, Moller identified a southerly current running along the coast near the wrecksite in 1992. In analyzing a groyne (a breakwater) known as the "Q-groyne" near Fjaltring, perhaps 7 miles north of the wrecksite, Moller says:

"The lee side erosion on the Q-groyne has increased to such a degree that the *sediment transport from the north has stopped following the shoreline. From the Q-groyne the transport now continues directly towards the south.* The sediments are deposited in rather deep water sufficiently far from the shoreline that the beach is deprived of sand and the erosion is further increased." (italics added, Moller, 1992, p. 714)<sup>48</sup>

This somewhat corroborates the "...*strong current* that sets to the S.E. at the rate of two miles an hour..." that Ryan says were known to Royal Navy officers and seamen at the time of the assemblage's deposition.

However, both these accounts run counter to the EuroSION Report of 2004, which flatly states: "The Gulf Stream comes from the Wadden Sea and is directed *northward* at the western coast of Jutland." (italics added, Sisternans and Nieuwenhuis, 2004, p.3)

Further, the Danish Meteorological Institute, referring to what it calls the "Jutland Coastal Current" adds rather authoritatively:

"The Jutland Coastal Current is a fresh-water influenced current that closely follows the Danish West Coast. It is part of a general cyclonic circulation in the North Sea and so the direction of the mean current in the Jutland Coastal Current is northward." (Nielsen, 1999, p.1).

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<sup>48</sup> We can only assume that this southerly "sediment transport" also indicates the predominant seawater current.

Apparently, both are true: the northward current starts (or resumes) along the coast just roughly 14 miles north of the wrecksite, near the town of Fjaltring. At the wrecksite itself, the current is indeed southbound. (Mortensen, personal communication, 2 May 2012).

Again, current direction is important to our thesis questions as it might explain or illuminate data presented by the bottles – for example, evidence of scouring. It could also explain burial and reburial, over time, of the assemblage in the sediment of the wrecksite.

Nevertheless, there are also “mini-currents” at work here: local “sediment transport paths” (Christensen’s & Aagaard’s term) or channels between sand formations (e.g. spits and bars and submerged depressions) that are constantly formed and re-formed by the forces at play. (Christensen & Aagaard, 2004, p.12.)

Such currents near the wrecksite can reach 4 knots – in fact, it is the rule rather than the exception almost year-round. If these currents resemble the destructive “turbidity currents” described by Loughton (as they seem to), then they are submarine blizzards of sediment (Loughton, 1962, p. 381).

One thing is certain, based on firsthand observation in modern times by local divers and archaeologists: these are horizontal, sediment-transporting currents. Estimates of net sediment transport along the coastline range from 500,000- 1 million cubic meters per year. (Sisternans and Nieuwenhuis, 2004, p.4)

Figure 24 illustrates the effect of a southerly current on sediment transport. The photograph is facing westward.

Note the buildup of sediment on the right (north) side of the beach, to the right of the breakwater.

What would be the effects of such a current on the interface of the St. George assemblage if the ship’s bow were facing westward? If the collection, at least partially buried somewhere on the starboard side, was taking the brunt of this sediment buildup?





Figure 24. From Moller, 1992. Effects of the southerly current along the coast, a few miles north of the wrecksite, from May 1988. Note the buildup of sediment to the right (north) of the “groyne” [the jetty or breakwater of large concrete blocks]. Moller: “The sediment transport from the north is represented by the deposit to the right of the groyne and the erosional offset in the downdrift direction.”

## Waves

Anthony and Moller refer to the North Sea coast in this area as “characterized by a high-energy wave regime.” (Anthony and Moller, 2002, p. 27) Indeed. Average wave height is more than two meters with a wave period of six seconds. Maximum wave heights can reach six meters with a period of 10 seconds. Wave lengths can vary from 350 to 1000 meters. (Sisternans and Nieuwenhuis, 2004, pp. 3-4).

## Tides

Although the North Sea coast in this area is exposed to strong westerly winds, the tidal range is not that severe – normally less than .5 meters. (Heuss, 2001, Table 7.1, first page of Ch. 7.)<sup>49</sup>

That figure of .5 meters, though, must be understood within the overall context of the dynamic personality of this area. Weather can, and most often does, often wreak havoc with tide tables: storm-induced fluctuations (i.e. surges) can raise the sea level by several

<sup>49</sup> Christensen & Aagaard report a mean tidal range of 1.5 meters, increasing to 1.8 meters in the spring, at the Skallingen barrier spit, about 60 miles south of the St. George wrecksite. (Christensen & Aagaard, 2004, p. 6).

meters near the St. George wrecksite. (Anthony and Moller, 2002, p. 27). In such an environment, the phrase “predictable tidal range” can be a contradiction in terms.

Most important for our purposes here: tidal scour – that is, the effect of constantly moving sediment, born by these tides, coming into contact with our assemblage of bottles.

## **Sediment**

As Loughton points out, the sea floor is “...a great deal more complex than the upper surface...” of the sea. (Loughton, 1962, p. 382).

To our knowledge, the sediment and seawater near the wrecksite have never been sampled or analyzed. We must infer, based on the works of other and personal observations.

To the casual swimmer or diver, the sediment near the wrecksite can best be described as mobile and dynamic. Surface sediment appears in the hand as roughly 60-70 percent sand (of varying grain sizes), mixed with roughly 30-40 percent small pebbles and stones rarely larger than a child’s marble. But no two handfuls on any given day follow this mixture. And there may be much more to this sediment than simply sand and stones.

About 30 miles south of the St. George wrecksite, just offshore of the Danish village of Klegod, Anthony and Moller, studying the seabed geology of this region, identified in 2002 several deposits of clay underneath a sand layer, what they refer to as “mobile sand.” (Anthony and Moller, 2002, p. 30).

The *in situ* presence of clay could, of course, greatly alter the formation processes at work on the St. George assemblage because of the anaerobic and possibly preservative qualities of clay on glass artifacts.

Anthony and Moller detail results of a marine survey with high-resolution marine seismics and vibracores that were conducted at depths between 10-25 meters roughly 800 meters offshore.

They discovered a “...large complex of Miocene sediments (primarily Mica clay) exposed (or covered by a thin sand cover) at the seabed” at the northernmost part of their survey area, i.e. nearest the wrecksite. They reported that the “mobile sand layer in the offshore survey area is most places less than 0.5 m in thickness.” (Anthony and Moller, 2002, p. 29, Fig. 3). They note further that the “mobile sand layer” increased in thickness towards the shore.

These deposits are not regular, stratified layers running evenly up and down the coast but random deposits of varying depths and dimensions. As Anthony and Moller indicate, at the risk of understatement, this area of the seabed is “relatively complex.” (Anthony and Moller, 2002, p. 30).

Of special interest in Anthony and Moller's work, however, is a vibracore 82.455, just offshore of Klegod, apparently the northernmost offshore core of their study area and, therefore, nearest the wrecksite. (Anthony and Moller, 2002, p.31).

This core revealed "... marine sand in the upper 9.2 meters, below which a thin unit of marine clay overlays another thin layer of marine gravel." (Anthony and Moller, 2002, p.31).

The possible presence of *in situ* clay at the wrecksite is tantalizing, in light of the varying states of preservation the bottles present to us. Of course, we do not bring the expertise to understand or explain the possible chemical impact of Mica clay on the St. George assemblage over time but it seems reasonable to assume that it would be different than that of sand and pebbles exclusively.

(Further, because the chemical structures of mica and silica appear to the lay archaeologist to be related, this presents another maddening question for the researcher: What would be the chemical formation processes at work if a glass bottle, made largely of silica, was deposited in sand and mica clay?)

Finally, it is provocative to also note that mica flakes provide many sandy beaches – including the beach near the St. George wrecksite -- with their sparkle, as the sun reflects off the tiny specks of mica. These specks eerily resemble the flakes and tiny specks of devitrified glass that were an almost-constant presence during our analysis of the St. George bottles.

### **Sediment transport and Turbidity: Scouring**

A tourist film running in a loop at the Strandingmuseum gives powerful testimony to the effects of scouring on the wrecksite. The narrated film, of a salvage dive presumably in the 1980s, shows and describes a cannon lying *in situ* on or near the St. George remains.

Because of its exposure over the years, the rounded top surface of the cannon has been sandblasted completely flat, according to the narration of the scene in the film.

If scouring at this site had this effect on iron, what would be the effect on glass artifacts?

Technically, the terms "sediment transport" and "turbidity" mean entirely different, though related, phenomena. Turbidity is usually used to describe an "...optical property of water that causes light to be scattered and absorbed..." by solid particle matter rather than be transmitted free of such obstruction, i.e. through clear water. (American Public Health Association, 1999, Section 2130)

For our purposes here, the term "turbidity" means the *presence* of suspended particle matter – e.g. sand, silt, mud, etc. It is caused by the transport of sediment – i.e. solid matter put in motion by water, much as sand is carried by the wind above-surface, on the beaches near the wrecksite.

We use the term “turbidity current” here perhaps a bit more loosely than sedimentologists and oceanographers: our definition simply means “sediment carried mostly horizontally by seawater.”

Sediment transports, and the resultant turbidity, are relevant to our discovery process here as its potential influence on the formation processes is huge. Archaeologically, these phenomena translate into *in situ* scouring.

Again, to be clear: we are not concerned here with the impact of turbidity on visibility underwater but on the *cause* of that turbidity: suspended particle matter moving at speed or “sediment transport.”

Loughton, in a paper on sea-floor morphology, may have unwittingly offered the best description of the wrecksite environment in 1962, writing: “...turbidity currents may transport sediments from one side of a basin to another producing anomalous stratification in the sedimentary sequence. (Loughton, 1962, p. 381). (The phrase “stratification in the sedimentary sequence” reminds us of Anthony and Moller’s vibracore samples that illustrate such stratification.)

Of course, particles of sand and/or small pebbles moving at 4 knots across the surface of a glass bottle even for one day would certainly leave lasting impressions on that bottle.

As another example of the destructive power of scouring in modern times, Elmendorf and Heezen mentioned in 1957 undersea telephone and telegraph cables being destroyed by earthquake-triggered turbidity currents – cables that were designed to withstand such scouring. (Elmendorf and Heezen, 1957, p. 1089)<sup>50</sup>

The waters of the wrecksite are not the most turbid in the North Sea ... but they are close. Visibility very rarely exceeds one meter – which means a lot of suspended particle matter and/or sediment transport. (Aarup, 2002, p. 325, Figure 2).

What this dynamism means: sand, pebbles, silt, mud and other particles are constantly lifted from the shallow sea floor near the wrecksite and carried along by Ryan’s “baffling currents” in a never-ending blizzard.

Annual monitoring cruises along the coast conducted by the Danish Meteorological Institute measure salinity, temperature, turbidity, and other environmental variables. Data from these cruises consistently demonstrate a high level of turbidity along the Danish North Sea coast. (Stedmon, 2010.)

## Temperature

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<sup>50</sup> Their definition of a turbidity current: “... a flow of sediment-laden water which occurs when an unstable mass of sediment at the top of a relatively steep slope is jarred loose and slides down the slope.” In other words, an undersea, waterborne, sediment slide.

Surface temperatures along the coast average between roughly freezing (32 degrees Fahrenheit/0 Celsius) in the winter to approximately 57 degrees Fahrenheit (14 degrees Celsius) in high summer (Danish Meteorological Institute, 2012).

Importantly, Vincent indicates that autumn and the first part of winter are the time of year when the water in the North Sea is warmer than the air, which means “a prevalence of thermally unstable conditions.” (Vincent, 2008, p.13). For our purposes here, this translates into rather violent weather and, therefore, dynamic formation processes in the form of storms, surges, increases scouring, changes in mini-currents, etc., all affecting the St. George wrecksite ... and the interface(s) of the St. George bottles assemblage until its retrieval.

### **Salinity**

It is unclear if salinity is a factor for our assemblage. Conservation experts declare that it is not. We record salinity level here primarily for the record.

Salinity levels in the waters near the wrecksite are roughly 28<sup>0/00</sup> (parts per thousand), which is lower than the North Sea average (about 35<sup>0/00</sup>). Further, salinity levels near the wrecksite might be relevant not because of any potential effects of salt on glass artifacts but because salinity affects two other environmental variables: surface temperature and the presence of nutrients – both of which could conceivably affect the St. George assemblage.

Becker and Pauly ably document that sea surface temperature in the North Sea are directly related to salinity; the higher the salinity anomaly, the higher the (positive or negative) temperature anomaly. In other words, the more saline the water, the greater the chance that the water is either noticeably colder or warmer than the surrounding waters falling into mean salinity patterns. (Becker and Pauly, 1996, pp. 889, 897)

### **Coastal Erosion**

The littoral eco-system created by these factors (wind, currents, seabed topography, sediment, etc.) translate into severe coastal erosion near the wrecksite. All up and down the North Sea coast, coastal erosion is a huge challenge for Danish authorities.

Long, windswept, flat sandy beaches are the primary, defining characteristic of the coast near the wrecksite. That sand – just as the sand under the waves – is constantly in motion. And it is acquisitive, meaning that it is predatory – eternally encroaching eastward.

As Moller eloquently described a scene in a 1988 photograph of the beach near the St. George wrecksite: “...the beach was built by the waves of that day. The conditions can change from day to day.” Indeed. (Moller, 1992, p. 716).



Figure 25. View from beach, a few miles north of wrecksite in 1988, looking south. Moller describes this photo as "View from the Q-groyne towards the south. To the left of the heavy-basalt breakwater an artificial cliff is under construction. Between the artificial cliff and the breakwater the beach was built by the waves of that day. The conditions can change from day to day." (Moller, 1992, p. 716)

Bird, in 1974, documented significant erosion over the previous two centuries near the wrecksite (i.e. the coastal town of Thorsminde) (Bird, 1974, p. 1). According to some reports, coastal erosion near the wrecksite averages 3-4 meters per year, with a maximum of 11m a year. (Sisternans and Nieuwenhuis, 2004, p. 4).

In fact, from 1978-88, within roughly a mile or two of the St. George wrecksite, at the Thorsminde-Nissum Fjord, an "average coastline retreat" of 6.7 meters per year was measured. (Sisternans and Nieuwenhuis, 2004, p. 7)

As we have noted, tidal range and influence is modest (.3 - .8 m) along this coast. Yet frequent storms and surges wreak havoc: one storm, in 1981, eroded an average of more than 10 meters along this coastline – a maximum of 30 meters in some places. (Sisternans and Nieuwenhuis, 2004, p.3).

We are left to imagine the impact of roughly 200 such storms on the St. George assemblage over the 170 years it was submerged in this environment.

Because of such erosion since 1811, the St. George wrecksite is now approximately one mile from shore – significantly farther than the "300 fathoms offshore" (roughly 600 yards) where it lay immediately after its partial burial in the sediment. (Grocott, 1997, p. 331)

Of even greater significance to the St. George assemblage: when the nearby coast erodes, where does it go?

That is, when the sea ingests the coastland, where does the solid matter – the soil, gravel, sand, stones, vegetation, etc. -- from the lost coastland go?

Bird indicated that it very likely moves toward the wrecksite: "The material eroded from the beaches...is evidently being lost seaward." (Bird, 1974, p. 13) He added: "It is inferred that extensive deposits of sand and gravel derived from the eroded shoreline are now

spread out across the sea floor to the west of Jylland.” (“Jylland” usually translates into “Jutland” in English.) (Bird, 1974, p. 14)

What this means: even more sediment being placed in, on and around the wrecksite since the St. George was lost in December 1811.

Sand and sediment from the sea, plus sand and sediment from the shore – all in a violent, eternally dynamic maelstrom...we are left to imagine the impact on the interface and formation processes of the St. George assemblage until their recovery.

The impact of coastal erosion on the St. George assemblage leads us to the first example of interventions by man on the wrecksite: dredging.

### **Periodic Interventions By Man: Dredging**

Because wave action can and does cause coastal erosion near the wrecksite, and because coastal erosion precipitates dredging and the man-induced movement of sediment near the site, we are faced with the very real possibility of tons of sand constantly being deposited upon, removed from, blasted onto at high speed, and otherwise assaulting the wrecksite and our assemblage for some 170 years.

First, we must note that the wrecksite and surrounding waters are indeed an area of almost constant dredging to prevent, delay, mitigate or otherwise decelerate the coastal erosion that Bird and many others have documented over the years. Man intervenes periodically to thwart the effects of the natural environment on the coastline.

It is unknown at this writing when exactly dredging of these waters began but we are confident it started long before our assemblage was ever recovered.

We assume that the wrecksite, which has supposedly been a protected heritage site since 1963, is almost certainly known to the firms that conduct these dredging operations and it is therefore prudently avoided. But that prudence does not necessarily preclude an impact on the site from dredging operations – even miles away from the wrecksite.

Because nature constantly moves sand and sediment in destructive ways, man is forced to intervene – i.e. to move the sand and sediment back to where it needs to be. It is a constant tug of war. As noted, natural turbidity currents in the area are significant. The cumulative sand-blasting/scouring effect of these currents since 1811 on the wrecksite and our assemblage can only be imagined.

In describing this constant battle against erosion just a few miles north of the wrecksite, Moller noted: “In order to replace the lost sediments, the shoreline south of Q-groyne is nourished with sand, dredged in deep water and pumped towards the beach. The ambient waves transport this deposited sand up the beach forming a natural slope, although it is not always an optimal slope.” (Moller, 1992, p. 715)

Sand “dredged in deep water and pumped towards the beach” can be carried by the currents directly to, by, over, through, near, etc. the wrecksite, thereby conceivably burying the St. George remains in even more sand – and adding sand to the natural sediment transport caused by the currents.

Apparently, this is exactly what is happening today: these dredging operations are burying the remains of the St. George in sand and sediment. (Mortensen, personal communication, 2 May 2012). This is a positive thing, in our view. Burial in sand and sediment is far preferable to the violent, destructive sandstorm that rages above the surface of the sea bottom.

### **Periodic Interventions By Man: Fishing**

Our only knowledge of this intervention comes from the aforementioned tourist video playing at the Stranding Museum. The video, of a salvage expedition apparently sometime in the 1980s or 90s, shows parts of the St. George wreck entangled with fishing nets. And the wreck itself is shown with schools of fish. The English-version of the narration indicates that the wreck is home to fish and has been subjected to damage from trawling and fishing.

### **Periodic Interventions By Man: Salvage**

Here our progress slows as we try to answer “what happened in the meantime?”



**Figure 26.** A May 1984 photo of salvage diver with a bottle in one hand and, apparently, its broken neck in the other. Note the corked mouth, sealed with wax, in the diver's left hand. Artifact numbers unknown. From Jepsen, 1985, p. 106.



This episode in the history of the St. George assemblage is somewhat veiled because all records are in Danish. What unpublished records are somewhat accessible consist primarily of one excavation report in 1983 (to our knowledge, the *only* excavation report), original recording sheets of many artifacts (including our bottles), and two site sketches drawn by salvors (one in 1980, the other in 1982).

Again, because of the language barrier, these records cannot tell us much, as we had to rely on online translators to piece together the headlines of what happened during salvage efforts.

First and foremost, it is important to firmly and clearly note a distinction here between “salvage” and “excavation.”

Unlike Montgomery (Montgomery, 2009), we do not classify salvage-diving expeditions by diving clubs, sport or professional divers, hobbyists, etc. as “excavations.”

However well-intentioned and productive of artifacts those expeditions may have been, they were most certainly not archaeological “excavations” in any professional sense of that word. They were salvage operations by salvors, apparently with the goal of artifact recovery for its own sake.

Nor are we as generous as Teisen in bestowing upon those salvage expeditions any imprimatur of anything remotely resembling “archaeology.”

For example, Montgomery, referencing Jepsen in a footnote, declares flatly: “The last wreck salvagers to visit the wreck of the St. George were led by Sigurd Damgaard in the summer of 1954...” (Montgomery, p. 145, footnote xxi; Jepsen, 1993, p. 103).

We do not agree that this intervention represented the final salvage expedition on the St. George. The evidence clearly indicates that salvage continued at least until 1983, the year of the first excavation involving an archaeologist and led by a heritage-management authority representing the Danish people.

Let us be clear: it appears that much (if not most) of the material culture from the HMS St. George currently in the inventory of the Stranding Museum in Thorsminde, Denmark was acquired not by any archaeological methods or practices or professionals but through salvage operations conducted by businesses and individuals. This was typical of organized shipwreck operations in the 1960s-1980s; they were organized by enthusiasts and focused on artifact recovery, not archaeology.

To our knowledge, the first archaeologist to personally examine the wrecksite was Norwegian Michael Teisen, who apparently first inspected the remains from 16-24 May, 1983 as part of the first archaeological excavation under the auspices of a controlling heritage authority. The local Ringkøbing Museum was responsible for the excavation. (Teisen, 1983, pp. 1-7).

Therefore, every intervention by man on the wrecksite prior to this excavation is referred to hereinafter as “salvage” operations; every intervention by man after Teisen’s 1983 excavation to examine or record the wreck, or to recover artifacts, is referred to as “excavations.”

Montgomery details the salvage operations well. Together with Teisen’s account of pre-1983, non-archaeological efforts on the wrecksite, we can construct a chronology of salvage:

**25 December 1811** – “Salvage work began as soon as the sea went down,” according to Teisen. (Teisen, 1998, p. 262) Apparently, Danish villagers were already waiting on the beach in the hopes of salvaging another wreck that Christmas morning.

**1876** – A local salvage firm with a helmeted diver recovered six small guns, a few powder kegs, and a ship’s bell. (Teisen, 1998, p. 262)

**1904** – Salvage restarts, with some 48 guns recovered, as well as a carpenter’s box that at first “...was the cause of much excitement; *the diver who found it hoped that it might be the fabled half-million pounds in gold that the vessel was reputed to be carrying.*” (italics added, grammar and punctuation corrected, Teisen, 1998, p. 262)

**1940-41** – Salvage restarts while Denmark is occupied by Nazi Germany. Two brass signal guns are recovered, as well as copper bolts. Salvagers dynamite bow of St. George. (Teisen, 1998, p. 263)

**1970** – Sport divers again conduct salvage operations after they “rediscovered” the St. George. They raised an anchor, according to Teisen, which was turned over to the Ringkøbing Museum for preservation and restoration. (Teisen, 1998, p. 263)

**1980** – Sport divers again conduct salvage operations. One salvor made a crude sketch of the site – not to scale, of course. (Teisen, 1998, p. 263)

**“late 1980”** – “The Department of Marine Archaeology at the Danish National Museum inspected the wreck late in 1980 and recognized its archaeological potential.” (Teisen, 1998, p. 263). This oblique statement is all we know about this “inspection.”

**1982** – Evidently, salvors again return to the wrecksite, producing another crude sketch. (Teisen, 1998, p. 263)

It must be noted here that these expeditions recorded above are only those that are *known*. There may have been many, many more salvage expeditions over the years that were never known to the public or reported to any government authority.

We would be derelict in our duty if we failed to mention here the possibility of treasure-hunting as a motive for these “salvage” efforts through the 20<sup>th</sup> century.

Recall Teisen's account of the helmeted salvor-diver in 1904:

*"A great box was the cause of much excitement; the diver who found it hoped that it might be the fabled half-million pounds in gold that the vessel was reputed to be carrying – but it proved to be the carpenter's tool box."* (Teisen, 1998, p. 262).

Teisen gives no source for this "fable" that so excited a diver in 1904. However, with this single sentence, he gives us great reason to suspect that this "fabled half-million pounds of gold that the vessel was reputed to be carrying" may have provided the impetus for such determined and repeated salvage efforts throughout the 20<sup>th</sup> century.

If such a fable or legend or belief existed and caused such "excitement" in 1904, it very likely only grew in mystique and appeal over time – especially with the advent of new technologies (e.g. SCUBA, metal detecting, etc.) that allowed individuals to prospect in shallow waters for extended periods of time.

### ***"What happened in the meantime?"***

Our answer is threefold: 1) natural (destructive *and* preservative) formation processes were constantly at work on the St George assemblage over an *in situ* period of roughly 172 years, and 2) indirect interventions by man in the form of dredging and fishing likely influenced those formation processes in the 20<sup>th</sup> century, and 3) direct interventions by man in the form of salvage greatly influenced the assemblage – indeed, preserving and presenting it to us for analysis while, unfortunately, leaving so much detail to the story behind.

We must also note here that archaeology today likely would not even *have* the assemblage to study were it not for these bottles being raised by non-archaeologists, hobbyists and salvors, regardless of their motives: they would very likely either be destroyed by the natural environment or, less likely, still be buried *in situ*. So we do owe these hobbyists and salvors a debt of gratitude, irrespective of their motives and methods.

No one familiar with official Danish archaeological practices and policies over the past 50 years has any confidence whatsoever that the material culture from the St. George would ever have been raised and presented to archaeologists and the public were it not for the efforts of these hobbyists and salvors – who put their own time and money into the endeavor.

### **What happened at excavation?**

Unfortunately, here our progress slows even further. The waters surrounding this question have even less visibility than those at the wrecksite.

For context, we first need to return to a fundamental question here: ***where were the bottles stowed?***

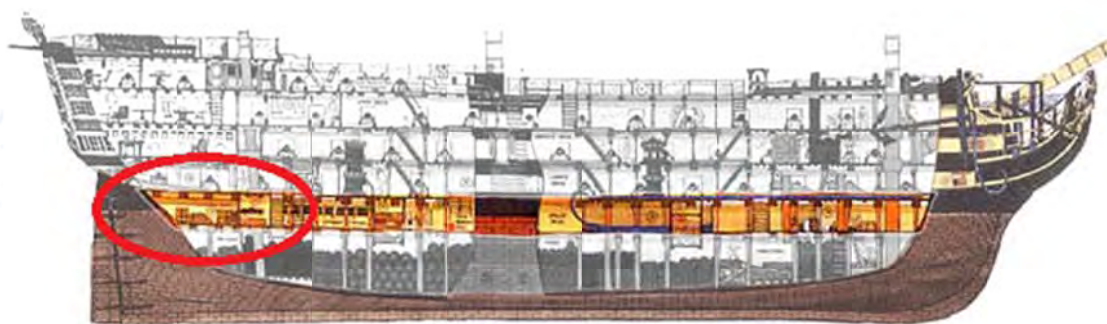


Figure 27. After Goodwin, 1987. Cutaway section of HMS Victory, similar in plan to the HMS St. George. Orlop deck is highlighted; area abaft on orlop deck circled in red is place where St. George assemblage was stored. (Goodwin, 1987, p. 17).

Using a popular sheer-cutaway section of the HMS Victory as a template, figure 27 indicates where we *think* the St. George bottles assemblage may have been stowed – somewhere abaft on the orlop deck (area circled in red). The St. George was built along plans similar to the HMS Hero but those plans are unavailable at this writing.

We are reminded here of the earlier discussion of the “spirits room” described by MacDonald.

In 1983, Teisen became, to our knowledge, the first (and perhaps only) archaeologist *assumed* (he does not say clearly) to have personally inspected the St. George wreck in the 20<sup>th</sup> century. Fifteen years later, he subsequently published what evidently is the one and only English-language “archaeological” report about the wreck in existence. (Teisen, 1998) This report appeared in a volume that has been criticized<sup>51</sup>.

We assume that Teisen personally inspected the wrecksite because he authored, in Danish, a 1983 excavation report – the only such report known to exist (in any language).

Unfortunately, Teisen’s 1998 report raises far more questions about the St. George assemblage than it answers.

To be fair, his 1998 report is a very brief summary-introduction to the story of the St. George and subsequent salvage efforts in modern times; the bottles are mentioned only as part of many “finds.” Further, Teisen was probably simply doing the best he could, given the circumstances of the times (almost zero resources). Nonetheless, his report is all we have in English.

Writing in 1998 as Curator, Norwegian Maritime Museum, Teisen is worth quoting in full here:

<sup>51</sup> We note Mark Staniforth’s observation that, in the volume in which Teisen’s report appears, Mensun Bound’s “Excavating the Ships of War” (1998) “Some of the ‘archaeology’ looks more like ‘collecting’ trips by local sports divers at best and at worst like blatant ‘goodie hunts’ with little or no archaeological control.”

*“The officers’ stores were situated at the starboard after end of the orlop deck. Here was found a wine cellar containing hundreds of bottles. All the traditional bottle-shapes for claret, white wine, port, champagne and gin were represented in large numbers... Quite a few were still sealed with cork, their contents intact, but most had been contaminated with sea-water. A few bottles of port had retained the qualities of the drink. Glasses, shaped according to the type of drink for which they were intended, were found stored next to the bottles.”* (Teisen, 1998, p. 266).

These seductive four sentences from Teisen’s 1998 article comprise the entire body of English-language knowledge about the on-board location St. George assemblage – at least, what we *think* we “know” about them archaeologically.

Are these four sentences a first-hand account from Teisen’s own inspection? Or are they second-hand information from the salvage-divers who raised most (if not all) of the St. George assemblage? Teisen is not clear.

Missing from the records are any drawings or sketches that indicate precisely where at the site the bottles were found. Also missing from the records is a grid map of the 1983 excavation that would indicate precisely where artifacts, including some of our bottles, were found. We thus have no picture of the bottles *in situ*. Spatial analysis of the bottles vis-à-vis other material culture is impossible.

Teisen refers to several excavation grid-blocks for artifact finds (e.g. “B49”) and explains a textual-description system of distances from a center-wire that ran down the center of the ship.<sup>52</sup> (Teisen, 1983, introductory letter to report).

Without a map, however, giving the location and context of those grid-blocks, however, not to mention the findspots, the system is not helpful to our investigation. We are blind when it comes to understanding how and where the assemblage was found and its *in situ* context.

Further, in the text of this 1998 article, Teisen is maddeningly vague as to the *year* of the discovery of the “wine cellar.” We are left to guess that the year of discovery is sometime between 1984 and 1986. The year matters a great deal as the site changed a great deal during this period – meaning that the interface for the collection may have changed significantly.

The only site plans or excavation sketches available for the St. George wrecksite are Michael Teisen’s June 1983 plan (the first archaeological sketch or plan) and a subsequent sketch or plan from a later year (probably sometime between 1984-1986).

Neither indicates the location of Teisen’s “wine cellar” or where any of the bottles were found. Neither of these plans indicates grid numbers for find locations. Neither provides a

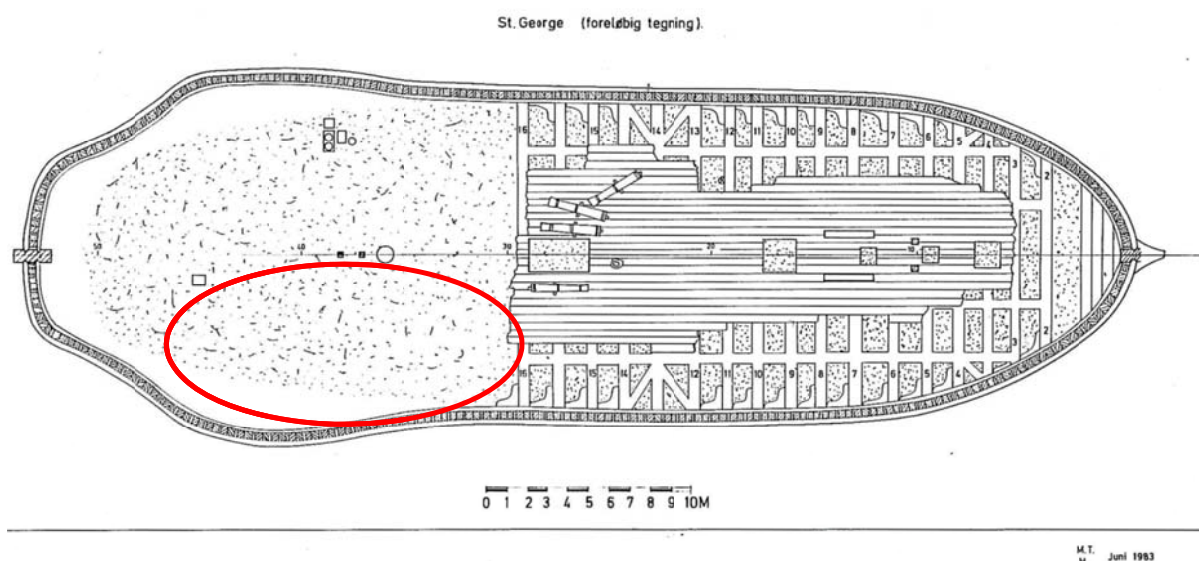
---

<sup>52</sup> “Example: 39 B 5/15: found 39 meters behind, 5 m to port, artifact No. 15.”

compass direction that would indicate the hull's disposition or heading upon deposition of the hull and the wine cellar. Spatial analysis of the material culture *in situ* is indeed impossible.

However, each sketch or site plan presents an extremely different possible interface for the St. George assemblage.

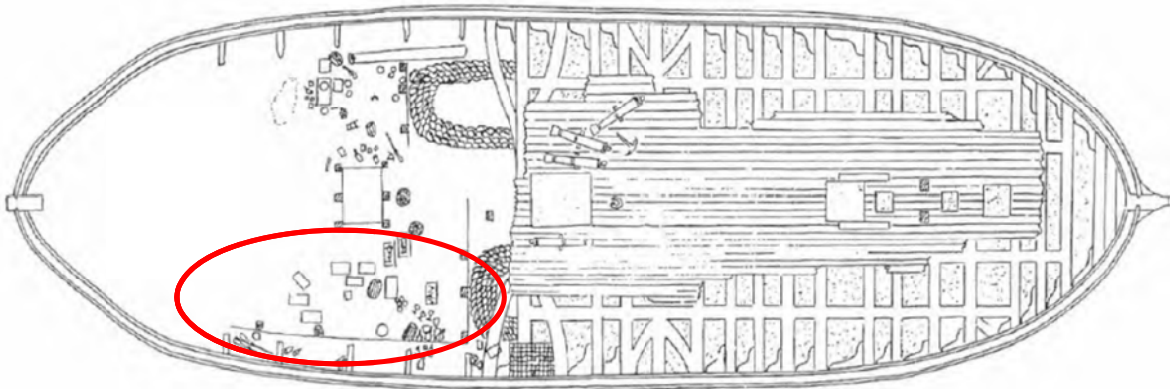
The 1983 plan (Figure 28) apparently shows the planking from the orlop deck either gone or buried in sediment. The general area of Teisen's "wine cellar containing hundreds of bottles" is circled in red. From this plan, it would appear that Teisen's "wine cellar" was completely buried in sediment in 1983...and not discovered until later.



**Figure 28.** After Teisen, 1983. The general location where Teisen describes the "wine cellar" is circled in red.

Figure 29 is a subsequent (but undated<sup>53</sup>) sketch with the supposed location of Teisen's "wine cellar" circled in red.

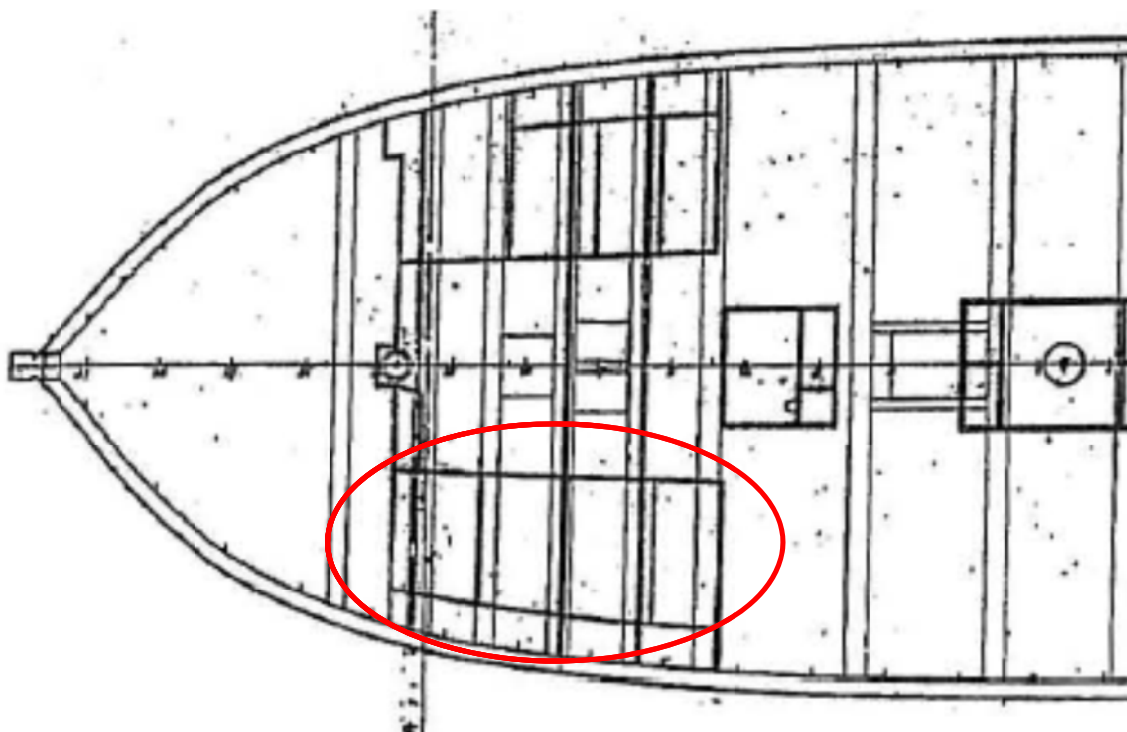
<sup>53</sup> Teisen does not indicate clearly what year this sketch or excavation plan was made. From the text, it appears it was from an excavation dive sometime between 1983-1986. (Teisen, 1998, p. 264)



**Figure 29.** After Teisen's sketch of the St. George wrecksite, circa 1984-86. The "starboard aft" area he describes as the general location of the "wine cellar" is circled in red. (Teisen, 1998, p. 264).

This subsequent site plan is quite different than the 1983 plan: the sediment covering the orlop deck is gone, exposing a number of artifacts. It represents a quite different interface for the collection.

Teisen's plans are consistent with what we know about the plans of the St. George orlop deck. The St. George was built along the same plans as the HMS Hero (Teisen, 1998, p. 258). Fig. 30 shows the after half of the orlop deck of the HMS Hero. Note the store rooms built on the port and starboard sides. The area where Teisen's "wine cellar" might have been is circled in red.



**Figure 30. Aft part of orlop deck of HMS Hero, after Teisen 1998. Teisen indicates that the St. George was built along the same plans. Teisen's spirit room or wine cellar was likely one of the four store rooms circled in red.**

This interpretation is also consistent with Montgomery, Karadimos, and Lonergan who analyzed material culture recovered from the St. George orlop deck.<sup>54</sup>

Most unfortunately, however, the wine cellar or spirit room Teisen refers to is not shown in his excavation plans. We are left to guess as to its precise *in situ* location ... just as we must guess at a number of other questions...

How were the bottles stored? Were they stacked? If so, how were they stacked -- vertically or horizontally? Was there any evidence of dunnage? Were they grouped according to style?

What was the interface for the bottles? Were they all buried in sand? Were some exposed to seawater? Were some exposed to other artifacts?

***When found, were the bottles buried in sand/sediment or not?*** This, the most fundamental question to our investigation of the excavation, is not answered by Teisen (or anyone else).

By identifying a "wine cellar" that was "on" the orlop deck, did Teisen mean a "spirit room," a purpose-built wooden structure built literally on the floor of the orlop deck? If so, this

<sup>54</sup> Montgomery analyzed the surgeon's instruments, Karadimos the small arms, and Lonergan a store of shoes – all found in close proximity to Teisen's spirit room, i.e. aft on the orlop deck.



would contradict MacDonald and all literature we have seen about the location of a spirits room on a Royal Navy 2<sup>nd</sup>-rater for this period.

If not, perhaps did Teisen mean a step-down compartment beneath the floor of the orlop deck – i.e. a storage space beneath, in the aft hold, as the term “cellar” connotes?

What were the dimensions of this “wine cellar?” What was its shape – square, rectangular, triangular, oblong, etc.? How many bottles were stored in it? Did it have a door? Was the door open, closed, broken? Did the door have a lock? Was there iron present anywhere in this structure, such as door hinges? Where was this structure in relation to the purser’s station?

And what is a “traditional bottle shape” for claret wine? For white wine? According to what typing protocol?

Regarding the “wine cellar,” it is likely that sand and sediment at some point filled that space, perhaps giving some bottles an interface of sediment and interstitial seawater, some seawater only, some with another artifact (i.e. another bottle, dunnage, or wood), some buried entirely in sediment only – or perhaps a combination of all of these and even other interfaces.

These differing scenarios would present different interfaces that could likely have catalyzed different chemical actions and reactions on the surface of the bottles.

Unfortunately, the person(s) who found the bottles *in situ* is silent on the subject.

### **Another possibility: A spirit room in the hold**

Is it possible that Teisen’s “wine cellar” on the orlop deck was actually the spirit room in the hold of the St George? That Teisen misinterpreted the “orlop deck?” That the orlop deck had “pancaked:” that the planking had actually collapsed and disappeared, dropping all of its material culture into the hold area?

We believe this is a distinct possibility, in spite of all the material culture Teisen reports having found “on” the orlop deck.

We believe it possible that salvagers and Teisen may have actually been excavating parts of the hold, i.e. material culture from the orlop deck that had collapsed into the hold – at least the starboard side of the aft orlop deck where Teisen’s “wine cellar” was reportedly found.

Lavery raises an interesting possibility. In 1776, thirteen years prior to the launching of the St George, the Admiralty issued an order to the dockyards for spirit rooms to be built “on all ships whose captains shall apply to you for it.” *This spirit room was to be built not on the orlop deck but in the hold, aft of the fish room.* It would be accessed by a small hatch in the orlop deck. (Lavery, 1983, p. 189).

Further mystifying a solid answer as to where these bottles were stored, i.e. the location and character of Teisen's "wine cellar," is the possibility that the structure itself was a multi-purpose stowage locker.

In addition to the proscribed "spirits room," Lavery describes the evolution of these spaces aboard larger Royal Navy ships in the 18<sup>th</sup> century. These spaces would eventually include "officers' pantries" and several other store rooms aft on standard orlop decks, such as a "Captain's store room" and a "Lieutenant's store room." (Lavery, 1983, pp. 154-194).

These are likely the rooms identified in Fig. 30, the aft part of the Hero's orlop deck. They are likely the "officers' stores" mentioned by Teisen. (Teisen, 1998, p. 266).

If the orlop deck was indeed extant in 1983 and had not collapsed into the hold, than we believe this is the most likely location of Teisen's "wine cellar." We believe he was referring to one of these storage rooms starboard aft on the orlop deck.

Further, if this is the case, it also means that the hold of the St. George has apparently not been excavated or even explored and remains buried in sediment to this day. Such an investigation would likely reveal if a spirit room was indeed built in the hold. There may indeed be a spirit room in the hold and it may even be packed with more glass beverage bottles. We cannot discount such a possibility.

### Chain of custody and curation

Again, the most fundamental question for our purposes here is striking in its simplicity: ***were the bottles found buried in sand and sediment or not?*** It does not appear to be answered by the records on hand. The answer to that question may never be known, unfortunately.

As noted, based on the available evidence, excavations on the St. George wreck began May 16, 1983. This is the first documented evidence of any archaeologist working on the St. George wrecksite. It is also the first documented evidence of *active, participatory or supervisory* involvement of any Danish heritage-management authority. (Teisen, 1983).

We are told that the "local Ringkøbing Museum became responsible for the excavation with assistance provided by the Danish National Museum in the form of a diving archaeologist and a diving conservator." (Teisen, 1998, p. 264).<sup>55</sup>

Unfortunately, we do not know the exact involvement or level of supervision that the Ringkøbing Museum or the Danish National Museum provided to this 1983 operation (and subsequent operations). We do know, however, from existing records and photographs (such as Fig. 26), that hobbyist-divers and salvors retrieved bottles in this and subsequent years – all apparently under the auspices of the Ringkøbing Museum.

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<sup>55</sup> Teisen may have here referred to himself in the third person as the "diving archaeologist."

Thus, the provenance of the St. George assemblage appears to be (at least after it was turned over from salvage divers to heritage authorities):

- The Ringkøbing Museum from 1983-84 to 1992
- The Stranding Museum from 1992 to present

Quite illuminating, however, is an artifact database that has been constructed by the current museum director at the Strandingmuseum. It lists 507 “glass bottle” artifacts, including intact bottles, shards, bottle necks, and bottle bottoms.

According to this database, the years of recovery for the St. George assemblage are as follows (St. George artifact database, Mortensen, 2012):

- 1983: five glass bottle artifacts recovered (2 bottle bottoms, 3 shards)
- 1984: 463 glass bottle artifacts recovered
- 1985: 16 glass bottle artifacts recovered
- 1986: two glass bottle artifacts recovered
- 1988: two glass bottle artifacts recovered
- 1996: five glass bottle artifacts recovered
- 1997: 14 glass bottle artifacts recovered

Clearly, the vast majority of the St. George collection was recovered in 1984 – roughly 91 percent of the entire collection. The “discovery lists” (“fundelist” in Danish) in the Strandingmuseum’s records, which include artifact recording sheets for these bottles, reflect this date of 1984. They were evidently entrusted into the care of the Ringkøbing Museum.

Curation of these bottles is also a lingering question – almost three decades after the majority of the bottles were recovered. Florina, Hamilton, and Smith (2003) all indicate that glass absorbs moisture from humid environments, which is not good for glass artifacts. (Smith, et al, 2003, p. 94). We do not know if the Ringkøbing Museum was climate- and humidity-controlled at the time it had custody of the collection, nor do we know if the Strandingmuseum has such controls in place now.

This is not insignificant, given the various states of decay and devitrification the assemblage presents. It is possible that such decay and devitrification occurred *after* excavation, while in the custody of the museums. We do not know.

### ***“What happened at excavation?”***

Our answer: we are not really sure. Available records are silent on so much critical information, such as the *in situ* context of the bottles and their interface...for example, whether they were buried in sediment or not.

We are told that “hundreds” of bottles were found in a “wine cellar” on the starboard aft part of the orlop deck. We know that the collection was recovered by hobbyist-divers and salvagers between 1983 and 1997, the vast majority of them recovered in 1984.

From 1983 until today, the St. George assemblage has been in the care of local Danish heritage-management authorities; at some point, the assemblage was transferred from the Ringkøbing Museum to their current home at the purpose-built Strandingmuseum, constructed in 1992.

#### IV. COMPARATIVE MATERIAL CULTURE FROM OTHER SITES

The material culture, i.e. glass beverage bottles, of similar sites before, during and after the St. George's service tells us much about the St. George assemblage: it tells us that it is exceptional in many ways. There is unmistakable correspondence with other material culture -- but there is even more unmistakable distinction to the St. George assemblage as a whole.

What clearly distinguishes the St. George assemblage from comparable material culture are the breadth of its variety, its volume of completely intact bottles, and the strikingly different states of preservation across the entire collection. What further distinguishes it is the unusually high number of extremely well-preserved corks, several of them with clearly legible lettering in wax seals, as well as the several artifacts that features seals.

Some of the comparative wrecks are well-published while others are not. Even among those that are well-published, the material culture of glass beverage bottles is generally not the highlight of what we are told. In the body of literature on comparable wrecksites, glass bottles are usually only even mentioned in passing as part of finds lists – and even more rarely shown. Photos, for example – the most effective way to remotely compare artifacts such as bottles in the digital age -- are rarely made available. Metrics are even rarer.

Further, much of the “bottle” finds from the following sites are fragments or sherds, which are largely irrelevant to our data; our currency is whole, completely intact bottles. So we will compare and contrast only whole, intact bottles from other sites.

Finally, because our sole archaeological focus has been the glass beverage bottles from the St. George, the metrics we have used to analyze and record her assemblage are more comprehensive and detailed than those very general observations published by the investigators of these other sites.

Every comparative “collection” of bottles has been approached and recorded differently by each investigative team – some producing no published data at all, others producing very little data (e.g. bottle height) that can be effectively compared and contrasted with our own data.

Simply put: for most of the comparative material culture, we have very little data to compare with the St. George ... and are left to make only visual comparisons.

What follows then is a topline overview of each comparative site and its relevant material culture, with notes and highlights about each. Possible correspondence with artifacts from the St. George assemblage is noted.

### HMS Invincible (3<sup>rd</sup>-rater) 1747-58

|                                    |   |
|------------------------------------|---|
| <b><u>Quantity of bottles:</u></b> | <b>17 “mostly intact”</b>   |
| <b><u>Reported style:</u></b>      | <b>mostly “Madeira wine” style, plus one mallet bottle and one onion bottle</b> |
| <b><u>Anomalies/features:</u></b>  | <b>two unlettered corks, one mallet bottle</b>                                  |
| <b><u>Correspondence:</u></b>      | <b>minimal/not enough data to answer</b>  |

Invincible Royal Navy third-rater, originally a French ship of the line. Lost in a storm in the Solent 22 February 1758. Rediscovered in 1979, excavated between 1981 and 1990.

What little we know about these 17 bottles comes almost entirely from an artifact database distributed with John Bingeman's book, a database created by a student, John Broomhead, for his master's thesis during the excavations, in which he participated. (Bingeman, 2010)

More than 17,000 artifacts were recovered during the excavations, including a total of 17 mostly intact glass bottles. (Broomhead, personal communication, 2012)<sup>56</sup>

However, comparison with St. George assemblage is difficult as images are unavailable: Most artifacts auctioned off to private collectors since excavation. ([English Heritage website.](#))<sup>57</sup>

Most of these 17 bottlers are identified as “green glass” and are recorded with only height and diameter measured, with no explanation of the methodology used for those metrics, e.g. where diameter was measured on the body of the bottle – at the shoulder, hips, or base.<sup>58</sup> (Broomhead database CD, Bingeman, 2010).

Two bottles feature corks; neither have wax or lettering and the style of those bottles are not known. Several bottles are described as “Madeira” style. One “mallet” bottle is mentioned, along with an “onion bottle.”

Images very hard to obtain at this writing. At this writing, the artifacts database is online at the [Hampshire and Wight Trust for Maritime Archaeology](#) but no images of bottles are currently available on that site.<sup>59</sup>

Broomhead provided three images of two bottles, one of which – based solely on the two dimensions provided, height and diameter -- seems to correspond with the common, VB-issued British-style “wine” bottles in the St. George collection. (Broomhead, personal communication, 2012) Fig. 31 juxtaposes these two artifacts.

<sup>56</sup> Mr. Broomhead manages an enthusiasts' website for the HMS Invincible at <http://www.invincible1758.co.uk/>.

<sup>57</sup> <http://www.english-heritage.org.uk/discover/maritime/map/invincible/>

<sup>58</sup> (The diameter of all St. George intact-bottle artifacts was recorded at their bases or resting heels, i.e. from center to center of the resting heel on the bottom of each bottle.)

<sup>59</sup> [http://www.hwtma.org.uk:8008/mapguide/Invincible/artefacts.php?&search\\_fd13=34](http://www.hwtma.org.uk:8008/mapguide/Invincible/artefacts.php?&search_fd13=34)

Visual comparison shows that while similar in basic construction generally, they are very different in detail, especially their mouth formations and necks, and the inward slope of the body (from the shoulders downwards towards the base) of the *Invincible* bottle. Fifty-three years separate the deposition of these two artifacts (1758-1811); this contrast could conceivably demonstrate the evolution of bottlemaking techniques during that period and, thusly, the evolution of common, Royal Navy-issued “wine” bottles. Or, just as likely, it may simply represent the styles of two different bottlemaking houses during the period.



**Figure 31.** Left (photo not to scale): artifact 89/0169 from *HMS Invincible*. Height: 250mm, diameter 100. Right: artifact 6000-1737 from *HMS St. George* assemblage. Height: 250mm, diameter 95mm. (Photo at left courtesy of John Broomhead, personal communication.)

Another artifact from the *Invincible*, artifact 88/0263, is described as a “mallet” bottle (apparently common in this period, based on Jones, Hume, and Dumbrell.) Fig. 32 is an image of this mallet bottle, provided by Mr. Broomhead.



This artifact does not correspond to any in the St. George collection: it features a much wider body and base, common to the period.

**Figure 32.** Unscaled image of artifact 88/0263-Chat INV.428 from HMS *Invincible*. Identified as “mallet” bottle in database, recorded with a height of 124mm and a diameter of 115mm. Database indicates bottle currently in collection at Chatham Historic Dockyard. (Photo courtesy of John Broomhead.)

In scope, scale, and variety, the St. George assemblage is demonstrably different than that of the *Invincible*. It is much richer, far more varied, and provides far more data. We can also add that distinctly continental European bottles are absent from the *Invincible* collection.



### HMS Swift (sloop) 1763-1770

|                                    |   |
|------------------------------------|---|
| <b><u>Quantity of bottles:</u></b> | total unknown; 45 mentioned in literature                       |
| <b><u>Reported style:</u></b>      | 28 “wine” and 17 case (“gin”) bottles plus one large “demijohn” |
| <b><u>Anomalies/features:</u></b>  | unknown number of corks   |
| <b><u>Correspondence:</u></b>      | moderate  |



Figure 33. Photo from Nautical Archaeology Society website of HMS Swift representative bottles. (<http://www.nauticalarchaeologysociety.org/projects/swift2004.php>). Note uniformity of devitrification, very unlike the St. George assemblage. Compare with Fig. 35, image of many bottles on display at museum, apparently after bottles were “cleaned.”

The *HMS Swift* was a sloop that wrecked in 1770 off coast of Patagonia, Southern Argentina. Discovered in March 1982, excavations on the *Swift* began in 1998. (Elkins, 2007, p. 48)

Fig. 33 showcases some of the *Swift* assemblage. Visually, many of them compare favorably with several in the St. George assemblage, especially the mouth and lips formations on several of the cylindrical bottles.

Elkins reports: “Different types of glass bottles have been found, most of them complete.” Twenty-eight (28) have been diagnosed as “wine” bottles, with colors ranging from green to dark brown, “...all free-blown and consequently asymmetrical.” (Elkins, 2007, p. 48). She further states their height ranges between 22 and 25cm.

These diagnostic comments could easily be applied to many bottles we too have generically catalogued as “wine” bottles in the St. George collection.

Some of these *Swift* “wine” bottles were found with corks in place but there is no mention of how many or of any lettering or wax present.

Further, 17 “case” or “gin” bottles are included in the *Swift* artifacts. “Case” bottles is our preferred terminology for these bottles (the St. George assemblage includes four); the “case” reference means that they were manufactured square to fit into purpose-made, partitioned, wooden cases. They are also commonly referred to as “gin” or “Dutch-gin” bottles because that is normally what they contained. (Elkins, 2007, p. 48).

Interestingly, one such case was found during excavation of the *Swift*’s stern, still with 13 such bottles inside. Elkins reports that “several” still had corks in place; none of the four case bottles in the St. George collection feature corks.

Unfortunately, Elkins provides no metrics for these 17 case bottles, other than capacity: “There are two main sizes, with volumes of c.4 liters and slightly over 2 liters (1 gallon and 1/2 gallon).” (Elkins, 2007, p. 48). In spite of the lack of metrics for these case bottles, we can easily see from Fig. 33 that they are much larger than the case bottles from the St. George collection.

Also unlike the St. George assemblage, the provenance of all 45 identified bottle-artifacts is known, as they were discovered and excavated by archaeologists. (Many artifacts from the *Swift* are not provenanced, as they came into the hands of archaeologists after removal from the site by salvage and avocational divers – very similar to the story behind the St George assemblage.) (Elkins, 2007, p. 48).



One curious glass bottle from the *Swift* should be noted: a very large “demijohn,” evidently an Anglicization of the French phrase “*dame-Jeanne*,” meaning “Lady Jane.” Fig. 34 (scale of 10cm) is an image of this container. Note the cork. These were used for wine and virtually all other liquids. They were normally enshrouded in wicker; Elkins reports this artifact was indeed “...found in association with remains of a net made of botanical fibers. (Elkins, 2007, p. 49.)

Figure 34. Demijohn from *HMS Swift*.

One final note from the *HMS Swift* pertains to Figure 33 as compared to Figure 35, images of many of the bottles apparently before and after conservation efforts or some type of cleaning.



Figure 35. Undated image of museum display case containing several bottles excavated from *HMS Swift*. Bottles housed at the Mario Brozoski Municipal Museum, Santa Cruz, Argentina. (Photo from [Mario Brozoski Municipal Museum website](#).)

Figure 33 evidently shows several Swift bottles as they looked after excavation, all with uniform devitrification. Figure 35 shows several Swift bottles with very little devitrification. One wonders if these bottles – *if they are the same bottles in both photos* – were subjected to conservation efforts before display at the museum. Elkins does not say.

The *HMS Swift* assemblage is provocative, especially the larger case bottles – one wonders about the dimensions of the wooden case in which 13 of these large vessels were contained. However, as with the *Invincible's* collection, in scope, scale, and variety, the St. George assemblage distinguishes itself from that of the *Swift*. It is roughly six times the quantity, it is more diverse in styles, far more varied, and thus provides much more data.

We can also add that, based on what has been published to date, distinctly continental European bottles (other than the case bottles) appear to be conspicuously absent from the *Swift* collection.<sup>60</sup>

<sup>60</sup> The demijohn is not necessarily continental, as they were evidently also made by British glassmakers in the 18<sup>th</sup> century.

## HMS Pandora 1779-1791

|                                    |   |
|------------------------------------|---|
| <b><u>Quantity of bottles:</u></b> | <b>19</b>   |
| <b><u>Reported styles:</u></b>     | <b>17 diagnosed as wine-style, 1 case-(gin) style, 1 possible fruit jar</b> |
| <b><u>Anomalies/features:</u></b>  | <b>two possibly continental-European bottle-artifacts</b>                   |
| <b><u>Correspondence:</u></b>      | <b>strong</b>   |

This Royal Navy Porcupine-class post-ship/frigate was wrecked 29-30 August 1791 off the northeast coast of Australia (120 km east of Cape York) on the Great Barrier Reef. Discovered in 1977, it has been excavated many times, mostly in the 1980s-1998 period. (Peter Gesner, Janet Campbell, 2000, HMS Pandora Project: A Report on Stage 1: Five Seasons of Excavation, Contributor: Queensland Museum, Publisher: Queensland Museum, 159 pages).

Excavations have produced 19 glass bottles, of which 17 have been diagnosed as “wine-style,” another as case (gin) style, and a smaller bottle that is likely not a beverage bottle but a fruit jar (item 8689 in Fig. 36 below, second from left in bottom row). Almost all of these bottles appear to be British wine-style to our eyes, based on the images we have seen. Unfortunately, no metrics for these artifacts have been published. Therefore, comparative analysis with the St. George assemblage is limited to visual similarities only.

Fig. 36 is a collage of a representative sampling of the bottle-artifacts from the *Pandora*.



Figure 36. Sample representation of HMS Pandora artifacts. Anomalies – i.e., styles not present in the HMS St. George assemblage – are circled in red. (Images courtesy of Queensland Museum).



Two artifacts, circled in red, from the *Pandora* distinguish themselves: artifact 7915 (top row, fourth from left in Fig. 32) and artifact 8676 (first from left, bottom row in Fig. 36). Neither style is present in the St. George assemblage.

Artifact 7915 appears to be a smaller bottle – shorter and narrower than the norm. To our eyes, it may be a pint or even a half-pint bottle. Note its very short neck and high shoulders.

Conversely, artifact 8676 appears to be a bruiser – a much larger, higher-capacity bottle – though not necessarily taller in height, yet also featuring a shorter than usual neck. Perhaps Jones and other experts would diagnose these two items as “beer” bottles.

Only two artifacts from the Pandora collection appear to have any continental-European characteristics or “personality:” artifacts 8824 and 4835, shown in Fig. 37 below.



**Figure 37.** Two Pandora bottle-artifacts that may have continental European origins. Note the tapered, narrowing slope and angle of the necks, moving upwards from the shoulders to the mouth.

Both bottles present what we call a “tapered” neck – a smooth, elegant, narrowing of the neck moving upwards from the shoulders to the mouth and lips of the bottle. The neck of artifact 8824 even tapers outwards slightly as it reaches the mouth. These are characteristics we see in several artifacts in the St. George Continental Family.

However, noticeably absent from this collection also are any other distinctly continental-European-style bottle-artifacts. These two appear to be the exception.

Once again, we see that the St. George assemblage is distinctive in scope, scale, and variety when compared to the 19 bottles from the *HMS Pandora*.

**“Mardi Gras” shipwreck (US schooner?, c. 1808-1820)**

|                                    |  |
|------------------------------------|--|
| <b><u>Quantity of bottles:</u></b> | <b>13</b>  |
| <b><u>Reported styles:</u></b>     | <b>11 diagnosed as “dip-moulded French ‘wine’ variety;” two reported as “British ‘beer’ bottles”</b> |
| <b><u>Anomalies/features:</u></b>  | <b>unknown number of corks</b>   |
| <b><u>Correspondence:</u></b>      | <b>strong (11 “French wine variety”)</b>   |

This ship of unknown origin was likely afloat during the St. George’s period of service (1785-1811). It has been diagnosed as a likely schooner from the shipbuilding yards of the United States in the late 18<sup>th</sup> or early 19<sup>th</sup> centuries. (Ford, et al, 2010, IJNA, 39.1: 76–98). Wreck date is given as “c.1808-1820.” Wreck discovered c. 2007 at some 1220m depth and subsequently partially excavated by ROV I May-June 2007. (Ford, et al, official report, 2008).

This wreck proves that the eyes of the investigator are the most useful initial tool when comparing material culture such as bottles from different archaeological sites. While reviewing images of bottle artifacts from this site, several immediately leap forward as directly corresponding to a specific subgroup within the St. George assemblage.

Fig. 38 is an image of four of the “dip-moulded French ‘wine’ variety”<sup>61</sup> bottles from the Mardi Gras site. These correspond to Subgroup A in the St. George Continental Family, shown in Fig. 39. According to the investigators, 11 of the total number of bottles from this site are French in origin if not style: “The majority (11) are of the dip-moulded French ‘wine’ variety with string rims, and range in colour from dark-green to dark-brown.” (Ford et al, IJNA, 2010, p. 83). Interestingly: “Six of these bottles contain their corks, indicating that they were filled at the time of the wreck.”<sup>62</sup> Unfortunately, nothing distinctive about these corks is reported. (Ford, et al, 2008, official report, p. 79)

In addition, two other bottles from the site were diagnosed as “British ‘beer’ bottles.” Fig. 37 is an image of these two bottles. (Ford, et al, IJNA, 2010, p. 83).

The investigators cite the work of Olive Jones, Hume and others as the basis for these diagnoses.

<sup>61</sup> This is the verbatim diagnosis of the Mardi Gras investigators. It is not necessarily our diagnosis.

<sup>62</sup> We don’t agree that the presence of a cork in a bottle – especially at a depth of 1220 meters – necessarily means that a bottle was “...filled at the time of the wreck.”



**Figure 38.** Four of the 11 “dip-moulded French ‘wine’ variety” bottles from the “Mardi Gras” deep wrecksite, Gulf of Mexico. (From L to R, artifact nos. 122, 203, 227, and 103) They directly correspond to several similar bottles in the St. George assemblage, shown in Fig. 39 below, a group image of seven of these bottles.



Importantly, the metrics of height and body diameter of the Mardi Gras artifacts in Fig. 38 generally correspond with those of the St. George (at left, Fig. 39): these bottles are all roughly the same height of 290mm, the obvious exception being artifact 227 in Fig. 34 - the shortest.

The bodies are all slightly tapered inwards moving from the shoulders to the base. There is no flaring at the base. Base-diameter ranges for these artifacts from both sites: from 76-80mm for the Mardi Gras bottles, from 75-78mm for the St. George bottles.

Note, however, differences in mouths and lip formations.

**Figure 39.** Group image of several St. George artifacts we have categorized as a subgroup in the Continental Family. These bottles seem to correspond well with the Mardi Gras artifacts shown in Fig. 34.



**Figure 40.** Images of six artifacts from the *St. George* that seem to be, with one exception, very similar to the Mardi Gras bottles shown in Fig. 38. (Top, left to right: artifacts 6000-1399, 6000-1387, 6000-1398. Bottom, left to right: 6000-1399, 6000-1751, and 312-7546). Bottom, left to right: 6000-1399, 6000-1751, and 312-7546).

Fig. 40 is a composite image of six *St. George* artifacts that compare and contrast with the Mardi Gras “French wine” bottles. The last bottle (lower right, circled in red, artifact 312-7546) is different. We have categorized this artifact as “continental” as it seems to demonstrate more of a Dutch or Lowlands influence rather than French, at least to our non-expert eyes. Note the subtle difference in angle of its neck and the formation of its mouth, for example. It is included for comparative purposes, as these subtle differences can certainly mean different “biographies” of bottles.



What is notable about this correspondence is that the Mardi Gras site features material culture from the four major naval powers in the Gulf of Mexico at the time: England, Spain, France, and (possibly) the United States (Ford et al, 2008, p. v, official report). Investigators have tentatively diagnosed the ship as being a United States schooner, based on the U.S. shipbuilding industry of the period in or near Louisiana.

Dating of this wreck is broad: “While nearly all of these artifacts were made between 1780 and 1820, allowing the wreck to be accurately dated, this wide array of material culture makes it difficult to assign a nationality to the vessel or its crew.” (Ford et al, 2008, p. v, official report).



Figure 41. Two bottles from the Mardi Gras site, both diagnosed as “British ‘beer’ bottles.” Artifact 201 at left is recorded as being 244mm in height and x 86 in width. Artifact 202 at right is recorded as being 223mm in height and 98mm in width. (Ford, et al, 2008, pp. 79- 81)

Artifact 201 from the Mardi Gras corresponds favorably with at least 2-3 St. George bottles, both in approximate metrics and in general design, though not in detail.



**Figure 42. Mardi Gras artifact juxtapositioned between two comparable artifacts from the St. George. L to R: SG artifact 6000-1329, Mardi Gras artifact 201, SG artifact 6000-1321. (Center image not to scale.)**

Fig. 42 illustrates the possible correspondence between artifact 201 from the Mardi Gras collection (center) and two St. George artifacts, 6000-1329 (left) and 6000-1321 (right). Artifact 6000-1329 at left seems to correspond more closely with the Mardi Gras bottle, especially the shoulders.

All three artifacts are between 236-244mm in height and 89-95mm in width<sup>63</sup>. Note the subtle differences, however, in the slope of the shoulders between MG artifact 201 (the blue bottle in the middle) and SG artifact 1321. The mouths and lips on these bottles are very similar but the shoulders are at noticeably different angles of slope.

There are a handful (less than 10) other bottles from the St. George assemblage that *may* correspond, metrically and visually, with Mardi Gras artifact 201. We have classified most of them as “port” wine bottles, however, for reasons we will explain in the next chapter.

The second “British ‘beer’ bottle” from the Mardi Gras collection, artifact 202 (the shorter, brown bottle to the right in Fig. 41), corresponds a bit better, at least visually, with at least one artifact from the St. George assemblage, artifact 6000-1285.

<sup>63</sup> “Width” means “base diameter” when referring to all St. George artifacts. The definition of or methodology for measuring “width” is not explained in the Mardi Gras literature. This could mean a variation of at least .5 to 1.5cm, as these bottles are all flared outwards at their bases.

Mardi Gras artifact 202 is recorded as being 223mm in height and 98mm in width; the St. George artifact 6000-1285 is recorded at 222mm in height and 104 in base diameter.



**Figure 43.** Mardi Gras artifact 202, left, diagnosed as “British ‘beer’ bottle.” St. George artifact 6000-1285 is at right.

Fig. 43 compares artifact 202 from the Mardi Gras site (left) with artifact 6000-1285 from the St. George assemblage. These are notably similar bottles. Mouth and lips on both bottles correspond, as do the straight-angled necks, i.e. necks with no bulges at either top or bottom. However, shoulders on St. George bottle at right seem more rounded.

What can we conclude from the Mardi Gras collection vis-à-vis the St. George assemblage?

While the samples are small, there is a strong correspondence between the continental bottles in both collections – the first substantive,<sup>64</sup> apparently continental European influence we have yet seen from the comparative sites we have examined. The Mardi Gras investigators refer to these bottles as “French;” we refer to them simply as “continental.”

There seems to be an additional correspondence between two other artifacts – both classified as “British ‘beer’ bottles” by the Mardi Gras team. (We do not share that diagnosis, on general principle.)

Yet again, though, in scope, scale, and variety, the St. George assemblage is demonstrably different than that of the Mardi Gras site. As with the other comparative sites, the St. George collection is much richer, much more varied, and provides far more data than any other collection we’ve yet seen.

### **The Cornwallis-Yorktown fleet (1781)**

|                                    |   |
|------------------------------------|---|
| <b><u>Quantity of bottles:</u></b> | <b>approximately 103</b>  |
| <b><u>Reported styles:</u></b>     | <b>standard beer-wine bottles, one continental, one case bottle</b> |
| <b><u>Anomalies/features:</u></b>  | <b>unknown number of corks</b>                                      |
| <b><u>Correspondence:</u></b>      | <b>strong (standard beer-wine bottles)</b>                          |

This collection is important because: 1) it is the largest comparative collection of which we are aware, 2) it is that upon which Olive Jones based much of his research and subsequent typology regarding cylindrical English wine and beer bottles, 3) many if not most of these bottles are reported to have originally contained rum, and 4) what we see in the Yorktown collection corresponds strongly with the dominant style – the general-purpose style known as a British “wine” bottle -- the Wine family in the St. George assemblage.

The Cornwallis-Yorktown “fleet” (to date) consists of at least seven British-origin ships and “...more than 40 transports and victualers, several captured prizes, and privately owned vessels and an indeterminate number of small craft” lost in 1781 during the Battle of Yorktown during the American Revolutionary War. (Johnstone, 1978, IJNA, 7.3: 205-226).

Two warships have been identified: the HMS Fowey and the HMS Charon, the latter a fifth-rate frigate and the largest warship of Cornwallis’s fleet. (Broadwater, 1980, IJNA, p. 277). Some ships were scuttled intentionally by the British. All ships in this fleet were evidently sunk between 16 September – 18 October 1781.

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<sup>64</sup> i.e. non-case bottle



Originally, 103 bottles from this site were discovered in 1934. Some 71 bottles are currently in the inventory of The Mariners' Museum in Newport News, Virginia<sup>65</sup>. Most unfortunately, *these bottles are not provenanced*: in the words of the Mariners' Museum staff, they "...were removed from the York River in 1934 and unfortunately, the concept of underwater archeology was vastly different then. No real documentation was created and the bottles came from the river bed in multiple places and from the five or so ships there. Everything found was lumped together as the Yorktown Recovery project." (C. Verser, personal communication, 4/22/11).

Further: "None of our bottles have any stamps or marks of any kind. Several of the bottles have corks or the remnants of corks but there are no signs of wax left on any of them and no mention in the object file...all I have at this point is that our bottles originally contained rum and they were originally a dark olive green color. The original 103 bottles sent here were divided into two groups—first and second quality. The second quality bottles were sent all over the world to different museums and historical societies and any that were left were sold to donors and/or interested parties. Much different museum policies in place in the 1930s than there are now." (C. Verser, personal communication, 4/25/11)

Most of the bottles available as images correspond quite strongly with the dominant style in the St. George collection – those heavy, sturdy, cylindrical “black-glass” bottles that constitute the Wine Family. Fig. 44 is an image of a random selection of five of these bottles on display at the Mariners Museum. The majority of styles are immediately recognizable to us. Note the varying stages of devitrification, which strongly corresponds to the St. George assemblage.



**Figure 44. Five of the most-common style of bottle-artifacts from the Cornwallis-Yorktown fleet, all very similar to the dominant style in the St. George collection. (Images courtesy of Mariners Museum.)**

<sup>65</sup> The remainder is distributed to museums, historical societies in the U.S. and the UK, to the foundation that manages the area where the ships sank, according to C. Verser, Mariners' Museum.



Figure 45. Display case of several bottles from the Cornwallis-Yorktown collection. (Photo by J. Lunze.)

Space and time do not allow us a detailed comparison between the 103 bottles of the Cornwallis-Yorktown collection and the 229 artifacts in the St. George collection. Even if we had the time and space, however, such a comparison would be impossible: comparative metrics and data on the Cornwallis-Yorktown bottles do not exist. Jones did not organize his data by source of artifact (i.e., a specific archaeological assemblage of material culture from a specific site) but by designs and “types” of bottles.



A few anomalies in the Cornwallis-Yorktown collection do step forward for attention: one “case” (gin) bottle (Fig. 47), a few of the shorter-fatter port-wine/“beer” styles also present in the St. George collection (Fig. 45), and one artifact that distinguishes itself as quite continental in our minds.

This last artifact, Mariners Museum’s Accession number 1934.1818.000040 and shown in Fig. 46, looks Dutch-Belgian to our novice eyes.

Figure 46. Artifact accession number 1934.1818.000040, from the Mariners Museum in Newport News, Virginia. Photo not to scale. (Image courtesy of Mariners Museum).

But we remind ourselves that such thinking is not open to useful speculation: the bottle has no archaeological provenance, no indisputable association with the Cornwallis-Yorktown-fleet archaeological site(s), no definitive connections with the British Royal Navy, etc. It could have come from virtually any imaginable source in the York River, e.g. a previous wreck deposited in the same spot as the Cornwallis-Yorktown fleet. It is, and will likely remain, an anomaly.



Figure 47. Left: “case” (gin) bottle from the Cornwallis-Yorktown collection, Mariners Museum accession number 1934.1818.000060. Photo not to scale. Right: group image of three “case” (gin) bottles and the Case in which they were found (along with the fourth bottle). Visually at least, the artifact at left does *not* compare favorably with the four “case” bottles from the St. George: the Cornwallis-Yorktown bottle appears shorter and much wider (higher capacity?) – although these differences may be illusional because of the image angle, quality and its lack of scale.

Finally because of the analysis of this collection published by Olive Jones in 1986, we do have a possible touchstone for these British “wine-style” bottles’ capacities – with implications for the same style of bottle in the St. George assemblage because of the clear correspondence between the two collections.

Jones states: “In a group of bottles lost at the battle of Yorktown in 1781, 97 had capacities under 950 ml and six had capacities over 950 ml.” (Jones, 1986, p. 76). While this gives us a top-end ceiling or benchmark to apply to the St. George collection, it does not give us a floor – a bottom-end capacity, such as pints, half-pints, etc. It is only one metric of the two obvious -- maximum and minimum capacities.

Jones later gives us a clear benchmark for the infamous British “wine-style quart” bottle: he estimated capacity are 801ml. However, measuring capacity is not a subjective function of the investigators’ eyes – it is an objective, measurable metric. We will return to capacity in the next chapter.

The Cornwallis-Yorktown Fleet collection presents a strong correspondence with the St. George assemblage because of its sheer volume and the dominant style among its 103 artifacts. We can confidently say that most of the Cornwallis-Yorktown Fleet bottles look like they came straight off the St. George and belong in our Wine Family.

An additional, fascinating correspondence: the varying states of devitrification shared by both collections within this style.

Other styles that correspond (“case,” and “port wine” or “beer”) are not statistically significant: the Cornwallis-Yorktown Fleet presents less than 10 of these.

Further, with the possible exceptions of those case bottles and the enigmatic continental bottle (Fig. 46), this entire collection seems to be British – or Colonial American – in style. Continental European styles are conspicuous in their absence.

Thus, yet again, the data lead us to conclude that, in scope, scale, and variety, the St. George assemblage is demonstrably different than that of the Cornwallis-Yorktown Fleet. As with the other comparative sites, the St. George collection is much richer, much more varied, and provides far more data than any other collection we’ve yet seen.



## Summary

Comparative analysis with other bottle-artifact collections from other wrecks of the period was disappointing for a singularly simple reason: true comparative analysis with the St. George assemblage is impossible because the details of those bottles in other assemblages – images and metrics – either don't exist or are poorly published.

Nonetheless, we looked at five comparable collections, four of them from Royal navy warships. Three of the five were deposited archaeologically prior to the St. George's service, one was likely in service at the same time as the St. George, and one (the non-British ship) possibly post-dates the St. George's loss:

**HMS Invincible (3<sup>rd</sup>-rater) 1747-58**

**HMS Swift (sloop) 1763-1770**

**Cornwallis-Yorktown fleet (1781)**

**HMS Pandora (frigate) 1779-1791**

**“Mardi Gras” shipwreck (US schooner?, c. 1808-1820)**

As demonstrated, we do see some level of correspondence with all of these collections, especially for the common, British wine-beer style of bottle. However, none of these other collections compares with the St. George assemblage in terms of volume, variety, or diversity. None offers such a broad sampling of continental-European-style bottles, for example.

Further, the St. George assemblage features a quite rich group of corks featuring wax seals with lettering, and bottle necks with seals stamped into the glass. The other collections have none of these.

Finally, and perhaps most interesting, none of the other collections offer such a dazzling array of varying stages of devitrification among their bottle-artifacts. The St. George presents bottle-artifacts in pristine condition that appear as if they were made yesterday, as well as others in varying states of decomposition or devitrification. (We believe this to be the real archaeological curiosity of the St. George assemblage. We further believe that the formation processes at work on the assemblage prior to salvage are quite possibly the explanation.)

We attempted to review data from two other possibly relevant collections, that of the *HMS Boscawen* (sloop, 1759-1767), and the *William Salthouse* (merchant/trader, 1824-1841) as bottle-artifacts have been excavated from both sites. Unfortunately, images and/or data from those collections were unavailable during our research.

Simply put, the St. George assemblage seems to stand alone in its volume, the breadth of variety, the lettering on many of its wax-seal corks, and its array of varying decomposition.

To prove our point, we will now let the artifacts speak for themselves.

## V. THE BOTTLES

What follows is an introduction to the data presented by the 229 artifacts we analyzed from the St. George assemblage, a collection almost entirely comprised of completely intact bottles. We do not pretend present here a “typology,” for reasons explained earlier. This is purely *an introduction to the data* – to hopefully expand the knowledge base of glass-bottle artifact experts within the archaeological community.

We have very, very loosely *categorized* and *catalogued* the bottles in the database using extremely generic terminology such as “wine” and “champagne” and “beer,” etc. Our hope is that experts far more knowledgeable than us will examine the St George artifacts and their data and, where we have erred, correct our designations.

We cannot overemphasize our reluctance to label bottles as of a certain “type” or “style.” Analyses purporting to be typologies using labels such as these, once published, tend to get perpetuated to the point of becoming rigid orthodoxy and dogma. Endless repetition of those orthodoxies leads to persuasion in any profession or field of endeavor and, often, perception of subjective judgments as fact. We have tried to avoid this.

Why? Because analyzing archaeological artifacts such as bottles is a *subjective* exercise. Yes, there are objective metrics used in good faith, but we are measuring, in essence, a pre-Industrial Revolution handicraft. Almost all of these bottles were free- or hand-blown without of the use of moulds. As a result, very, very few bottles seem exactly alike. As we shall see, one investigator’s “wine” bottle may be another investigator’s “champagne” bottle.

In the final analysis, labeling a certain bottle as being of a certain type, style, design theme, etc. is a matter of subjective interpretation, no matter how diligently the investigator tries to rely on empirical data or metrics. Of course, we rely on available evidence – but our analysis depends on how we interpret that evidence.

Another impassioned caveat: we have far too much data for any credible, in-depth analysis into a certain grouping or family. At the advent of our research, we were confronted with the choice of diving deeply into one obvious grouping in the St. George assemblage (champagne, for example) or “skimming the treetops” of the entire assemblage, i.e. choosing breadth of investigation over depth. We could very easily have focused our research on any single grouping and investigated that grouping far more thoroughly than we have. We chose breadth over depth.

As a result, what follows is a “view from 30,000 feet” of only the highlights from the entire St. George assemblage.

Our categorization, therefore, must err responsibly of the side of extreme caution: it is tentative, tenuous, and, we believe, temporary. We fully expect that if we were to examine the St. George assemblage one more time, artifact by artifact, our categorizations would

change yet again for some bottles. We fully expect that future investigators will correct our analysis.

### **Thesis vs. Antithesis**

We have taken an almost antithesis approach to much of what follows, the antithesis being the remarkable work of Olive Jones, et al. Of all the investigators, experts, and researchers on our subject matter, Jones and his fellow researchers have provided the most data on glass-bottle artifacts from the period. We use that data to contrast and compare our own data from the St. George assemblage.

Our thesis questions are not designed to *disprove* Jones's typology, but merely to understand the St. George assemblage as best we can. In the process, though, we have added newer, fresher data that should complement Jones's work. We will try and let the data speak for itself.

### **Groupings or "Families"**

So -- what does a rum bottle from a 19<sup>th</sup>-century British warship look like?

Like the experts, we don't know. We have established the very strong likelihood that rum was indeed a staple alcoholic beverage aboard the St. George, officers included. But in what bottles? Was there any preference for a particular style of bottle among those who decasked and bottled the rum for ship's company? Did they prefer rum to be stored in the common "wine-style" bottle? Or perhaps the shorter and fatter "beer" style?

Again, we don't know.

The prevailing protocol within archaeology is to name or "type" bottle-artifacts after beverages – wine, beer, champagne, etc. – often without any evidence that the artifact was, in fact, purpose-made to hold, store, or serve the beverage for which it has been named. This tradition or orthodoxy seems destined to be perpetuated *ad nauseum* among many thinking archaeologists.

That said, we have categorized the 229 St. George bottle artifacts into eight groupings or families, with the following definitions for each:

|                         |   |
|-------------------------|---|
| <b><u>Wine</u></b>      | our generic term for those artifacts that appear to be of the family or theme commonly known as "British wine-style" or "Madeira"                             |
| <b><u>Beer</u></b>      | our designation for those few artifacts that conform to Jones's and Smith's stipulation and metrics of a British "beer" bottle (Jones and Smith, 1985, p. 18) |
| <b><u>Port wine</u></b> | our designation for artifacts that seem to have been used especially for port wine at some point  |

|                           |   |
|---------------------------|---|
| <b><u>Quart</u></b>       | artifacts that appear to metrically match Olive Jones, et al's designation of similar artifacts                           |
| <b><u>Champagne</u></b>   | our designation for artifacts that appear to fit into this general design theme   |
| <b><u>Continental</u></b> | our designation for artifacts that appear to have either continental European origins or influence                        |
| <b><u>Case</u></b>        | artifacts that match this well-known design family  |
| <b><u>Anomalies</u></b>   | artifacts that are either unique, one-of-a-kind, or different in substantive ways; most sherds are included in this group |

| <b>Group</b>       | <b>Number</b> | <b>Percentage of total<sup>66</sup></b> |
|--------------------|---------------|---|
| <b>Wine</b>        | 128           | 56%                                     |
| <b>Beer</b>        | 7             | 3                                       |
| <b>Port</b>        | 6             | 2                                       |
| <b>Quart</b>       | 23            | 10                                      |
| <b>Champagne</b>   | 34            | 15                                      |
| <b>Continental</b> | 18            | 8                                       |
| <b>Case</b>        | 4             | 2                                       |
| <b>Anomalies</b>   | 9             | 4                                       |

Table 2. Table of groupings in the St. George assemblage, with percentages of the total for each group.

<sup>66</sup> Rounded.

Table 2 presents an overview of the assemblage as we have categorized each artifact. The predominant design theme, “wine,” presented constitutes 56 percent of the collection, with the other six themes and the nine anomalous artifacts making up the remainder.

We should note here that the St. George assemblage contains a few bottle-necks. They are remarkable in that they each present lettering of some type – either stamped into the glass or stamped into the wax seal of the cork present in the neck. Most bottle-necks are categorized under Anomalies.

## Dating

Dating bottle-artifacts is another issue. Much of the body of work of the experts centers on artifacts from *terrestrial* archaeological sites, rather than from submerged sites. As we know, maritime archaeological sites often give us an indisputable *terminus ante quem* for the material culture they present. That is, they give us a date after which something could not possibly have happened – such as a bottle being made or put aboard a British warship after that ship was archaeologically deposited.

In our case, none of the bottles from the St. George assemblage could have been made after December 25, 1811, of course. Terrestrial sites usually do not give us that certainty; indeed, terrestrial sites often give us neither a firm *terminus ante quem* or a *terminus post quem*.

This is not to discredit or cast doubt on the prodigious, learned work of Jones, Dumbrell, Hume, and other experts. They have simply done at times what we often must do in archaeology, when left with no alternatives: they have cross-dated<sup>67</sup> artifacts against the archaeological record.

That is, they have looked at other corresponding material culture, historical documentation, and other evidence that offers a firm date and, using classic “if-then” syllogistic logic, projected that date onto the artifact in front of them.

For example: “We know that this bottle style existed on December 25, 1811 because it comes from the HMS St. George. If this style existed on that date, then we can date this style from our site at least as far back as that.”

Given the ubiquity of the style of our predominant category – the Wine Family – in the archaeological record, we are nonetheless reasonably comfortable with dating ranges provided by Jones, Dumbrell and others for that style of bottle-artifact. There is enough data on this common design theme to have some confidence in the dating they provide for it.

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<sup>67</sup> By “cross-dating,” we mean statistically and existentially – not the classic archaeological method of cross-dating based on a site’s stratigraphy.

Nonetheless, dating styles from *maritime* material culture such as this should be done, in our view, with corresponding collections of similar *maritime* material culture.

For example, because of the strong correspondence and significance with the Cornwallis-Yorktown Fleet for the “wine” category in the St. George collection, a reliable, datable database could be created that would present statistical significance for maritime archaeology. Large collections of wine-style bottle-artifacts from two British maritime sites created only 30 years apart (1781 and 1811, respectively, for the Cornwallis-Yorktown Fleet and the St. George) would make dating in the future more reliable, e.g. when additional, comparable maritime collections are discovered and excavated.

Jones did indeed analyze most of the Cornwallis-Yorktown Fleet assemblage – but he compared it almost entirely with material culture from terrestrial sites, most likely because large, rich assemblages such as that of the St. George simply weren’t known.

### **Methodology and metrology**

Again, we used our own methodology and metrics for recording these artifacts, as opposed to trying to “fit” the St. George assemblage into another so-called “typology.” Our eyes were our most important investigative tool.

We for each artifact, we recorded the following diagnostics in the database:

**Item Number** (using Stranding Museum’s mnemonic)

**Style** (our own categorization)

**Color** (glass color)

**Height**

**Base diameter**

**Base flared?** (i.e. does the bottle’s body angle outward at the base, making the base diameter fractionally wider than the bottle’s body?)

**Weight** (weight of the bottle, inclusive of any cork present in the mouth)

**Cork present?**

**Inside mouth diameter**

**Inside mouth flared?** (i.e. does the inside of the mouth flare outward at the top of the bottle?)

**Pontil depth** (i.e. the depth or height of the pontil – or push-up or kick-up – in the bottom of the bottle)

**Turning** (evidence on the neck of the bottlemaker turning the bottle from left to right or vice versa when it was made)

**Comments**

These diagnostic metrics were created as we examined each of the 229 artifacts against one another and distinguishing characteristics began to appear.

## Turning

As mentioned, “turning” is a diagnostic we created based on an assumption: that some bottles seems to have been turned from right to left or vice versa during their manufacture. The vast majority of the St. George assemblage seems to have been free-blown, i.e. hand-blown. Part of this process is when the craftsman takes the hot bottle while it is still malleable and still attached to the blowpipe and rotates it on a flat or rounded surface to “round” the bottle – a process known as “marvering.”

Fig. 48 is an image of an example of these odd striations on the neck of artifact 6000-1301.



Figure 48. An example of “turning” striations on neck of artifact 6000-1301. Note lines impressed into glass moving from left to right from top to bottom of neck.



Angular striations on many of the bottles seem to move from left to right or vice versa: “turning” is our interpretation of these striations. We believe they were made by a tool such as the glassmaker’s tongs during marvering or remarvering. If so, these marks could indicate if the bottlemaker was left- or right-handed.

## Weight

For the master of a British warship, the weights of various cargoes were a critical factor in managing the ship’s trim. Where and how these weights were distributed mattered greatly to the ship’s performance. The combined weight of the 229 artifacts we analyzed is more than 162 kilos (350+ lbs.) – empty, of course.<sup>68</sup> This is not a lot when contrasted with the tons of provisions and water carried in the hold of the St. George. We suspect, however, that the Master of the St. George might argue that every pound mattered – especially during a massive gale.

In their work submitted for publication in 1981,<sup>69</sup> their “Parks Canada Glass Glossary,” Jones and Sullivan, et al tell us that weight is a key metric in examining and recording glass bottle-artifacts:

“Weight - The weight of a complete container in grams. *Do not weigh an incomplete example.* The weight of a container was of major concern to glassmaking companies, as it is related to the amount of glass used to make a container blown in a mould of known size and intended capacity.” They then proceed to show us how to properly weigh a bottle-artifact. (Jones and Sullivan, et al, 1989, pp. 120-121).

We thus find it extraordinary that Olive Jones does not himself, to our knowledge, provide any comparative weights of bottle-artifacts in his published works. We cannot find any instance of where he recorded the actual weight of the bottles he studied with such passion and detail.

For example, in 1986 landmark work, “Cylindrical English Wine Bottles 1735-1850,” Jones studied “...over 211 cylindrical sealed and dated bottles and 127 complete undated bottles were examined to establish criteria for dating cylindrical ‘wine’ bottles made between 1735 and 1820. Four distinct body styles have been isolated: a wine-style, a beer-style, undersized beer-style and imperial wine-style.” (Jones, 1986, Cylindrical, back cover)

In that work, more than 300 bottle-artifacts were analyzed in dizzying detail – yet, inexplicably, the weight of each bottle was not recorded and only marginally mentioned in the text.

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<sup>68</sup> This includes two artifacts half-full with liquid and a few bottlenecks.

<sup>69</sup> Introduction, p. 6, Jones and Sullivan, et al, Parks Canada Glass Glossary.

Jones is not alone in overlooking weight as a key diagnostic: we were unable to find any data regarding weight from either Hume, Dumbrell, Henkes or Bartels. To our knowledge, only collector Willy Van den Bossche provides weights for the bottles and glassware he studied.

We enthusiastically agree with Jones and Sullivan in 1989 that the weight of each bottle is indeed a very important metric -- far more important when we are researching material culture from a *shipwreck* rather than from a terrestrial site. This why we recorded weights of each artifact in the St. George assemblage. Handling each of these bottles very quickly established that some were in fact lighter or heavier than others – a key diagnostic for the study of glass beverage bottles in and of itself.

Any investigator who has handled common British black-glass “wine” bottles and non-British (continental European) bottles from this period notices the differences in weight. The continental European bottles generally feature much thinner walls than do the British “wine” bottles and appear far more fragile.

This may very well be one reason why so many unbroken, completely intact British “wine” bottles have survived in situ, contrasted with the relative rarity of intact continental European bottles.

Weight in glass-bottlemaking does indeed translate into mass, i.e. how much glass comprises the bottle. Based on our analysis of the St. George assemblage, heavier mass usually equates to sturdier, stronger bottles – a defining characteristic of the well-known British “wine” bottle. Heavier mass translates into thicker walls, heavier bases, etc. – more durable construction.

The St. George data supports this. For example, the 128 artifacts we have categorized into the “wine” family have an average weight of 717.38 grams. Most (if not all) are of British origin, in our opinion. Conversely, the 17 artifacts we have categorized as “Continental” (i.e. non-British) average 550.65 grams – in spite of having very similar heights and base diameters.<sup>70</sup>

The weight and mass of these artifacts directly affect their archaeological durability, in our view. Continental bottles feel much more brittle and breakable than do the “wine” bottles we suspect came from British glasshouses of the period.

Fortunately, for the non-British artifacts (e.g. the Continental Family), we do have some applicable data from van den Bossche, who provided weights for the artifacts he recorded, photographed and analyzed.

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<sup>70</sup> The two artifacts with liquid present inside were not included in these measurements.

### Capacity: imperial vs. metric (vs. continental European)

As noted, we did not record or estimate the capacity of the St. George artifacts because it was beyond our means and ability. We will rely on Jones and Smith here for the bottles that seem British in origin; for the non-British bottles, Van den Bossche seems the only reliable authority as to capacity – and he is a collector. Further, Van den Bossche only gives capacities for the objects he records; he does not explain the rationale or design-thinking behind European capacities.

Jones and Smith eloquently illustrate the quicksand investigators firm themselves in when studying British bottles of this period.

Of British “wine” bottles, they say: “The commonest glass object found in archaeological excavations is the English-style dark green glass ‘wine’ bottle, perhaps not surprising in light of the parties described previously. These bottles, however, were probably multipurpose containers used to contain any of the alcoholic or non-alcoholic beverages as well as other items such as vinegar, linseed oil, or any substance sold in *quantities over a pint and under a gallon.*” (italics added, Jones and Smith, 1985, p. 13)

They continue: “The bottles came in half-pint, pint, quart, half-gallon and gallon sizes but these were conceptual sizes, not actual ones. *Capacity measures taken on this type of bottle show that the true capacities were seldom made.* The quart bottle, for example, ranged in size from about 675 ml to 1250 ml. From 1755 to 1820 two liquid capacity measures were in effect in England - the Queen Anne wine gallon of 3785.4 ml and the beer gallon of 4621.1 ml. The quarts are, respectively, 946 ml and 1155 ml. Scotland and Ireland both had other systems.” (italics added, Jones and Smith, 1985, p. 14),

Jones’s (and Jones’s and Smith’s) work was limited almost exclusively to artifacts he/they determined were British in origin. Thus, his work on measuring capacity naturally used the British weights and measures protocols for capacities in place at the time – a bewildering array of differing terminology and measurements that was not standardized until the Weights and Measures Act of 1824 was passed into law.

Prior to that, it does seem that British bottles were often manufactured by several glasshouses into general sizes and capacities. But there is very little consistency, which makes estimating the capacity of a single bottle and then comparing data across an assemblage a quite risky proposition.

Indeed, as an illustration that we are investigating a pre-industrial, made-by-hand *craft* rather than an *industry* with a *standard method of manufacture*, Jones himself explains the wild fluctuations in size and assumed capacity for these general-purpose British “wine” bottles:

“At the beginning of this study I assumed that a range of ‘quart’ capacities would cluster around the reputed quart of 757mL. However, a preliminary series of capacity measure taken soon after the study began made it clear that this was not the case. *Bottles identifiable visually as ‘quarts’ ranged in capacity from 675 mL to 1250mL.*” (italics added, Jones, 1986, p. 110).

Jones then identifies a “wine-style quart” with an estimated capacity of 801ml, as an example. (Fig. 58, p. 80, pp.78-83 of Jones, 1986).

We have relied on Jones’s descriptions of the various known capacities of British-manufactured bottles from the period – primarily pints, quarts, half-gallons, and gallons.

Calling an artifact a “gallon jug,” for example, or a “quart” would make sense if we were investigating a *standard method of manufacture* for glass beverage bottles in the period. But we are most certainly not. We are investigating rather an *artisans’ handicraft* where, to paraphrase Hume’s insight, “there are enough exceptions to obscure any rules.”

Each glasshouse and bottlemaker had its own methods, variations on those methods, approximations of measurement systems, and, importantly, its own variations or interpretations of popular design themes. etc.

In fact, there are so many variations on basic themes, it is difficult to see any original intent for an artifact’s capacity, in many cases. (We will demonstrate this forthwith as we try to distinguish between a “beer-style” bottle and a “wine-style” bottle.)

## Devitrification



Figure 49. Example of devitrification on St. George artifact. Note scaling.

The process of creating glass by heating and fusing different elements together is called “vitrifying.” When a glass bottle decomposes or crystallizes, it is therefore called “devitrification.”<sup>71</sup> There are various stages in this process, the final process being actual loss of mass in the form of scaling. The artifact begins losing layers of “skin,” as it were. Fig. 49 presents an example of this process with a St. George artifact. Note the flaking.

The process of devitrification is chemical – specifically, how the chemical properties of the glass itself, its composition, interacts with the chemical properties of its environment. For our purposes, and as we understand the archaeology behind it, this process is directly related to the maritime environment in which the glass artifact was deposited. This is why we emphasized the depositional environment of the St. George assemblage and the formation processes at work on it prior to salvage and excavation.

<sup>71</sup> In the database comments about each artifact, “DV” refers to devitrification. Some call it “glass diseases” or “bottle psoriasis.”

Also, as best we understand it, the various stages of devitrification are the cause of the dazzling, rainbow array of iridescence, luminescence, patination, etc. present in the St. George collection. Many of the St. George bottle-artifacts are in the process of devitrification.

Yet many have no signs at all of any devitrification whatsoever. These bottles appear as if they could have been produced yesterday. Fig. 50 presents one such bottle (far left) contrasted with three in various stages of devitrification.



Figure 50. One pristine artifact (far left) compared with three others in various stages of devitrification.

We do not have the knowledge to attempt any explanations for this, beyond the obvious: the artifact's deposition and environment is the reason for the difference.

### Corks and seals

Perhaps the strongest feature of the St. George assemblage is the extraordinary amount of corks present in the bottles, as well as several artifacts with lettered seals in the glass. Further, many of the corks present lettering stamped in wax on the top of the cork.

Twenty-nine (29) percent of the St. George artifacts feature corks – 66 of the 229 artifacts. Of those, ten (10) corks feature lettering in wax.

Words or letters evident in these corks' wax seals:

6000-1449AG "VAMP" stamped into reddish/pinkish wax

6000-1449y "CLARE" stamped into remnants of wax

|            |  |
|------------|--|
| 6000-1345  | "VA" are only letters decipherable; could be followed by "MP"  |
| 7546-283   | letters "VA" visible; possibly the RN broad-arrow "GR" symbol  |
| 6000-1605  | "...Y&" and the letters "P" and "C" outside circle with "PORT" stamped inside circle   |
| 6000-1607b | letter "M" at 8 o'clock, "PORT" in center, and a "CR" at 10-11 o'clock   |
| 6000-1743  | "PORT" stamped into black wax  |
| 6000-1747  | "CAR" or "CAP" at 10 o'clock and the letter "H" at 3 o'clock, all outside circle; "T" is visible inside circle at 3 o'clock  |
| 6000-1748  | "...LOCH" below circle at 4 o'clock; "PORT" stamped inside circle  |
| 6000-1752  | "...ULLOCH" outside/below circle, with "PORT" stamped inside circle; the top right arm of a "T" is also possible to identify, just to the left of the "ULLOCH" making the name "TULLOCH" likely; "PORT" stamped inside circle; lettering on top of circle is illegible |

We interpret the "...ULLOCH" name to be either "Tulloch" or "McCulloch." We also interpret several of these corks to be lettered "PORT."

Glass seals are also present in the St. George assemblage:

|             |  |
|-------------|--|
| 6000-1422:  | glass bottle-neck/sherd with "WH 1805" stamped into lip at mouth                         |
| 6000-1795c: | bottle neck/sherd with the Royal Navy broad-arrow "GR" stamped onto the shoulder         |
| 6000-3203   | large, intact bottle with the same Royal Navy broad-arrow "GR" stamped onto the shoulder |
| 6000-1335   | large, intact bottle with the word "BRUT" stamped into glass on shoulder                 |
| 6000-1507   | bottle neck/sherd with cursive-script "M" stamped inside circle at shoulder              |

It was very difficult for us to resist the detective-work challenge in back-tracing these words and letters back to either St. George crew members, known vintners and spirits merchants of the period. It is not often that archaeological material culture gives us such sizeable body of rich clues in plain English – another distinguishing characteristic of the St. George assemblage.

## WINE FAMILY



Figure 51. Artist's sketches of two St. George artifacts in the Wine Family. Artifact 6000-1752, left, and 6000-1747. Sketches by Evangelia Karali.

The greatest challenge in creating the Wine Family was trying to distinguish a “beer” bottle from a “wine” bottle, based on the prevailing thinking of experts. We failed. Making such a distinction was either simply beyond our capabilities ... or the St. George data just do not fit into the prevailing orthodoxy about so-called British “wine” and “beer” bottles.

Fig. 52 is an image from Jones's and Smith's “Glass of the British Military ca. 1755-1820,” in which they identify a traditional “beer-style” bottle at left juxtaposed with what they identify as a traditional British “wine-style” bottle at right. (Jones and Smith, 1985, p. 18.)





Figure 52. After Jones and Smith, 1985. Two British bottles “...dating from ca. 1790 to 1820...” Jones and Smith identify bottle at left (a) as a “beer-style” and one at right (b) as “wine-style.”

Of the “beer-style” bottle at left, Jones and Smith say: “Beer-style bottles are about 240mm high with base diameters about 95mm.” Of the “wine-style” bottle at right: “Wine-style bottles are generally 275mm with base diameters about 85mm.” (Jones and Smith, 1985, p. 18).



**Figure 53. Which is wine and which is beer? Artifact at far left, with the shortest neck, is categorized in the Beer Family; center bottle and one at right are classified in the Wine Family.**

Fig. 53 above is an image of three St. George bottles that are very close to these specific metric definitions of beer-style and wine-style bottles from Jones and Smith. The artifact at left, classified in the Beer family solely because it matches their metrics, is 240mm in height with 97mm base diameter. The center and right artifacts are classified as belonging to the Wine family: center artifact measures 275mm high with a base diameter of 86mm, artifact at right measures 275mm high with a base diameter of 87mm.

All three St. George artifacts seem to visually match the design themes for beer- and wine-style bottles as presented by Jones and Smith in Fig. 52. All three almost precisely match, respectively, the metrics presented for each “style.” The only problem: the St. George has given us 135 such bottles – all of which could conceivably be categorized by experts as either “beer” or “wine” bottles.

The metric parameters offered by Jones and Smith do not seem to apply to the data presented by the St. George artifacts we have identified as belonging to either the Wine or Beer design themes. Nor do the visual representations of these “styles” presented by Jones and Smith seem to apply to the great majority of Wine and Beer bottles from the St. George.

We do not believe that the St. George data supports the concept of a “standard” beer or wine bottle from this period – at least any standard that can be consistently measured or denoted with measurements such as height and base diameter.

One would think that Jones and Smith are simply reporting the metrics found from one or more corresponding archaeological sites and then stipulating that their conclusions – and declarations, such as those above, which essentially define metrically “beer” and “wine” styles – *apply only to the data presented by those sites*.

Unfortunately, this is not the case. As they make clear in the introduction to their book, Jones and Smith projecting the data from “...glassware used by the British military in Canada from ca. 1755 to 1820” onto *all* British glassware from this period, no matter the geography of the archaeological sites. (Jones and Smith, 1985, p. 7).

They have presented what purports to be a *global typology* based on local, provincial, parochial data from a handful of Canadian archaeological sites. We believe the data from the St. George assemblage, especially the Wine family as we have categorized it, may very well disprove their typology.

Further, to illustrate their global typology, they give us images of only two artifacts for comparison – one each for their beer-style and wine-style. Finally, this extremely narrow definition of these “styles” is completed with their flat declarations of acceptable heights and base diameters for each style. “A beer-style bottle looks and measures like this and a wine-style looks and measures like this,” they seem to be saying.

We have no such confidence in our interpretation of the data from the St. George assemblage.

We have classified 128 of the St. George bottles as belonging to the Wine Family and seven (7) bottles as belonging to the Beer Family. *However, we have very little confidence in any distinction between a wine bottle and a beer bottle in the St. George assemblage.*

Of the 135 bottles we have designated as wine or beer, they all appear to be very much simply *variations on the same, general design theme*. Our designation as either Wine or Beer is therefore quite artificial: for example, we have simply used Jones and Smith’s two-dimensional metrics (height and base diameter) for their “beer-style” to create the Beer family. We could have easily categorized these artifacts as belonging to the Wine family.

Further, adhering strictly to Jones’ and Smith’s metrics, only seven of the 135 possible St. George candidates are “beer-style” – about one-half of one percent.

We do not believe this reflects the reality of these 135 bottles – i.e. either their manufactured purpose or their practical use on board the St. George. In our judgment, there are far too many subtle nuances among these 135 bottles to designate one or the other as having been manufactured and sold in the marketplace as “beer-style” or “wine-style.”

“Beer-style bottles are about 240mm high with base diameters about 95mm” Jones and Smith say. “Wine-style bottles are generally 275mm with base diameters about 85mm.”

This gives us a height range of 240-275mm between Jones' and Smith's beer-style and wine-style and a base diameter range of 95-85mm, the taller wine-style being narrower (85mm) than the beer-style across the base.

The St. George Wine family presents 135 bottles across the metric spectrum presented for Jones' and Smith's differentiation between beer and wine styles – some of the St. George artifacts are shorter than Jones' and Smith's 275mm wine-style type, some taller, ranging in height from 248mm to 284mm.

Table 3 illustrates the key variables of the Wine Family in the St. George assemblage<sup>72</sup>:

| VARIABLE              | AVERAGE/MEAN | RANGE   |
|-----------------------|--------------|---------|
| Average height        | 263mm        | 248-284 |
| Average weight        | 697g         | 614-876 |
| Average base diameter | 87mm         | 81-97   |

Table 3. Key variables for Wine Family.



Figure 54. Image of (l to r) shortest, mean height, and tallest artifacts in the St. George Wine Family. Composite image not to scale.

Fig. 54 is an image of the shortest bottle in the St. George Wine family (left), the tallest (right), and an example of the mean/average-height (center) in the assemblage.

<sup>72</sup> Three bottles not included in these averages: 6000-1140, which is missing two broken pieces at shoulder; 7546-798c, which is roughly half-full of a clear liquid, and 6000-1731, which is an aberration from the norm (shorter, fatter, almost like a "mallet" bottle). This last artifact, 6000-1731, could have been categorized as an Anomaly.

Artifact 6000-1288 at left is 248mm in height with a base diameter of 88mm; artifact 6000-1263, center, represents the mean/average height in the Wine Family and stands 263mm high with a base diameter of 87mm; artifact 6000-1733, right, is the tallest bottle in the Wine Family at 284mm high and a base diameter of 88mm.

Interestingly, the heaviest bottle we have categorized in the Wine family, artifact 6000-5026, weighing in at 876g, is not the tallest. It is 280mm high. Again, Jones has never used weight as a key metric in understanding the bottle artifacts he has studied. If he had, we may have a better chance of finding correspondence between artifacts and collections of artifacts. Height-to-weight ratio, for example, may reveal some proportional relationship that would help archaeologists understand these artifacts better.

Admittedly, we may be splitting insignificant hairs here. Suffice it to say that: 1) we do not believe that Jones' and Smith's distinction between a wine-style and beer-style bottle applies to the St. George assemblage, and 2) any of the 135 bottles we have categorized in both the Wine and Beer families could easily be categorized the other, i.e. a Wine bottle could easily be categorized as a Beer bottle and vice versa. There is no dogma attached to our categorizations.

Twenty-six (26) of the Wine family bottles feature corks, although none with lettering. (We have categorized bottles with lettered corks differently, for reasons that will become clear.) Again, that so many corks have survived leads us to think again of the formation processes at work on the St. George assemblage *in situ*.

There are other interesting anomalies in the Wine family – differences between mouths, lips, necks, etc. – that are detailed in the database.



One artifact in the Wine family that we should note is 6000-1731. See Fig. 55. We have chosen to include this artifact in the Wine family purely on instinct, as it could very well be a Port Wine bottle.

This bottle design theme seems older, at least according to the literature. Dumbrell, Hume, Jones and others have traced an evolution of the common wine bottle in the late 18<sup>th</sup> and early 19<sup>th</sup> centuries. Essentially, cylindrical bottles became taller and narrower over the years, especially between 1760-1820. Bottles from the early part of this period were shorter and what Dumbrell describes as “squat.” (Dumbrell, 1983, pp. 31-32).

Figure 55. Fig. Artifact 6000-1731.

Dumbrell gives us an interesting image of this evolution in Fig. 56.

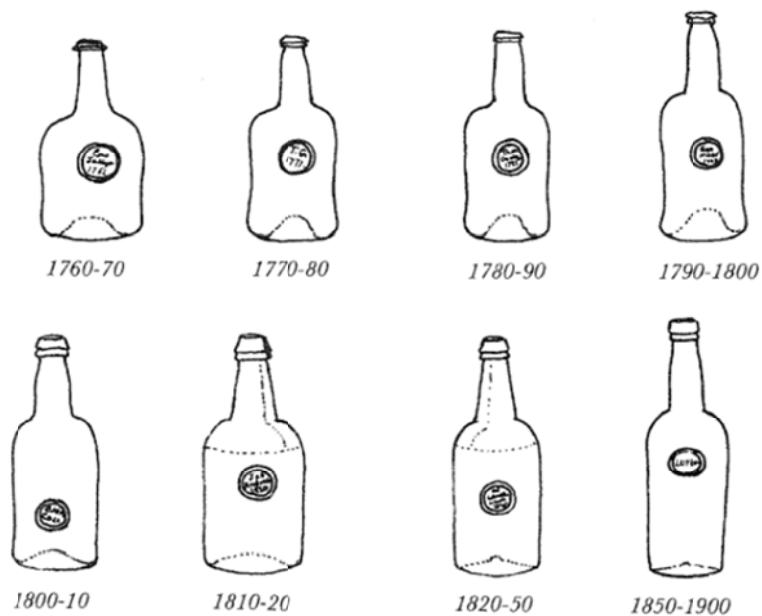


Figure 56. After Dumbrell, 1983, pp. 31-32. Note evolution from short and “squat” to taller and slimmer during the St. George period of service (1785-1811).

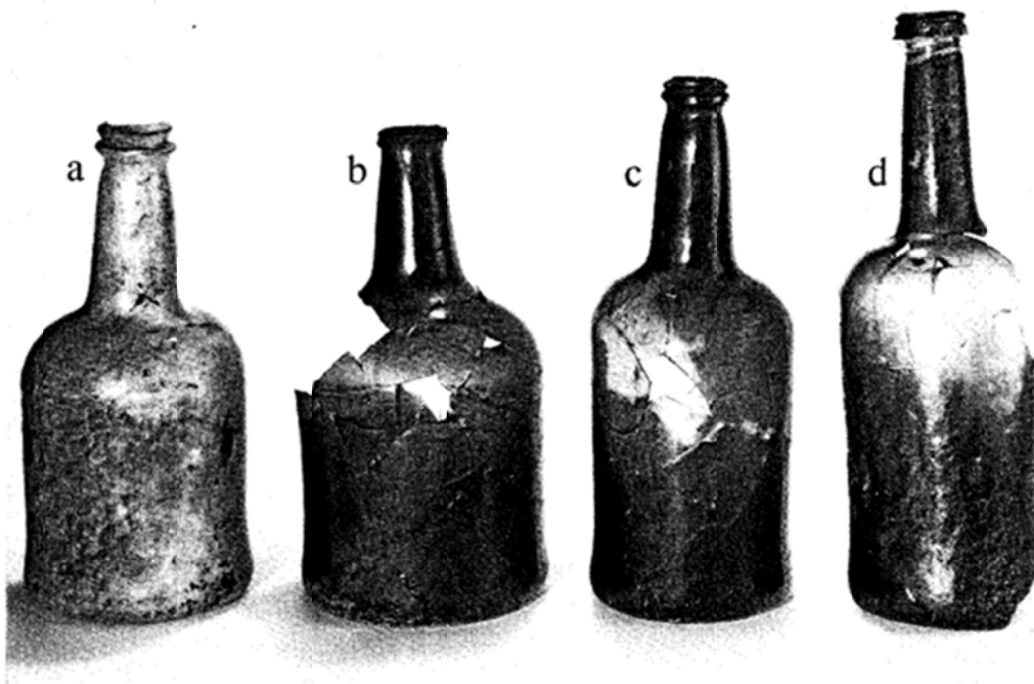


Figure 57. After Jones and Smith, 1985, p. 17. From left to right, they indicate dating “...from the 1760s to the early 1790s.” Jones and Smith identify all these artifacts as “quart” bottles.

Jones and Smith illustrate this evolution using actual artifacts in Fig. 57. (Jones and Smith, 1985, p. 17)

With variations beyond our current ability to interpret with any confidence, all four general design themes in Fig. 57 seem to be unmistakably present in the St. George assemblage. Note example B, which corresponds (sort of) to St. George artifact 6000-1731, as shown in Fig. 55.

Jones and Smith go further, also giving us an image of bottle-artifacts from an actual maritime archeological site. Fig. 58 is (from p. 76 of Jones, *Cylindrical*) an image of two bottles Jones identifies as “wine-style quarts from the *Machault*, which sank in 1760.”



**Figure 58.** From Jones, *Cylindrical*, p. 76. Two “wine-style quarts” from a 1760 maritime site, the wreck of the *Machault*.

Jones and Smith identify these as “wine-style quarts.” The bottle on the left in Fig. 58 is reported as 206mm high with a base diameter of 119mm. Bottle at right is 212mm high with a base diameter of 118mm.

Fig. 59 is an image of selected St. George bottles with similar metrics to these “wine-style quarts” from Jones in Fig. 54. It is worthwhile to contrast these against Jones’s “wine-style quarts.”



From left to right in Fig. 59, St. George artifact 7695-798a stands 218mm high with a base diameter of 99mm – a bit taller and slimmer than the “wine-style quart” at right in Fig. 54 from Jones. Artifact 6000-1369, center, stands 212mm high with a base diameter of 97mm, exactly the same height as Jones’s “wine-style quart” but also is a bit slimmer. Artifact 6000-1731 at right stands 222mm high and is 101mm wide at its base.

Even when the subtle differences between these artifacts from two depositions are noted, we must ask ourselves: what exactly are we looking at? A *de facto* difference in conscious design themes, a true evolution in design? Or are we seeing simply the vagaries between two or more glasshouses? Or perhaps local, parochial variations on a general design theme widely imitated at the time?



**Figure 59.** St. George artifacts (from l to r) 7596-798a, 6000-1369, and 6000-1731 – two Quart Family artifacts and a Wine Family artifact, respectively.

We have categorized 23 St. George artifacts as belonging to the Quart family, explained hereinafter. They are very similar in design features and metrics to the two “wine-style quarts” from the *Machault* Jones and Smith show us in Fig. 58.



## BEER FAMILY



**Figure 60.** Jones's and Smith's "beer-style" bottle, left, and St. George artifact 6000-5046, right, categorized in the Beer Family. Visually, they are obviously different bottles; metrically, they are an almost exact match.

To recall Jones's and Smith's declaration: "Beer-style bottles are about 240mm high with base diameters about 95mm." (Jones and Smith, 1985, p. 18).

If that is so, then the St. George presents seven artifacts that Jones and Smith might identify as "beer-style" bottles. All seven closely correspond with the metrics Jones and Smith present for that designation.

Fig. 60 above, however, presents distinct differences between the example Jones and Smith give us (left) and what the St. George assemblage offers (artifact 6000-5046, right). Visually, the bottles in Fig. 60 are obviously different. For example, the Jones and Smith bottle at left has a shorter neck, more rounded shoulders, and a much more tapered neck.

Metrically, however, these artifacts are an almost exact match: artifact 6000-5046 stands 236mm high with a base diameter of 95mm.

The St. George presents no artifacts that correspond visually -- in any compelling or convincing way -- with this image of a "beer-style" bottle from Jones and Smith.

We have thus created the Beer Family based solely on the two-dimensional metrics (height and width) offered by Jones and Smith as the baseline standards for a “beer-style” bottle. We have little confidence in the designation.

The Beer Family’s key variables are shown in Table 4.

| <b>VARIABLE</b>       | <b>AVERAGE/MEAN</b> | <b>RANGE</b> |
|-----------------------|---------------------|--------------|
| Average height        | 240mm               | 233-250      |
| Average weight        | 707g                | 647-755      |
| Average base diameter | 93mm                | 87-97        |

**Table 4. Key variables for seven beer-family bottles.**

It must be noted, however, that many other St. George artifacts correspond generally to these metrics – we are talking about differences in millimeters, after all -- and generally with the manifest design scheme of Jones’s and Smith’s “beer-style” bottle.

It is our view that the categorization of these artifacts as belonging to a supposed Beer Family is, without question, open to further interpretation.

## PORT WINE FAMILY

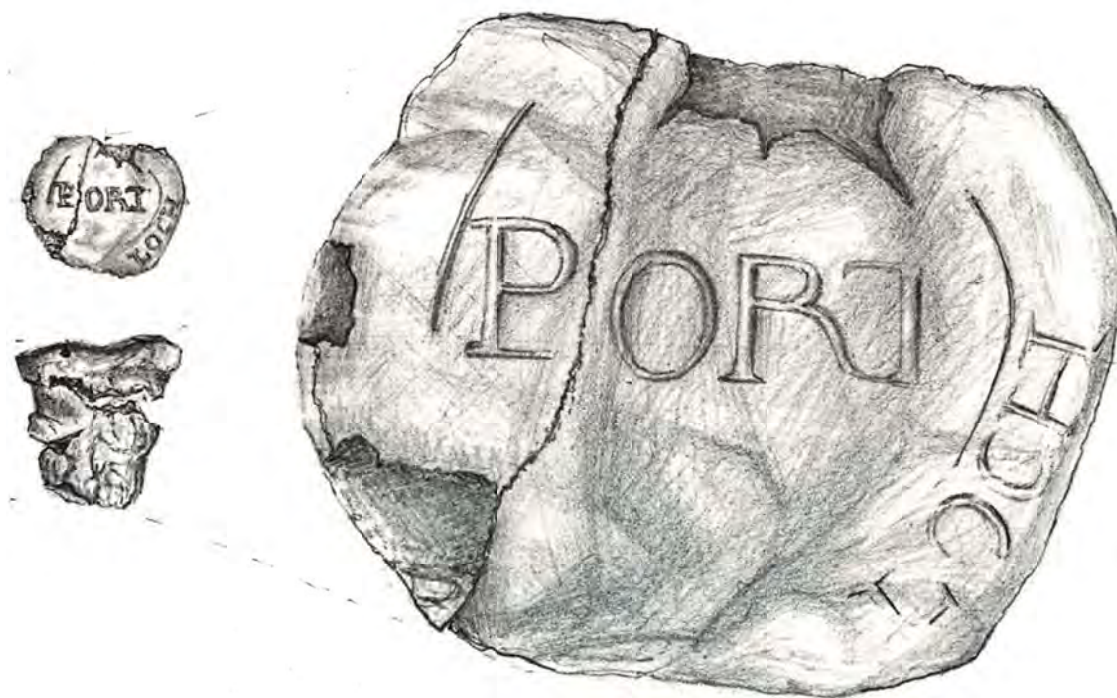


Figure 61. Artist's rendering of a cork from artifact 6000-1748. Sketch by Evangelia Karali.

Port wine was almost certainly aboard the *St. George* during her Baltic service, and perhaps throughout most of her life.

Jones and Smith say of port wine: "Between 1755 and 1820 wines seem to have increased in popularity with the officers, port gradually becoming the commonest, followed by madeira and claret." (Jones and Smith, 1985, p. 9).

However, the decision to create this small family was directly driven by the data from the *St. George* assemblage: six bottles feature corks with wax seals and the word "PORT" stamped into the wax. While we do not have much confidence in the provenance of any of the *St. George* assemblage, we will assume that these corks were, in fact, present *in situ* in the bottles that host them today.

The Port Wine Family presents the following key variables:

| VARIABLE              | AVERAGE/MEAN | RANGE   |
|-----------------------|--------------|---------|
| Average height        | 263mm        | 258-268 |
| Average weight        | 681g         | 615-725 |
| Average base diameter | 86mm         | 82-89   |

Table 5. Key variables for the six Port Wine bottles.

The Port Wine bottles all seem to be of a much browner hue of glass than the Wine Family bottles, which are general dark-green or even blackish. The Port Wine bottles also seem to be more translucent. We are uncertain how to interpret this.

Fig. 61 is an artist's rendering of the stamped cork from artifact 6000-1748. Fig. 62 below is a composite image of that sketch and artifact 6000-1748.



Figure 62. Artifact 6000-1748, left, and artist's rendering of its stamped cork, above. Sketch by Evangelia Karali.

Figure 63. Image of an "...English brass die with an ebony handle for impressing 'PORT' on the wax seal of a port wine bottle." Van den Bossche dates this to c. 1880.<sup>73</sup> (Van den Bossche, 2001, p. 382, plate 320).



<sup>73</sup> Dies like this, as well as stamps for lettering and embossing waxed corks and bottles, were a huge, thriving business during the St. George's service life.





**Figure 64. St. George Port Wine Family.**

As we can see in Fig. 64, the Port Wine Family features differences in construction. Note the differences in the shapes of the mouth and lips, for example. The necks are different, too. Note the artifact in center of top row; it reminds us visually of Jones’s and Smith’s “beer-style” design theme.

We will cover corks forthwith. But following are our notes from the Port Wine Family corks:

| HMS St George Glass Bottles   |
|---|
| Comments  |
| 6000-1748: ANOMALY: CORK HAS LETTERING IN WAX STAMP -- "...LOCH" BELOW CIRCLE AT 4 O'CLOCK; "PORT" STAMPED INSIDE CIRCLE; 'CLOCK, ALL OUTSIDE CIRCLE; pontil has inside rim as in moulding; extremely faint seams or mould marks on shoulder but no discernible sign of neck being attached or other signs of moulding; POSSIBLE TULLOCH CONNECTION ON CORK |
| 6000-1743: ANOMALY: CORK APPEARS TO HAVE LETTERING "PORT" in WAX on top; BLUE bottle; beautiful devitri; tapered neck, with tool marks; round pontil nose   |
| 6000-1747: ANOMALY: CORK HAS LETTERING IN WAX STAMP -- "...CAR..." or "CAP" AT 10 O'CLOCK AND AN "H" AT 3   |

| HMS St George Glass Bottles  |
|--|
| Comments   |
| O'CLOCK, ALL OUTSIDE CIRCLE; INSIDE CIRCLE A "T" IS VISIBLE AT 3 O'CLOCK; hips are perfectly straight, not flared; pontil has inside rim as in moulding; extremely faint seams or mould marks on shoulder but no discernible sign of neck being attached or other signs of moulding; POSSIBLE TULLOCH CONNECTION ON CORK   |
| 6000-1605: ANOMALY: LETTERING ON CORK -- "...Y&" AND A "P" AND A "C" OUTSIDE CIRCLE WITH "PORT" INSIDE-- LOOKS DOUBLE-STAMPED WITH DIE; cork may have been glued; bottle is broken in back, missing large piece; heavy DV; neck is straight  |
| 6000-1607b: ANOMALY: LETTERING ON BLACK WAX SEAL HAS "M" AT 8 O'CLOCK, "PORT" IN CENTER, AND "C_R" AT 10-11 O'CLOCK; INTERPRETATION IS "McCULLOCH:" bottle is broken and has been reconstructed; neck is tapered, with band/tool mark around neck just below lower lip; some DV; blunted pontil nose   |
| 6000-1752: BEST CORK. ANOMALY: CORK HAS LETTERING IN WAX STAMP -- "...ULLOCH" BELOW CIRCLE with "PORT" inside...the top right arm of a "T" is also possible to identify, just to the left of the "ULLOCH" making the name "TULLOCH" possible; INSIDE CIRCLE IS LETTERED "PORT"; LETTERING ON TOP OF CIRCLE IS INDECIPHERABLE; neck is perfectly straight; mouth and lips are the most perfect yet encountered; hips are perfectly straight, not flared; pontil has inside rim as in moulding; extremely faint seams or mould marks on shoulder but no discernible sign of neck being attached or other signs of moulding |

**Table 6. Comments from database on Port Wine Family bottles.**

Interestingly, during our research of the names “Tulloch” and “McCulloch,” we discovered that the Tulloch family was a known wine and spirits merchant in Scotland in the late 18<sup>th</sup> and early 19<sup>th</sup> centuries. In fact, a winery by the same name was established by a Tulloch patriarch in Australia in the early 19<sup>th</sup> century and still operates today.

## QUART FAMILY



Figure 65. Quart Family artifact 6000-1407, representing mean height and base diameter for group.

We created this family of 23 artifacts based on their correspondence with the findings of Olive Jones in 1986 and Jones and Smith in 1985 – specifically, their designation of a “quart” bottle.

Key variables of the Quart Family in the St. George assemblage:

| VARIABLE              | AVERAGE/MEAN | RANGE   |
|-----------------------|--------------|---------|
| Average height        | 217mm        | 197-236 |
| Average weight        | 746g         | 647-866 |
| Average base diameter | 99mm         | 94-104  |

Table 7. Key variables for the 23 Quart Family bottles.

The average artifact in the Quart Family is 217mm high, weighs 746g, and has a base diameter of 99 mm. Artifact in Fig. 65 is 217mm in height and 100mm base diameter.

Although the image is not to scale, Fig. 66 juxtaposes two remarkably similar bottles that Jones and Jones and Smith identify as being both “quart” bottles – yet of entirely different “styles.”

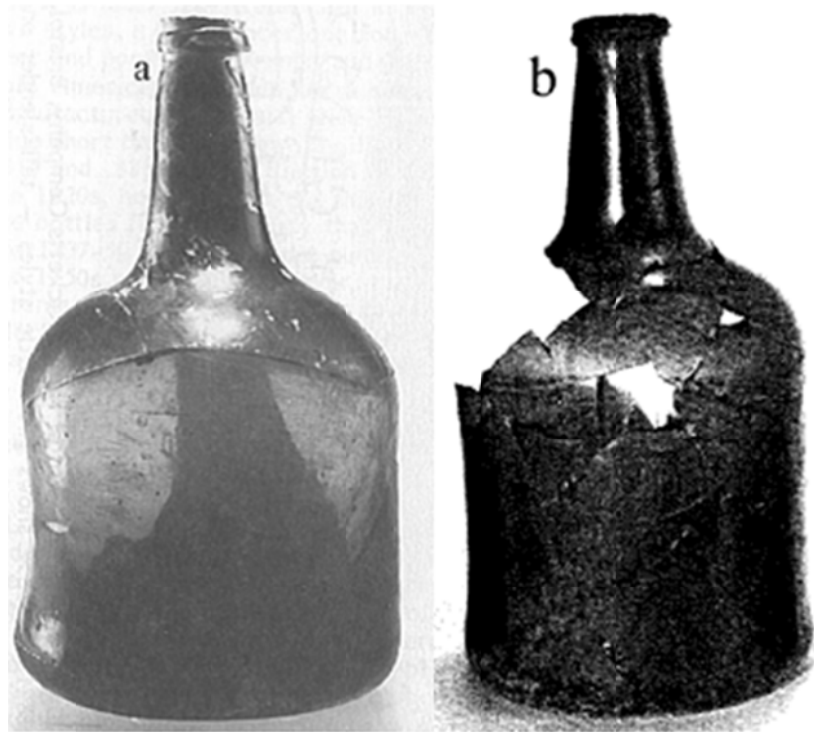


Figure 66. After Jones, 1986, and Jones and Smith, 1985, p. Artifact A is identified as a “wine-style quart” by Jones and dated to 1760. Artifact B is identified as a “beer-style quart” and dated by Jones and Smith to “...the 1760s to the early 1790s.” A is from Jones, 1986, p. 76. B is from Jones and Smith, 1985, p. 17. Photo not to scale.

Artifact A at left, defined as a “wine-style quart” by Jones and Smith in 1985, was recorded with a height of 206mm and a base diameter of 119mm; Artifact B at right, defined as a “beer-style quart” by Olive Jones in 1986, was recorded with a height of 116mm and a base diameter of 116mm. Both bottles are dated “...from the 1760s to the early 1790s.” (Jones, 1986, p. 76; Jones and Smith, 1985, p. 17).

To our eyes, the differences between these two bottles are so minute as to be inscrutable, at least visually. They seem to be very much of the same general design. Metrically, however, they are different: Artifact B at right is a full *nine centimeters* shorter than Artifact A.

We must ask: if both bottles are supposed to be “quart” bottles, implying their common capacity, shouldn’t they be of roughly the same height and width? How can one “quart” bottle (Artifact B, the “beer” bottle) be of the same base diameter but nine centimeters shorter than the other and still have the same capacity, i.e. a quart? The volume and capacity of the shorter bottle must mathematically be less than that of the bottle standing nine centimeters taller, we would think.

Beyond that, it is hard to distinguish between the two: Artifact A’s shoulders are more rounded and its base is more flared than that of Artifact B, and the mouth and lips are



different. Artifact B's neck appears straight, without the inward tapering near the mouth of Artifact A.

Yet one is supposed to be "beer-style" and the other "wine-style."

We make no such distinction for the St. George Quart Family. We have created the family solely based on the "quart" distinction from Jones and Jones and Smith and the metrics they provide (height and base diameter). Table 8 illustrates how the average St. George Quart Family bottle compares with the "beer" and "wine" bottles from Jones, and Jones and Smith, respectively, shown in Fig. 66.

Key variables for the Quart Family:

| <b>Artifact</b>                     | <b>HEIGHT</b> | <b>BASE DIAMETER</b> |
|-------------------------------------|---------------|----------------------|
| St. George Quart                    | 217mm (mean)  | 99mm (mean)          |
| "BEER" style, Jones, 1986           | 116mm         | 116mm                |
| "WINE" style, Jones and Smith, 1985 | 206mm         | 119mm                |

Table 8. Key variables for Quart Family.

Based on these comparative metrics, we do indeed feel comfortable in using the "quart" designation for this type of design theme present in the St. George collection. The average St. George quart bottle is a bit taller and narrower than both artifacts presented by Jones and Jones and Smith, leading us to speculate that its capacity is indeed a "quart."

Most interesting: we would guess the dating of the Quart Family to be ca. 1760-1800, based on the preponderance of the literature (including Jones, Jones and Sullivan, and Jones and Smith). We estimate that the Quart Family artifacts are a bit older than the taller, narrower bottles that dominate the St. George Wine Family.

If so, it again raises the obvious, maddening question re the biography of these artifacts: how, and when, did they come aboard the St. George? Were they part of ship's stores for many years?

Finally, for comparative purposes, we must ask: how would Jones (and/or Jones and Smith) diagnose our Quart Family? As "beer-style" or "wine-style quart?" A mix of each? Something else?

Visually, the Quart Family artifacts appear to be quite similar to both the "beer" and "wine" styles defined by Jones and Jones and Smith. Fig. 67 juxtaposes one Quart Family artifact, item 6000-1367, between Jones's and Smith's "wine" bottle at left and Jones's "beer" bottle at right.



**Figure 67.** After Jones, 1986, and Jones and Smith, 1985. Left (a), "wine" bottle as designated by Jones and Smith. Center, St. George Quart bottle; Right (b), "beer" bottle, as designated by Jones. Image not to scale.

In the figure, the center artifact, 6000-1367, is 205mm in height and has a base diameter of 104mm. In terms of general design features, it seems to correspond well with each bottle at its side.

As with all 229 St. George artifacts, we make no postulation as for which beverage (if any) any of the Quart Family artifacts were manufactured.

To illustrate the danger in "typing" bottle-artifacts from this period, in Fig. 68, Van den Bossche gives us a provocative example of a 230cm-high Port Wine bottle for which his description is telling: "An English common utility bottle for port wine, sealed: "Port," 1760...This bottle shows the earliest known English wine seal indicating its contents. This style of bottle, combined with its correct capacity [90cl] was in the 19<sup>th</sup> century mainly used for *beer and porter*." (italics added, Van den Bossche, 2001, p. 37).

Fig. 68 shows this c. 1760 Port Wine, sealed bottle juxtapositioned with St. George artifact 7546-798a. The general design theme for both has been called by some experts a "mallet" style, given its resemblance to the tool.<sup>74</sup> The bottles are not quite the same. Note, for example, the shorter neck on the St. George Quart bottle.

<sup>74</sup> Other experts, such as Van den Bossche, refer to an entirely different design theme when using the term "mallet."



Figure 68. Port Wine bottle, left, c. 1760, from Van den Bossche (Van den Bossche, 2001, fig. 12, p. 37). St. George Quart Family artifact at right.

Quarts, port wine, beer and porter – it seems many labels have been given to this design theme by experts over the years ... with some justification.

### CHAMPAGNE FAMILY

"In victory, you deserve Champagne. In defeat, you need it." Popular quotation attributable to Napoleon.

We diagnose 34 artifacts as belonging to the Champagne Family. Of those, two have a broken-off mouth and neck (6000-1604 and 6000-1606, respectively) but are at least 95 percent intact.

Fig. 69 below an image of artifact 6000-1339, representative of the dominant design: 32 of the 34 artifacts in the Champagne Family match this design theme.



Figure 69. Artifact 6000-1339, representative of Champagne Family dominant design theme.



Also, we have included a bottle neck (6000-1507, Fig. 70, left) as belonging to the champagne theme, as the neck corresponds to another artifact in the family (6000-1335, Fig. 71, below) that is clearly a champagne bottle: artifact 6000-1335 features the word “BRUT” stamped into the glass along its shoulder.

**Figure 70.** Artifact 6000-1507, neck of likely champagne bottle, with “M” stamped into the high shoulder.

Fig. 71 below is a composite image of 6000-1335 (the “Brut bottle”) and its stamp.



**Figure 71.** Artifact 6000-1335, “BRUT” champagne bottle, with close-up of seal. Note letters “EN” to right of “BRUT” and flroid design above the lettering.

Because of this BRUT seal, is our judgment that this bottle was purpose-made for containing Brut champagne. This is why we have categorized it here rather than in the Anomalies grouping.



In tooling, mouth and lips, the bottle neck (6000-1507, fig. 66) seems to directly correspond to that of the Brut bottle. The bottle neck also features the letter “M” stamped into its lower neck.

The BRUT bottle is the clear exception to the design theme of the other intact bottles in the champagne grouping. It is the tallest bottle in the entire collection at 319mm – but weighs only 514g, making it a very light bottle in terms of mass.

By comparison, the other champagne-style bottles are quite heavy, averaging 834g (almost 40 percent heavier than the BRUT bottle) and a little shorter, averaging 280mm in height. The BRUT bottle features a base diameter of 98mm, while the average base diameter for the rest of the champagne family is 94mm.

We interpret the difference in mass as an indication that the Brut bottle is non-British, i.e. that it is Continental in origin. Generally speaking, Continental bottles were known to have thinner walls and thus more delicate construction than British bottles from this period. We believe this to be a reason why Continental bottles are much rarer in the archaeological record than the sturdy, heavy British-made bottles. Fewer have survived.

A possible exception to this would be Continental bottles from the champagne family. Because of its composition and the secondary fermentation process that takes place once bottled, champagne (and cider) could burst thinly walled bottles. So glassmakers across Europe over the decades consciously made Champagne bottles with more mass – thicker glass – which is certainly characteristic of the other intact champagne bottles in the St. George collection.

Excluding the Brut bottle, the broken neck, and the two bottles with damaged mouths and lips, Table 9 presents three key variables for the remaining 30 champagne bottles.

Key variables for the Champagne Family:

| <b>VARIABLE</b>       | <b>AVERAGE/MEAN</b> | <b>RANGE</b> |
|-----------------------|---------------------|--------------|
| Average height        | 280mm               | 268-290      |
| Average weight        | 834g                | 733-940      |
| Average base diameter | 94mm                | 90-98        |

Table 9. Key variables for 30 champagne bottles.

The most striking feature about the champagne bottles is the number of corks that have survived.

Of the 33 bottles, 20 feature corks still in place; 18 are still completely intact and unbroken, although shrunken. Only two corks have been sheared off, flat with the bottle mouth. Of the 18 intact corks, 12 present embedded remnants of string or twine used for sealing the cork tightly.

At least two more intact corks present the imprints of twine. All full corks weigh between 2-4g and measure roughly 23mm in diameter.

Fig. 72 is an image of four champagne corks with extant twine still embedded. The presence of twine and these corks leads us to speculate with some confidence that these bottles did indeed contain an effervescent beverage – likely either champagne or cider -- when the St. George was lost. The corks and the embedded twine are the key diagnostic that led us to classify these bottles as being of the champagne family.



**Figure 72. Four champagne corks with extant twine embedded.**

Our categorization of these artifacts as “champagne” bottles is also at odds with expert opinion.

Fig. 73, below, from Jones and Smith, is an image of what they identify as two “French-wine” bottles.

The bottle on the right, “...from an early 19<sup>th</sup> century context at Fort George...”<sup>75</sup> looks very much like the majority of the St. George Champagne Family of artifacts. It also corresponds metrically as well, with a height of 281mm and a diameter of 91mm.

They date the bottle at the left as “...[m]id-18<sup>th</sup> century.” (Jones and Smith, 1985, p. 22)

<sup>75</sup> Fort George, on Lake Ontario, Canada, was the British HQ for the Centre Division of the British Army during the War of 1812. Jones and Smith do not provide a firm date for the “French-wine” bottle that corresponds to the St. George champagne design-theme family.



Figure 73. After Jones and Smith, 1985. Jones and Smith identify both artifacts as “French wine” bottles. They date bottle at left as “...[m]id-18th century;” bottle at right as “early 19<sup>th</sup> century.” Bottle on right, at 281mm height and base diameter of 91mm, directly corresponds to the St. George champagne family both metrically and visually. Image not to scale.

Jones and Smith based their designation of both bottles as “French wine” rather than “champagne” on their 1985 analysis on glassware used by the British military in Canada



from ca. 1755-1820. As they say: “We have focused on three wars -- the Seven Years’ War (1756-63), the American Revolution (1776-83), and the War of 1812-14...” because, they say, these were the most active periods of the British military in Canada in the 18<sup>th</sup> and early 19<sup>th</sup> centuries. (Jones and Smith, 1985, p. 22)

This is more than a footnote for our investigation, as Jones and Smith explain the archaeological context behind this designation as “French wine:”

*“French wine bottles ... also of dark green glass, are the most common non-British glassware found in British military contexts of the 1750s and 1760s. They may have been left behind by the French military or obtained from the civilian population, by one means or another. However, when comparing the popularity of French wine, chiefly claret, with the paucity of French wine bottles in later military contexts, it is obvious that French wines were sold here in English bottles. One probable exception is the sparkling champagnes as bottling was an integral part of the production of these wines.”* (italics added, Jones and Smith, 1985, p. 14).

Thus, Jones and Smith appear to have “typed” this design as “French wine” based primarily on very limited, parochial archaeological contexts in Canada. They do not give us the exact number of sites that produced this “type” of bottle, nor do they provide the quantity excavated.

## Origins

From Canada to the Baltic to the North Sea coast of Denmark in 1811 – all this leads us to yet again briefly wonder how the Champagne Family artifacts aboard the *St. George* got there. Without repeating all the possibilities mentioned earlier, our instincts tell us the most likely sources can be narrowed down to the following:

- They were acquired by officers during the *St. George*’s Baltic service – either through outright purchase from private merchants, or even as a gift or barter with Russian merchants.
- They were acquired as part of prize compensation during the earlier years of the *St. George*’s service. We must recall that the *St. George* shared in the 1793 capture of the 20-gun privateer *General Doumuorier* and its Spanish-registered prize the *St. Jago* off Finisterre. At the time, this was considered “...one of the most valuable prizes ever brought to England.” (The Literary Panorama, Obituary of Admiral John Gell, p. 1385, Vol. 1, March 1807).
- They were made in England.

Regarding this last possibility, Jones and others have established that the British did indeed manufacture a prodigious amount of “champagne” bottles during the period. (Jones, 1986, pp. 11-13). This may require an entirely new thesis, however, to either prove or disprove.

However, as Jones states: “There is absolutely no evidence to suggest that the ‘champagne’ bottles were intended exclusively for champagne or that they had the long sloping shoulder and high bell-shaped pushups so characteristic of the 19th-century champagne-type bottles. The French champagnes listed in the 1787 Day Book *probably resembled French forms of the period* and may have been a precursor of the 19th-century champagne shape.” (italics added, Jones, 1986, p. 13).



Figure 74. “French-wine” bottles from Dumbrell. Image not to scale. (Dumbrell, 1983, p. 138)

Dumbrell, perhaps simply regurgitating Jones and Smith, also provides us with a similar “type” of “French wine” bottle.

While he provides no metrics or data, only images, Dumbrell has nonetheless given us another interesting visual comparison in this “French wine” vs. “champagne” labeling dissonance.

Fig. 74 is an image of two artifacts, the bottle at left described by Dumbrell as “French wine, c. 1780...” He adds “Both the Dutch and French used these bottles...” (Dumbrell, 1983, p. 138).<sup>76</sup>

Of the bottle at right, Dumbrell says: “Later, as the nineteenth century progressed, the form developed into a narrower bottle with a band-like string-rim, c. 1890-1900.” (Dumbrell, 1983, p. 138).

Fig. 75 features two artifacts from the St. George assemblage. At left is artifact 6000-1714 from the Champagne Family, very similar to the “French wine” bottle presented by Dumbrell in Fig. 74. At right is artifact 312-7546, which is very similar to the bottle at right in Fig. 74 -- the design that Dumbrell identifies as a later iteration (c. 1890-1900) of the “French wine” bottle.



**Figure 75. St. George artifacts 6000-1714 and 312-7546.**

We have categorized the artifact at right in Fig. 75 in the Continental Family. Its contours and general design theme seem to correspond to several others in that category. Perhaps 312-7546 was a harbinger of the design theme that evolved over the years.

<sup>76</sup> We reserve judgment on any dating provided by Dumbrell.

## CONTINENTAL FAMILY



Figure 76. Two group shots of several artifacts categorized in the Continental Family. (Exceptions are two artifacts noted with red stars in grouping at left – these are categorized in the Champagne Family.)

We created the Continental Family of 17 artifacts based exclusively on their common attributes: 1) elegant, flowing and less-severe lines than those seen, for example, in the Wine, Beer, or Quart families, 2) much thinner glass (and thus heft and weight) than in other families, and 3) far more translucent glass, and usually of a browner hue.

We will cover only the highlights of this family here, not every artifact.

A strong caveat: several of these artifacts could be classified in the Anomalies Family. Pure instinct and preference led to our decision to classify them as Continental.

Because they represent several design themes rather than one or two, there are no key variables that are measurable. However, there appear to be at least two discernible subgroups within the Continental Family.

Fig. 77 is a collage image of Subgroup A, which, obvious to the eye, shares a common design theme.



Figure 77. Subgroup A within the Continental Family.



Compare Subgroup A in Fig. 77 with the bottle at left in Fig. 78 from Van den Bossche, who describes it as one of “[f]ive French utility bottles for containing wine, oils, or other liquids.”

Of this artifact, Van den Bossche says: “Sealed with a monogram surmounted by a Crown and surrounded by the words: ‘CHATEAU MARGAUX.’ The earliest known sealed Margaux wine bottle, c. 1800. Blowpipe pontil scar. Olive green colour. H: 24cm. Cap: 40cl. Wt.: 290gr.” St. George artifact at right, 6000-1387, is 295mm high, base diameter is 76mm, and weight is 427g. (Van den Bossche, 2001, p. 201.)



**Figure 78.** Bottle at left is “Chateau Margaux” bottle, c. 1800, from Van den Bossche. The similar bottle at right, artifact 6000-1387, stands roughly 5.5cm taller and is heavier by roughly 130g. (Image at left not to scale.)

Subgroup B (Fig. 79) in the Continental Family also presents an obvious, common design theme. What is most notable about these four artifacts is the brownish hue to their glass, as well as the translucence of that glass.



**Figure 79. Subgroup B in the Continental Family. Note the brownish hue to their glass, as well as the common design theme.**

Subgroup B has a mean height of 254mm, a mean base diameter of 83.5mm, and a mean weight of 480g. They are notably lighter than what we would expect to see from British green-black glass in other families of the St. George collection.

A total of eight artifacts in the Continental Family present corks. Of those, three present the same lettering stamped into the same type of wax seal. We refer to these three artifacts as the “VAMP bottles.”

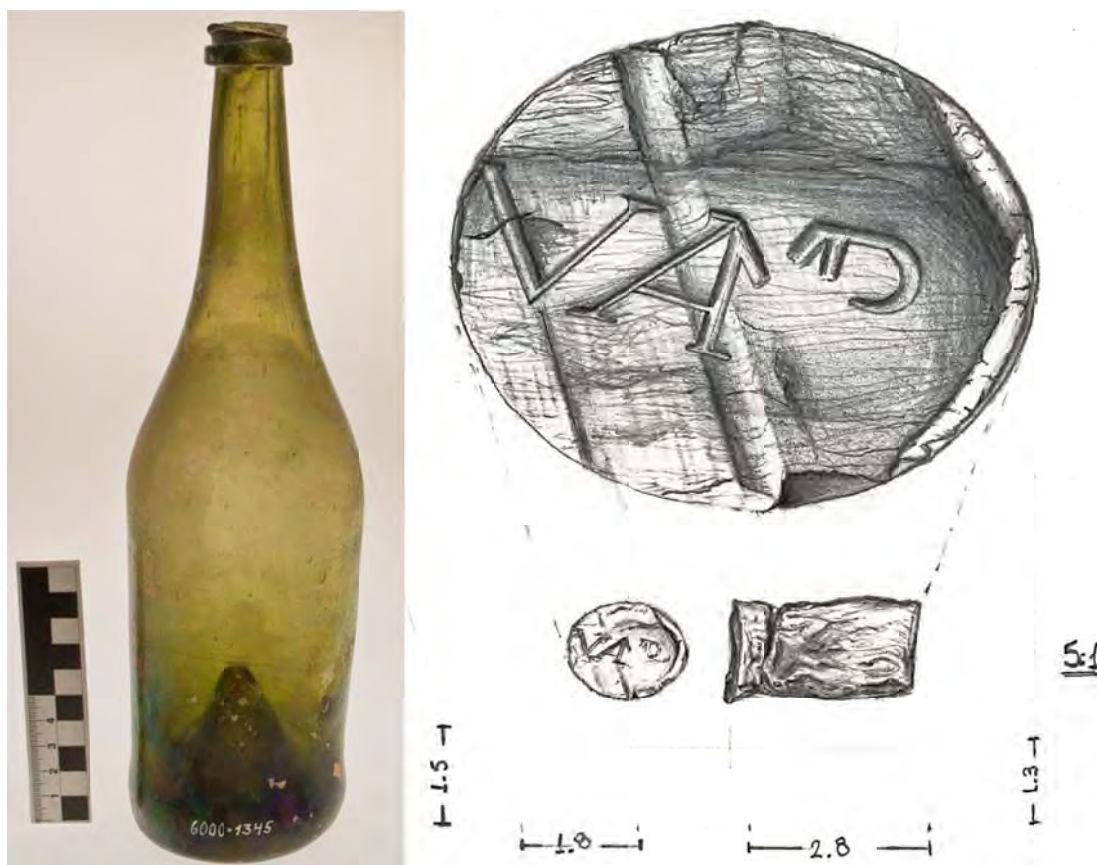


Figure 80. Artifact 6000-1345, from Subgroup A, and artist's rendering of extant cork with “VAMP” lettering. (Photo at left does not include cork.) Sketch by Evangelia Karali.

Fig. 80 is an image of 6000-1345 and an artist's rendering of the cork it presents. Comments from database about this artifact:

6000-1345: “ANOMALY, cf. with 6000-1449AG and 7546-283: LETTERING ON WAX SEAL in pinkish-reddish wax; “VA” are ONLY LETTERS DECIPHERABLE -- could be followed by an MP or MR or MB; very deep and very pointed witch's hat pontil; base is very thick and heavy -- this is a heavier bottle; some DV but glass is clear; lip is lower around mouth than others of this type.”

This bottle and cork correspond to artifact 6000-1449AG, a bottle neck with the same “VA” stamp in a reddish-pink wax, and with artifact 7546-283, an intact bottle that is half-full of a reddish alcoholic liquid that smells of wine.





Fig. 81 is artifact 7546-283. While this artifact presents a very similar cork ("VA" lettering in pinkish wax) to that of artifact 6000-1345 in Fig. 80, the bottles themselves are obviously different design themes. Based on the same wax seal, we interpret this as both bottles originating from the same continental vintner or spirits merchant.

These three artifacts are included in the Continental Family primarily due to the common "VA" letter in pinkish wax on the corks they each host. The lettering, as well as the pinkish hue of the wax, look exceptionally un-British compared to the lettered corks in the Wine Family and the Port Wine family, for example.

**Figure 81.** Image of artifact 7546-283, "VAMP" bottle half-full of reddish-wine liquid.



Fig. 81 is a close-up image of artifact 6000-1449AG, a bottle neck with its "VAMP"-lettered, wax-seal cork. Note the reddish hue to the wax, which is more pinkish in reality.

**Figure 82.** Artifact 6000-1449AG, bottle neck featuring "VAMP" cork in place.

Database comments for artifact 7546-283: "ANOMALY, cf. with 6000-1449AG and 6000-1345; BOTTLE IS HALF-FULL OF REDDISH WINE; CORK FEATURES LETTERS (V? A?) OR EITHER THE RN "GR" SIGN; corks smells of wine; neck is narrow and untapered; upper lips are top-hat design -- upper lip flares outward; pontil may feature four-cornered tool mark; concretions around mouth and upper neck; bottle still tightly sealed."

Database comments for artifact 6000-1449AG: "ANOMALY: bottle neck; "VAMP" stamped into reddish/pinkish wax; cf. with 6000-1345 and 7546-283."

Fig. 83 is of artifact 6000-1139 juxtapositioned with the “mid-18<sup>th</sup> century French wine bottle” as diagnosed by Jones and Smith and presented earlier. (Image from Jones and Smith, 1985, p. 22).

It is provocative to compare this St. George artifact with the bottle at left below, of which Jones and Smith say: “Mid-18th century French wine bottles are characterized by a tapered body and sloping shoulder. The finishes are crudely made, having untooled or roughly tooled string rims and cracked-off, lightly fire-polished lips. Usually about 255 mm tall, the base diameters are about 100 mm. Height: 253 mm.” (Jones and Smith, 1985, p. 22)



**Figure 83.** As designated by Jones and Smith, 1985, “French wine” bottle from “mid-18<sup>th</sup> century at left. At right is artifact 6000-1139 from St. George Continental Family, which we believe reflect a Dutch-Belgian or northern German design theme. Note the differences, which are probably representative of French design preferences vs. those of the Dutch and northern Germany.

While the two bottles may at first look quite similar, they are not (at least to our eyes) upon closer examination. St. George artifact 6000-1139 at right stands 240mm tall, with a base diameter of 97mm – roughly within the range Jones and Smith give for the bottle at left.

However, we would draw attention to the longer, straighter neck of artifact 6000-1139, which is completely untapered. Longer, straight, and inward-sloping necks seem to be a key signature of “Dutch” and “Dutch-Belgian” design themes.

Further, the shoulders of 6000-1339 are far more rounded than the “French wine” bottle and its base is perfectly straight and unflared, i.e. it has no bulge at the base as does the Jones bottle. Finally, the mouth and lips are obviously different.

As our notes about 6000-1139 indicate, it is a brittle bottle: “PROBABLE LOWLANDS BOTTLE, WITH VERY WIDE FEET OR LEGS AT BASE MEASURING 20MM; broken bottle, reconstructed; brown glass?; very, very thin walls.”



**Figure 84.** Artifact 6000-1139 bracketed by two Dutch/Belgian “langhals” bottles from Van den Bossche. Note the similar construction and design theme, although the neck of 6000-1339 is a bit more severely angled inwards as it moves up from the shoulder.

Fig. 84 is of Artifact 6000-1139 bracketed by what Van den Bossche refers to as “long neck utility bottles for the Dutch market.

Of the bottle at left, he says: “Half size. Belgian origin (‘Bouteille de Hollande.’)” He dates it “c.1770.” Van den Bossche describes the bottle at right as: “A full size ‘long neck’ flowerpot bottle” of “Dutch/Belgian” origin. (Van den Bossche, 2001, pp. 126-127, plates 78 and 79.

We tentatively interpret artifact 6000-11139 as of Dutch-Belgian origin as well. We would guess dating to be c. 1760-1790.

Glasshouses and bottlemakers were active all over continental Europe, of course, centuries before the *St. George* ever set sail. Bartels gives us an idea in Fig. 85 of “Production Centers in The Netherlands and Belgium, 18<sup>th</sup>-19<sup>th</sup> centuries.” We have

highlighted the map to indicate those “flessen” or “bottles” production centers. They are circled in red.<sup>77</sup> (Bartels, *Cities in Sherds 1*, p. 266.)

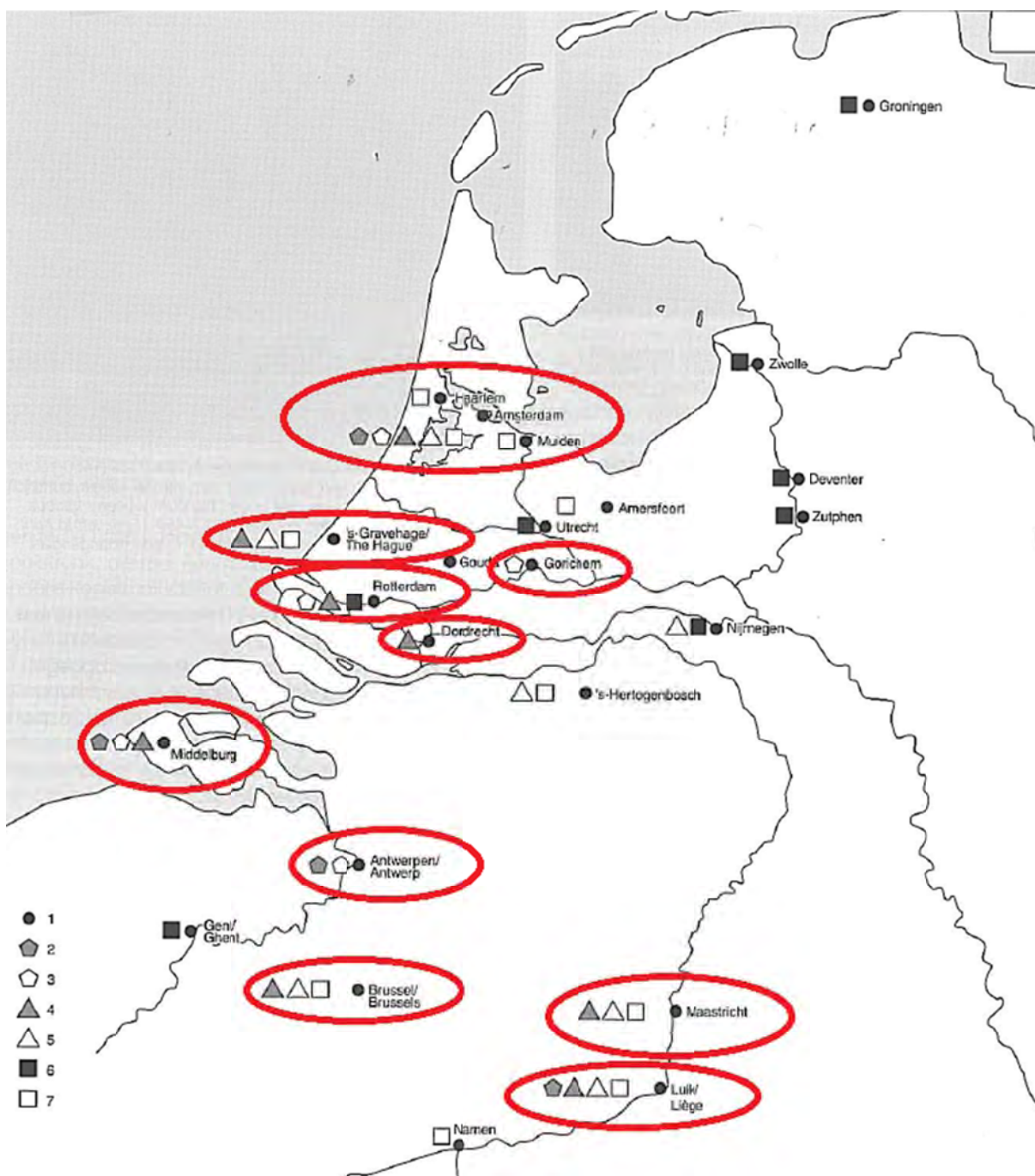


Figure 85. After Bartels. Dutch and Belgian bottle production centers, Netherlands and Belgium, 18<sup>th</sup>-19<sup>th</sup> centuries. (Bartels, *Cities in Sherds 1*, p. 266).

<sup>77</sup> Legend from Bartels includes other glass-production centers such as “windowglass, tableglass, and mirrorglass,” all Bartels’s terms.



## CASE (GIN) FAMILY



**Figure 86. Three of the four case bottle-artifacts with their extant case.**

Perhaps the easiest diagnosis for grouping in the St. George assemblage were the four distinctive “case” bottles, all recovered in their case (Fig. 86). These distinct bottles are square (four-sided) and flare outward from base to mouth. They are characterized by a very short neck and a mouth that generally curls outward. No corks were present in any of these four artifacts.

Commonly known as “gin” bottles because that is apparently what they largely used for, they were designed to be packed and shipped in cases custom-made to hold them.

There are four of these bottles in the Case Family (Fig. 87) – all four apparently found together *in situ*, still packed in their wooden case.



Figure 87. Case Family. Clockwise from upper left, artifacts 7546-280a, 7546-280b, 7546-280c, 7546-280d.

Key variables for the Case Family:

| VARIABLE              | AVERAGE/MEAN | RANGE   |
|-----------------------|--------------|---------|
| Average height        | 241mm        | 230-246 |
| Average weight        | 675g         | 627-724 |
| Average base diameter | 95mm         | 94-98   |

Table 10. Key variables for Case Family.

A general observation about the Case Family: all four feature heavy devitrification that seemed to flake differently than the other devitrified artifacts we handled during diagnosis.<sup>78</sup> Our guess is that the chemical composition of these bottles is significantly different than that of many other St. George bottle-artifacts. Of course, the devitrification could be explained by the formation processes at work on these artifacts prior to salvage. But the *manner* in which these case bottles flaked – smaller, much thinner flakes than those produced by other heavily devitrified bottles – is what we find curious and different.

The Case Family could easily have been included in the Continental Family: there are several indications that these could be of Dutch origin. The Dutch were known for this type of case or gin bottle. In fact, they came in a variety of sizes and capacities but always conforming to the same design theme. (Van den Bossche, 2001, pp. 131-137).

Fig. 88 features a Dutch case bottle from Van den Bossche contrasted with a St. George case bottle. Although a bit lighter, the bottle at left corresponds generally with the metrics of the St. George Case Family: it is 235mm high and weighs 450g. Van den Bossche dates it to “c. 1780-1830” and says it was produced in Chaleroi, Belgium. (Van den Bossche, 2001, p. 132).



**Figure 88.** Dutch-Belgian case bottle from Van den Bossche (left) contrasted with a St. George case bottle. Note the dip or “moat” around the base of the neck in the St. George bottle. Image at left not to scale.

Of this design theme, often referred to as a “case-gin” style, Van den Bossche says: “From 1770 these bottles were blown the world over, although mainly in Holland and Belgium.” (Van den Bossche, 2001, p. 131).

<sup>78</sup> Given the heavy state of many of the St. George bottles, some descaling was unavoidable during recording and analysis.

And they were produced in many different capacities, as shown in Fig. 89.



Figure 89. After Van den Bossche. Various sizes and capacities of Dutch-Belgian case and/or case-gin bottles of different periods. The tallest bottle, second from left, stands 54cm tall and weighs more than four kilos. (Image not to scale.)

From left, in Fig. 89 (Van den Bossche, 2001, p. 131):

- Bottle 1): straight-sided body, c. 1720-1750. Height: 255mm. Capacity: 1.93 liters. Weight: 860g.
- 2) c. 1770-1800. Height: 540mm. Capacity: 11 liters. Weight: 4005g.
- 3) c. 1750-1770. Height: 370mm. Capacity: 5.46 liters. Weight: 2350g.
- 4) c. 1770-1800. Height: 360mm. Capacity: 4 liters. Weight: 1440g.
- 5) c. 1880. Height: 145mm. Capacity: 19cl. Weight 260g.

For comparative purposes, we repeat here the key variables for the St. George case bottles:

| VARIABLE              | AVERAGE/MEAN | RANGE   |
|-----------------------|--------------|---------|
| Average height        | 241mm        | 230-246 |
| Average weight        | 675g         | 627-724 |
| Average base diameter | 95mm         | 94-98   |

Also for comparative purposes, we include Fig. 90, images from Van den Bossche of two cases for, in his words, "...storing or exporting case-gin bottles all over the world."





**Figure 90. Two Dutch-Belgian case-gin cases from Van den Bossche.**

Van den Bossche describes the case at left in Fig. 90 as a “...Dutch or Belgian original ‘case’ or ‘cellar’ (in Dutch ‘kelder’)...” It contains twelve ‘case’ bottles. Interestingly, he refers to the case at right as a “...liqueur cellar for storing six case-gin bottles. In this case the gin bottles were used for liqueurs such as cognac, brandy, etc. Late 18<sup>th</sup> century.” (Van den Bossche, 2001, pp. 136-37, plates 89 and 90).



For comparison with the Van den Bossche cases, the St. George case for case-gin bottles is shown again in Fig. 91.

**Figure 91. St. George case for case-gin bottles.**

## ANOMALIES



**Figure 92.** Artifact 6000-1418, likely the oldest artifact in the St. George assemblage.

We created the Anomalies Family for unusual or one-of-a-kind artifacts, even though they may be more at home in another family. Obviously, there are no metrics shared between artifacts in this family.

We categorize nine bottles as “anomalies,” meaning that they seem unusual in their own right and deserve a special look. As before, most (if not all) of these artifacts could easily have been categorized in other families, such as in the Continental Family.

Artifact 6000-1418 in Fig. 92 is probably the oldest bottle in the St. George assemblage. Known as an “onion” bottle, it is probably Dutch or northern German in design and probably dates to c. 1760-1785, in our estimation. Notes from database: “ANOMALY: old-style onion (port?) bottle; heavy DV; top lip flares outwards and upwards; bottle is cracked and has been repaired just next to item number; neck is perfectly straight, with no tapering.”

We believe artifact 6000-1418 to likely be the oldest bottle in the St. George assemblage, based on the datings of experts for this design theme. We estimate it to date roughly to c. 1760 – 1785.



**Figure 93. After Hume. "Dutch wine bottles found in Guyana, South America."**

Fig. 93 above, after Hume, is an image of "...Dutch wine and gin bottles found in Guyana, South America." Bottle at far left corresponds somewhat with artifact 6000-1418 – but not precisely. Hume dates this bottle "tentatively" to 1730. (Hume, 1974, p. 194).

A much closer correspondence with St. George artifact 6000-1418 can be seen in Fig. 94 below. The bottle at left is a "...typical Belgian bottle shape." (Van den Bossche, 2001, p. 119).

Of the "horsehoof bottle" at left, Van den Bossche gives a dating of "...c. 1720-1750." Of this design theme and metrics he says: "Yellowish olive green colour, mainly produced in Belgium or in North Germany (Mecklenburg) for the Dutch market. H: 21.5cm. Cap: 85cl. Wt.: 855gr." (Van den Bossche, 2001, p. 119).





Figure 94. “Horsehoof” bottle at left, from Van den Bossche, compared with St. George artifact 6000-1418. The St. George artifact is less than 2cm shorter and weighs roughly 200g less.

Based on this strong correspondence, we are comfortable identifying artifact 6000-1418 as a “horsehoof” bottle as well. We stand by our dating, however.

### Half-pint?



Artifact 6000-1300 in Fig. 95 is a small bottle – perhaps a half-pint. Notes from the database: “ANOMALY: size -- pint? Half-pint? Half-flask?; pontil has the four-cornered tool mark; medium DV; base is deformed.”

Figure 95. Artifact 6000-1300, perhaps a half-pint.

## Fruit containers?



Artifact 6000-1334 in Fig. 96 seems to be not a beverage bottle but perhaps a fruit container. Note its very wide mouth of 31mm – the second widest of any in the St. George assemblage.

Notes from database: “ANOMALY: huge mouth, possibly moulded, neck is straight -- see indentations horizontal on shoulder; possible fruit jar?; shoulders are deformed; heavy DV; pontil nose is nipped.”

**Figure 96.** Artifact 6000-1334. Possible fruit container.



Similarly, we believe artifact 6000-5049 (left, Fig. 97) to be a fruit container rather than a beverage bottle.<sup>79</sup>

A shorter, stouter bottle, it features a very large mouth and neck. It presents the largest mouth diameter in the assemblage at 34mm.

It is quite heavy for its smallish size, indicating mass and sturdy construction. It is 231mm high, with a base diameter, and a weight of 558g.

Comments from database: "6000-5049: ANOMALY: huge mouth, very short straight neck; short, squat bottle; possible fruit jar? Cherries? No signs of moulding; pontil nose is blunted"

**Figure 97. Artifact 6000-5049, possible fruit jar.**

<sup>79</sup> There are several other probably glass fruit containers in the inventory of the Strandingmuseum. These apparently were diagnosed at some point and included with the beverage bottles on display.

### “WH 1805”



Artifact 6000-1422 in Fig. 98 (left) is a bottle neck that features a seal impressed into glass on the lip. Our interpretation of the lettering: “WH” in large type with “1805” imprinted underneath. (There appears to be another letter between the “W” and the “H” but we cannot decipher it.)

Note the outward taper of the neck near the mouth and the mouth itself; this could very well be a neck from a champagne-style bottle. It should be compared with artifact 6000-1335 (the “BRUT” bottle) and with artifact 6000-1507, another bottle neck that features lettering impressed into glass (the “M” seal neck that we have categorized into the Champagne Family.).

Notes for artifact 6000-1422, left: “SHERD with “WH 1805” SEAL; COMPARE MOUTH WITH 6000-1355/BRUT AND 6000-1507, COULD ALSO BE CHAMPAGNE NECK.”

Figure 98. Artifact 6000-1422.

### “Claret”

One bottle neck features a cork with a wax seal presenting the letters “CLARE.” We interpret this cork as identifying “claret” wine, which was evidently a staple among the British military for decades prior to the St. George’s demise.

Claret wine was quite likely contained at some point in artifact 6000-1449y, a bottle-neck that features a black-wax stamp on the cork reading “CLARE” in the remaining wax.<sup>80</sup> The top-down view of 6000-1449y is shown in Fig. 99. The wax where the “T” in “claret” would be is missing.

<sup>80</sup> Image was taken with 6000-1449y resting on top of another artifact. Artifact 6000-1449y is circled in red in the image.



Of claret among the British Army in Canada during the period, Jones and Smith observe:

*“Claret is a generic term for clear red wines, generally from the Bordeaux region of France. In spite of its probable origins, claret was readily available during wartime in North America and even in England ... Claret was less popular than port, but there was a continuous market for it throughout the period. Its purchase appears to have been a matter of personal taste and choice.”* (Jones and Smith, 1985, p. 9)

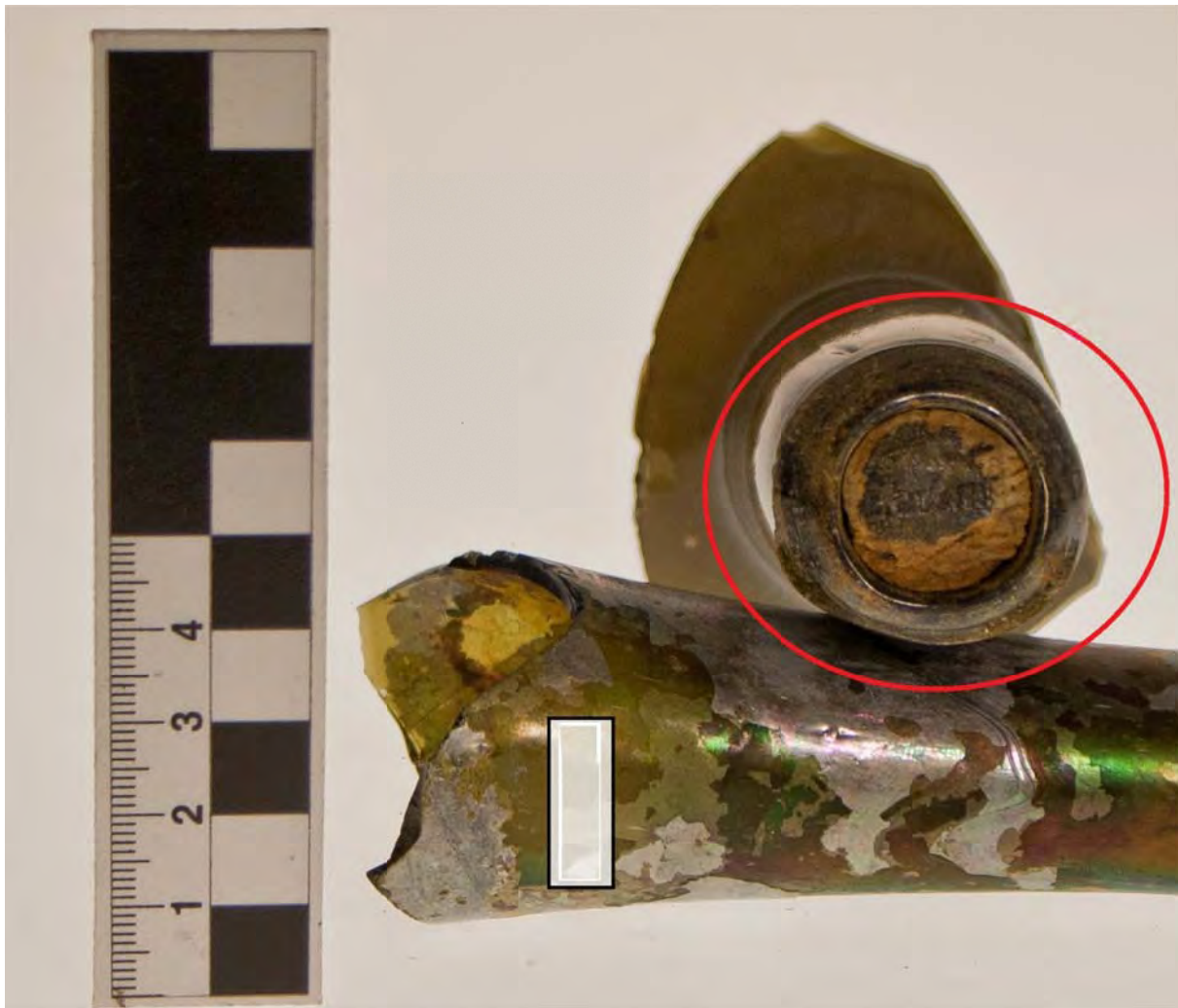


Figure 99. Artifact 6000-1449y (circled in red), with “CLARE” visible in black-wax seal on cork.

Database comments about artifact 6000-1449y: ““CLARE” stamped into remnants of wax; diagnosed as CLARET wine bottle BUT COMPARE MOUTHS WITH OTHER CONTINENTAL CHAMPAGNE BOTTLES.”

### The “GR” Broad-Arrow: Lime-Juice Containers?

Artifact 6000-1795c, a sherd shown in Fig. 100, introduces us to the famous “GR” (“Georgius Rex”) and broad-arrow (“devil’s claw”) symbol of the Royal Navy.



**Figure 100.** Artifact 6000-1795c with “GR” and Royal Navy broad-arrow symbol stamped into glass.

The artifact directly corresponds with two completely intact St. George bottles, both much larger (capacity- and potential volume-wise) than any other St. George bottle: artifact 6000-3203 shown in Fig. 101 and a virtual “carbon-copy” bottle-artifact in the St. George assemblage that was not available for recording (artifact \_\_\_\_).

While we hesitate at estimating the capacity of any of the St. George artifacts, our best guess for 6000-3203 (and its mate on display) is a Queen Anne gallon – that is, 5/6ths of today’s imperial gallon.

Artifact 6000-3203 is the heaviest bottle in the St. George collection, weighing in at more than one kilo -- 1.139 grams.<sup>81</sup>

<sup>81</sup> Two other artifacts (7546-798c and 7546-283) are heavier but both are roughly half-full of liquid. See database.



Figure 101. Artifact 6000-3203 with its “GR” broad-arrow seal.

Most interestingly, an enthusiasts/collectors’ website presents some evidence that this design theme was actually a “lime juice” container. Fig. 102 is an image from this website.

The metrics presented for this bottle correspond directly to artifact 6000-3202: it stands 260mm high, with a base diameter of 113mm – compared with a height of 254mm and a base diameter of 111mm for 6000-3202.

Fig. 102 is an image of 6000-3203 (right) compared with a purported “lime-juice” bottle supposedly discovered in Bermuda, date unknown (item number #601016). (Addams, 2012, Black Glass and Seal Bottles of the British Military website) <http://www.coffinland.ca/blackglass.htm>). Note the horizontal lines across both bottles, perhaps a sign of the use of a mould of some type.

The mouths and lips on these bottles are not the same, nor are the seals. Otherwise they are very similar.



**Figure 102.** St. George artifact 6000-3202 (right) as contrasted with a similar bottle with a different seal (“VR”) from Addams’s website.

The seals from both bottles are shown in Fig. 103.





**Figure 103.** Seal of VR Bermuda bottle (top) compared with St. George “GR” bottle seal. From Addams’s website.

The “VR” seal in Fig. 103 (top) almost certainly refers to “Victoria Rex” – Queen Victoria (reign of 1837-1901). The “GR” refers to “Georgius Rex” – King George, III (reign of 1760 – 1820). (Addams, 2012, [http://coffinland.ca/black\\_glass\\_seals/601016alg.jpg](http://coffinland.ca/black_glass_seals/601016alg.jpg))

The St. George “GR” seal appears in at least another archaeological context, one in Antigua – English Harbour. Fig. 104 is an image of this seal on a sherd. The curator of the Museum at Nelson’s Dockyard at English Harbour has been noted Some seals had the letters “G.R.” on them, others an anchor, still others had both the letters “G.R.” and the anchor. (Addams, 2012, website)<sup>82</sup>

Desmond Nicholson, curator of the museum at Nelson's Dockyard explains. "The letters 'G.R.' stand for 'Georgius Rex', or King George, III of England, (1760 - 1820), and the anchor denotes government property. During its time the anchor was known by the working class as the 'devil's claw', this anchor would convict a person found with any item thus marked in his personal possession." (Addams, 2012, website)



**Figure 104. “GR” seal on undated sherd from English Harbour, Antigua.**

<sup>82</sup> Reference for the Bermuda VR seal is <http://www.coffinland.ca/blackglass.htm>, item number #601016. References for the “GR” seal from Antigua are <http://glswrk-auction.com/WebPics-MORE/106.06.jpg>, and <http://glswrk-auction.com/106.htm>.

## 6000-1441



Artifact 6000-1441 (Fig. 105) is an odd bottle, in that it is very brittle and has been reconstructed. While it seems to conform to the general design theme of the British-glass bottles, especially the Wine Family, it weighs only 526g – noticeably lighter than the Wine Family mean weight of 697g.

Further, the bottle features a stamp on the shoulder with the letters “KP” and “3” distinguishable.

Comments in database about artifact 6000-1441: Comments from database about 6000-1441: “ANOMALY: SEAL/STAMPED BOTTLE WITH LETTERING “KP” AND “3” WITH POSSIBLE / AFTER THE 3, AS IN “3 OF 12”; SEAL IS NOT FANCY BUT LOOKS VERY RUDIMENTARY; BOTTLE IS EXTREMELY FRAGILE, BROKEN AND RECONSTRUCTED; HEAVY DV MAKES COLOR INDISTINGUISHABLE.”

**Figure 105.** Artifact 6000-1441. With “KP” seal on shoulder.

### Summary

Once again, we have only just skimmed the treetops in providing this very brief introduction to the data from the St. George assemblage. It is our intention that the data will be used for comparative purposes by other investigators to draw their own conclusions. Suffice it to say that, as we have previewed, the St. George assemblage is very rich and diverse, unlike any other collection of comparable material culture. This is reflected in the database.



## VI. CONCLUSIONS

To draw any conclusions, we must review the original questions of this thesis.

The central question addressed here, *“Is the St. George collection representative of what we would typically expect to find from comparable wreck sites?”* has been clearly and directly answered. We have compared the St. George assemblage with comparable material culture from relevant submerged archaeological sites, as well as with the literature. Our answer of “no” to this question is not just confident – it is emphatic.

The St. George assemblage is, without question, unique in its scope, scale, variety, diversity, and preservation of detail – detail such as several individual corks with lettered wax seals. That this assemblage is extraordinary has been convincingly demonstrated.

We have further argued that there are two primary reasons it is so extraordinary: 1) when she was lost, the St. George was flagship to a Royal Navy Rear Admiral, the ninth admiral’s flag she carried during her service life, and 2) the preservative qualities of the collection’s marine environment on the North Sea coast of Denmark during the wrecking process. When she was lost, she carried a wine and spirits “cellar” worthy of her service record and of the flag of her last Admiral: just as the St. George was a flagship, her glass beverage-bottle assemblage is the flagship of such archaeological assemblages.

*“Upon examination, does a clear typology emerge from the collection?”* This important secondary question has also been addressed, if not directly answered. We have categorized the assemblage into loose categories rather than “types” because, no, we do not see a “clear typology” emerging from the collection – at least not according to traditional definitions of a “typology” within archaeology. We have identified general design themes, not “types.”

*“How did such a large amount of unbroken glass bottles survive what was, by all contemporary accounts, as extremely violent wrecking event?”* Using survivor accounts, as well as the archaeological evidence, we have explained that the wrecking of the St. George was not an “event” but rather a process over roughly a 24-hour period on 24-25 December 1811.

We have argued that the wrecking process for the assemblage stored on the aft part of the orlop deck was most likely not that violent – certainly not as violent as that topside.

*“Are the bottles mostly common or largely exceptional?”* “Both ... and neither,” as we have demonstrated with the data from the collection. We have presented data showing that, at minimum, roughly 56 percent of the St. George assemblage (the Wine Family) can be considered “common” or every-day, utilitarian bottles. This percentage would be higher if we included the Beer, Quart, and Case families.

Conversely, we have also presented data illustrating that almost 30 percent of the St. George collection could be considered “exceptional:” the Continental, Champagne, and Port families, and the Anomalies.

Again, the data strongly argue that the St. George assemblage is a mixture of the common and the extraordinary.

*“Are any bottles likely to have been personal items rather than communal stores? What depositional evidence supports this, if any?”* Neither the data or our investigation have reliably answered the first question. Moreover, we found no hard, depositional evidence to support either contention, i.e. personal vs. communal stores. We have theorized that the bottles were likely stored in an officers’ locker, and that many were indeed the personal property of officers.

*“What explains the wildly different states of preservation among the bottles?”* We do not have an empirical answer to this. We have speculated, on the *terra firma* of sound reason, however, that the marine environment of the St. George assemblage *in situ*, and the formation processes at work until salvage, is the explanation.

*“What do we know of the in situ disposition of the bottles when first salvaged?”* Because of the language barrier, we were unable to answer this question. From the site excavation drawings, however, we know next to nothing.

*“Is there a manifest correlation between the bottles in the collection and the route and ports-o-call of the HMS St. George?”* No. There is no such “manifest correlation” that we have been able to identify. We have quite liberally, however, again speculated that at

least a portion of the assemblage came aboard the St. George during the years of its Baltic service. We have made our case for this scenario.

*“Where were the bottles stowed aboardship? How were they packed and stored?”* We do not have concrete, archaeological data to answer the first question – at least not data in English. There is reason to believe that many, but not necessarily all, bottles were discovered in an officer’s store-locker in the aft part of the orlop deck. The archaeology does not speak to how any of these artifacts were packed or stored *in situ*.

*“Is there archaeological or historical evidence that the bottles were the exclusive province of the officers and “off limits” in any way from the crew?”* There is no archaeological or historical evidence to support the contention that these bottles were the exclusive province of the St. George officers. However, there is at the same time a plethora of historical documentation that wine and spirits were always strictly controlled, and often “off limits” to crew, aboard a Royal Navy warship of this period.

Again, we believe many bottles were indeed the personal property of officers.

*“What can data from comparable sites, excavations, etc. tell us about the St. George assemblage, if anything?”* Data from other collections tell us unequivocally that there are no comparable sites or collections yet known that are as rich and diverse as the St. George assemblage.

*“What textual evidence exists from the known route of the HMS St. George during its last voyage (i.e. from the time it left Portsmouth until 24 December 1811?)”* This has not been answered, as it requires far more investigation into historical archives.

*“What glass beverage flasks were standard-issue provisions aboard a second-rate ship of the line?”* We believe that our review of the victualing system of the Royal Navy for its Baltic Fleet confirms that at least the Wine, Beer, Quart families could be considered “standard-issue” bottles aboard the St. George. The Port and Case families could also possibly be included in this designation.

*Is there any evidence (manifests, survivor accounts, journals, communications, etc.) that the HMS St. George took on stores of glass beverage bottles during its ports-o-call on that final voyage?* We are confident that such evidence exists in Royal Navy archives

(especially paperwork from the Victualing Board) but this was beyond the abilities of our investigation.

Other than these initial questions, we can also confidently conclude the following from our investigation:

Unless and until the relevant files are translated from Danish into English, the archaeology behind the St. George assemblage – indeed, all the ship's recovered material culture – will remain a mystery to the broader, world archaeological community, especially to future investigators. The archaeology of the HMS St. George remains vastly under-published.

The archaeology of 18<sup>th</sup>-19<sup>th</sup> century glass beverage bottles is not what it should or could be in the 21<sup>st</sup> century. It is dominated by provincial, parochial perspectives that are decades old. We often learned more about many bottles in the St. George collection from hobbyists, enthusiasts, and collectors than we did from archaeologists.

Formation processes and the natural marine environment are the critical factors as to if and how glass material culture survives.

We solicit, covet and welcome other conclusions – and scrutiny of our own, of course.

**# # #**

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## **VIII. APPENDICES**

**(see attached DVD)**

**Artifact Photos**

**Artifact Database (MSFT Access)**

**PDF of thesis**

**Miscellaneous Photos**