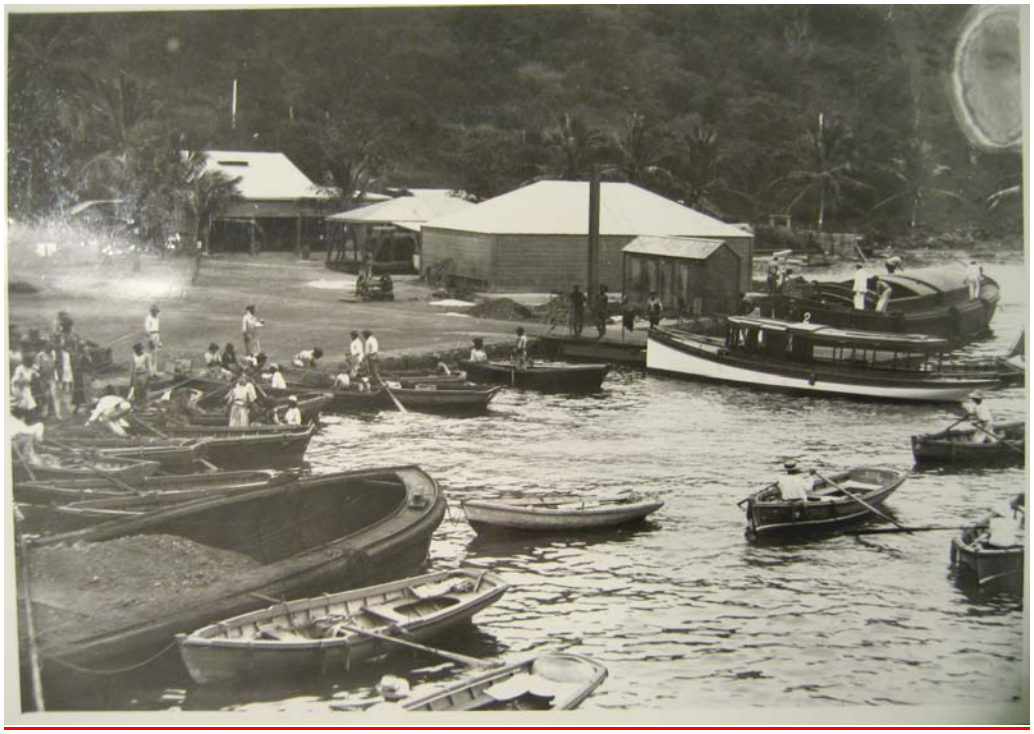
Research of the Barge Wreck in Careening Cove and it's role in 19th Century Charlotte Amalie Harbor Logistics

(eller Arkæologisk tema I - 1/4 årsværk (FHA 301).

Research objective:

This research paper outlines the archaeological documentation of this barge wreckage in Careening Cove, Hassel Island, USVI. The main focus of this paper explores which company the barge belonged to and its historic uses.



KD DWI 3606

By

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Introduction and Research Goals

Background

This study is the result of a five-month joint venture between the National Park Service (NPS) and Copenhagen University in Denmark. Copenhagen University provides proficient Danish students with an intern ship that involves research within various (primarily) Danish archives, libraries and museums in matters relating to the United States Virgin Islands (USVI), formerly the Danish West Indies. In addition to the archival work, Danish interns also carry out archaeological field work in Virgin Islands National Park (VIIS) for one month with an NPS archaeology team.

Research Objective

Initially, VIIS archaeologist, Ken Wild, professors at Copenhagen University and the student interns decided upon research objectives for the program. In the case of this research paper, Wild, Assistant Professor Niklas Thode (History), Professor, Klavs Randsborg (World Archaeology) and I decided on five possible research ideas within the theme of a maritime history, a topic I could approach with knowledge gained as a naval officer. After searching the archives, the research objective decided upon related to one particular archaeological object, as it offered the most research potential**:**

To carry out archaeological documentation of the barge lying as wreckage in Careening Cove, within the park's Hassel Island unit, in order to ascertain the provenance and historic uses of the vessel.

It was realized during the research process that two categories of archives that could have shed more light on the subject were outside of my immediate reach: the National Archive in Washington, D.C. and the archives of shipping lines which operated in the USVI, including, the Hamburg-Amerikanische-Packetfahrt-Actien-Gesellschaft, (or, Hamburg America Line (HAL)) archive in Hamburg, Germany and the Royal Mail Steam Packet Company (RMSPC) from the United Kingdom.

The photos can be viewed in greatest detail in Appendix 1, since the photographs shown in the text portion of this study have been scaled to fit.

Terminology

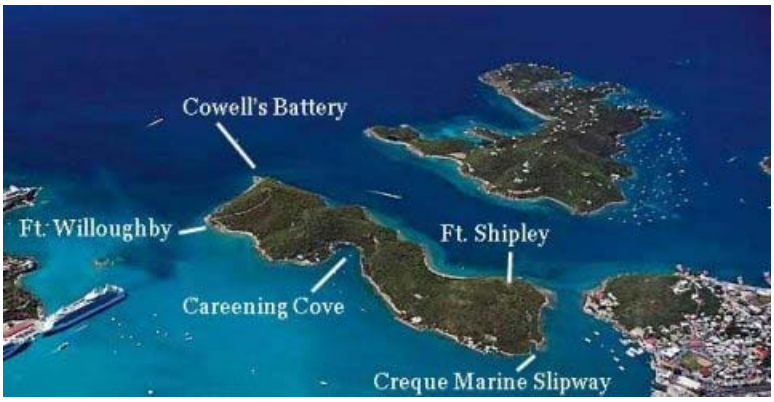
Below are a few brief descriptions of some of the nautical terminology used throughout this report which may assist readers in understanding this study.

- Knees: are pieces of steel or iron shaped for supporting structures coming together at an angle, as in the deck beams and frames of a ship.
- Frames: are pieces of steel or iron used for making the skeleton of a ship.
- Futtocks: one of the curved timbers/irons scarfed together to form part of the compound rib of a ship.

- Rivets: is headed pins or bolts of metal used for uniting two or more pieces by passing the shank through a hole in each piece and then beating or pressing down the plain end so as to make a second head[1]
- Angel iron: a piece of structural steel rolled into a L-shaped section[2].
- Plate: forged, rolled, or cast metal in sheets usually thicker than 1/4 inch (6 millimetres).

Description of the Wreck Site in Careening Cove

Visible wreckage, known as the HAL coal barge, has been lying in Hassel Island's Careening Cove, within inside St. Thomas' harbor for many years. The National Park Service has recognized its undoubted historical value in connection with Hassel Island's extensive use during the nineteenth and twentieth centuries as a location for several coal depots, shipyards, stables and steam-operated marine slips. In 2007, NPS began preservation efforts on the island: clearing and restoring the Creque Marine Slipway, Shipley Battery, and the HAL coal depot and shipyard.[3]



Hassel Island seen from the Northeast (Picture adapted from Hasselisland.org).

The archaeological survey of the wreck in Careening Cove was carried out in May of 2007. Surveying the site was a challenge because the lower part of the hull is lying in the surf zone and this section of the hull is filled with gravel and sand, that could not be removed in the time allocated. Furthermore, there are resource protected mangrove trees growing through and around the site. Sections of the hull had rusted, twisted and eroded away, making exact measurements impossible at times because some parts had bulged due to rust while other parts were completely corroded away. However, as a result of this project the wreck is now surveyed and documented in case, as most likely, it collapses completely into wreckage.

The barge is made of iron that is riveted together, but finding literature and archival material relating to this type of vessel has been a challenge. This is not uncommon since

1 From Merriam-Websters 11th Collegiate Dictionary.
2 From Merriam-Websters 11th Collegiate Dictionary.
3 http://hasselisland.org/

information pertaining to utilitarian objects is lacking in archaeological and historical literature. This offered both advantages and disadvantages. While the wreckage site itself was relatively small and the construction technique of the barge was fairly simplistic, the lack of research on this type of vessel underlines the biases of maritime archaeological toward what one prominent maritime archaeologist, Carl Olof Cederlund ,calls “the prestigious ships/site.” Cederlund notes a disciplinary focus on ships possessing a nation-defining function, citing examples such as Sweden’s Regal ships *Kronan* and *Wasa*, and the Viking ships from Gokstad, and from Oseberg and Skuldelev in Norway and Denmark, respectively.[4] Ships in the United Kingdom, such as the *HMS Victory*, *Cutty Sark*, and *Mary Rose*, and the *USS Constitution* in Boston, Massachusetts,[5] serve the same purpose. Unfortunately, the basic, everyday type of ships such as small sloops, dirty merchant steamers, and barges are not often the subject of museum exhibitions or of scholarly papers.

Archeological Survey Results

Hull and plates

The wreck of the double-edged barge in Careening Cove is one of these neglected vessels. Its hull presently rests slightly on its side tilting toward the east. The barge’s eastern side has collapsed, possibly due to the stranding, beaching, storm damage and rust that has weakened this side. It was not possible to determine the exact cause with certainty due to the time limitations during this initial survey effort. It was observed that a visible break of the eastern side slightly south of the midship balk was causing the hull to twist at least where the midship balk joins the western side of the barge[6]. In the northern end, the same is also noticeable, as the main stem/stern iron has broken about two meters from the top end[7]. It is also possible that the greater part of the lower hull, which is buried in sand and gravel and is half way below the water line, is gone. An excavation might be worth undertaking to determine the integrity of the lower part of the hull.

4 Cederlund 1997.

5 http://www.maryrose.org/, http://www.ussconstitution.navy.mil/ and http://www.hms-victory.com/

6 See Double ended Coal Barge: pictures 051 & 060.

7 See Double ended Coal Barge: pictures 036.-039.

The Double-ended Barge seen from the East in May 2008.
Picture: Double ended Barge 020e.

Almost immediately apparent when examining the wreck is its simple or straight forward construction, featuring largely one type of iron/steel plating, one type of angle iron and constructed almost exclusively with rivets. The iron/steel plating is about 10mm thick, although an exact measurement is impeded by rust and corrosion prevalent on all parts of the barge.

The construction of the barge must have begun with the laying of the keel, followed by the raising of the frames and the attachment of the side plating to the frames. This was all attached by rivets and is the logical sequence when constructing an iron/steel vessel[8], as opposed to a wooden vessel where it usually is constructed keel first, then sides and frames using the clamp building technique.


Vor dem Hintergrund des projektierten Ausbaus der Mosel zur Großschifffahrtsstraße entschloss sich Hans

Abb. 11: Die Schiffbauerei Erang in Barbelen.

[8] Das Logbuch heft 4 -2008 p. 181.

Picture: from Das Logbuch.

On this barge, the riveting of the side plating must have been followed by the attachment of the knees and the supporting futtocks, as the knees are sandwiched between the frames and the supporting futtocks. After the knees and the supporting futtocks were attached, the shipwrights probably laid down the side walkway plating and finally the stringers running from stern to stern along the uppermost part of the side plating (as can be deduced from the pictures in the Photos appendix: Double-ended Barge[9]).

An interesting detail that also indicates the construction date of the barge is the use of the alternate clinker and reverse clinker that join the side plating together[10]. This type of construction was especially common between 1850 and 1940, when the majority of iron and steel ships were built using this technique. After 1940, welding started to come in to general use and from then on, the side plating was more commonly joined edge to edge with a weld.

Rivets, nuts and bolts

The general impression when examining this barge is that it has been built almost exclusively with rivets. However, it also features construction with nuts and bolts; the nuts being both with four and six sides (see pictures: Double-ended Barge 067e & 069e).

Picture: The Double-ended Barge 067e. (4 sided nut).

9 Photo Appendix: Double-ended Barge.

10 Dansk Søfartshistorie 4.-6.

Picture: The Double-ended Barge 069e. (6 sided nut and rivet heads).

The nuts and bolts are primarily found in the upper part of the barge and it appears that they have been used primarily for attaching the fender wood on the outside part of the hull. It is unique that these nuts and bolts are not used entirely for attaching the fender wood. Ordinary rivets have also been used to attach wood. Rivets are used on some sections of the fender wood, generally amidships, while other sections have had the fender wood secured with nuts and bolts mainly toward the ends. The exact cause of these differences are unknown, but when compared with the bolted manhole on the north-western lower part of the barge, it is possible that there were repairs,[11] as it is generally the bow and the stern parts of a ship that often withstand unavoidable "blows" when docking. This would imply a greater need for repairs in these sections of a ship's fender wood.

Unfortunately, it was difficult to find literature relating to the mass production and usage of steel bolts and nuts in shipbuilding, but the general use of the screw threaded nut and bolt combination dates to pre-seventeenth century.[12] Since the introduction date of these materials proves to be inconclusive as a dating/identification tool, the repair theory is the most likely explanation, as it seems illogical to utilize only one technique on the main parts of the barge and the midship section of the fender list, while using a different technique on the ends of the ship during its construction.

The Midship balk

The position of the midship balk is exactly mid-way between the southern and northern ends of the barge, at frames numbers 14 and 15, counting from the southern end.
The construction technique used in the making of the midship balk is similar to the construction technique used in the barge itself and is made up of iron/steel plating and angle-iron that are riveted together. The midship balk must have been installed at the same time as when the knees were inserted into the hull because the angle-irons running from the western to the eastern ends are below the walkway with two angle-iron stringers running from end to end. It is possible that the midship balk and its supporting "futtock"

[11] From my own experience as a Captain of ships and as Navigator in the Navy.

[12] From personal experience/find within a closed context of a needle and thread container with a screwed on lid on the Kronan project, a 17th century shipwreck in the Baltic.

(running at the lower parts of the midship balk) were constructed after putting in the walkway and the stringers, but this would have been rather illogical as the effort to obtain an appropriate fit would have been many times greater.[13] But a curious detail about the midship balk is the horizontal walkway plating on top of the balk, which has a pattern on its upward facing side, but not on its downward facing side. Furthermore, it appears that this patterned plate has been welded on to the two angle-irons supporting it. This is evident by a distinct welding type of scatter on the downward side attachment to the angle-irons running from beam to beam[14] (see Double-ended Barge, picture 066) that implies a repair in the replacement of the original plate[15], as this is a joining, which hasn't the slightest need for water-tightness and a type of joining not seen anywhere else on the Barge. If this analysis is correct, it implies that the barge was used till at least the 1940s, when welding started to become more commonplace[16].

Frames, reinforcing futtocks and angle-iron in general

An interesting detail about the barge is the consistent use of one standard sized angle-iron type for all of the frames, futtocks, stringers, and odd reinforcing beams. The angle-iron used throughout construction is 5 x 5 cm, with a thickness of 1 cm,[17] but of varying length and curvature. This is interesting, as it could indicate a local origin, as a large ship yard would have had access to more diverse inventory of materials than just one type of angle-irons, whereas a local repair yard could be limited to just one type..

Knees

The knees on the barge are all the same type and made out of cut iron/steel plates to form triangular shapes with studded ends, except for the one end where the triangle forms a 90 degree angle.[18] The thickness of the knees was difficult to determine due to the rust coating the metal, but it is estimated at approximately 1 cm.

It appears that the knees were cut accurately without going to extremes, as determined from the knees that were measured during this survey. Knees measured included a sample from either end, midway between the ends and sample measurements taken from around the midship balk. All knees measured between 45 and 47 cm on the sides, with the studded ends of the knees measuring 5 cm. Again, measurements are slightly uncertain due to the rust coating the metal.

In general, the simplistic form of the knees gives a utilitarian impression. They were most likely made simply by cutting regular plate material into squares, then cutting them diagonally before studding the ends.[19]

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13 Photo Appendix: Double-ended Barge pictures: 047.-052. & 054.-055.

14 Rasmussen, Tom (Ed.) 1998: page 145 Lloyd registered the first welding in shipbuilding in 1918, while the first ship to be build entirely by welding was build in 1920.

15 Photo Appendix: Double-ended Barge pictures: 047 & 066.

16 Personal comment by librarian at The Maritime Library, Blegdamsvej, Copenhagen, November 2008.

17 See Plan 2.

18 See Plan 2.

19 Hansen C. Fig 54-74, Blad 5.

The Stern and the Bow

The first impression upon examining the stern and the bow of the barge is their similarities. Once more a thorough analysis of the different plate widths was completed. In so doing, it became apparent that there is however a difference, despite the similar construction details of both ends.[20] The southern end of the barge has proportions similar to the barge depicted in the picture of Brøndsted & Co Coal Wharf. The margin of error is approximately one percent, which is expected.[21] The fender wood in the Brøndsted & Co Coal Wharf picture has a different appearance than the remaining fender wood on the Careening Cove barge as it lies today. This indicates that the remains of the Careening Cove barge is either a different barge altogether than the one in the picture, even though there are many similarities, or it is the same barge in the photograph but altered by later repairs. The latter conclusion appears more in agreement with earlier evidence to that effect.

Picture: Double-ended Barge Brøndsted & Co Coal Wharf e.

In both the stern and the bow segments, plating is riveted on to the main stern iron, compressing the stern iron between the side plating and the stem iron. Rivets pass through both plates. This construction approach further reinforces the argument regarding a skeleton construction technique. This construction must have necessitated a pre-bending of the side plates or heating of the side plates while riveting them to the stern/stem and the frames. Both techniques were common within the shipbuilding industry around 1900.[22]

The bow and stern of a barge are critical construction elements in this type of vessel. It is these strategic points of the ship that can receive the most pressure when coming alongside another vessel, in docking or in casting off. This pressure, of course, can be avoided if the ship is handled correctly; by bringing the barge alongside the beam, this pressure can be spread out over a greater area. Generally, the bow and stern are

[20] From an analysis of the stern and bow side plating measurements.

[21] It should be noted that none of the pictures examined for the analysis were taken with a stereographic camera. See Photo Appendix: Double-ended Barge, photos: Brøndsted & Co Coal Barge, 022 and 035.

[22] Hansen, C. 1910.

reinforced by the designers/shipwrights through solid and strong construction technique. On the barge in Careening Cove, the only visible reinforcing detail is seen in the two aftermost/foremost angle-irons supporting the walkways that run from stern to bow. These two angle-irons are not cut off like the other angle-iron supporting the walkways. They run from side to side, joining the frames through their attachment to the knees and providing increased rigidity in these two critical parts of the barge. An interesting detail only visible in the northern end of the barge is the presence of concrete, used as reinforcement or ballast (or both), just below the break in the stern/stem iron.[23] The specific purpose of this concrete could not be determined during this survey, though it is possible that additional investigations could determine the concretes exact purpose.

Other inconclusive reinforcements in the bow and stern were not observed during the survey effort, but it is a possibility that there are more supports in the submerged sections of the barge.

Cut holes and a bolted hole

Among the barge wreckage, there are three holes purposely made either as repairs or from scavenging for plate material or bollards. In analyzing the two non-repaired holes,[24] it appears that a blowtorch or a similar instrument was used to make the holes. This is especially apparent in the photo (double-ended Barge 058e) where the edges look melted as opposed to being heated, chiselled and hammered out. Furthermore, the edges pictured in Photo 058 are not folded back, but rather follow the original plate's orientation thereby increasing the likelihood that the holes were cut with a blowtorch or similar kind of instrument. However, the deterioration and the rusted condition of the edges make it impossible to determine this conclusion for sure.

The reason why these two holes were formed is unclear, but the location of the hole in the walkway in photo 058 could indicate the removal of a bollard for use elsewhere after the barge had been abandoned, wrecked, or discarded. While the most logical explanation for the hole as depicted in the photo (double-ended Barge 025)[25], appears to be, that it was cut to get some spare plate for a purpose unrelated to the barge, as the edges again looks melted, just like on photo (double-ended Barge 058e) and doesn't show signs of repair work being attempted.

[23] Photo Appendix: Double-ended Barge, photos: 036.-040.
[24] Photo Appendix: Double-ended Barge, photos: 025, 058 & 058e.
[25] Photo Appendix: Double-ended Barge, photo: 025.

Picture, Double-ended Barge 058e.

The third hole is different because it was covered with a metal plate that was bolted on to the side of the barge, indicating a repair while the barge was still in use. The use of bolts both here and on some parts of the fender wood could indicate a different shipwright or owner being involved in these repairs, but evidence for this will have to be strengthened with further analysis to be able to make a more accurate conclusion (Picture, Double-ended Barge 033e).

Picture, Double-ended Barge 033e.

Measurements in centimetres or inches/feet?

An interesting detail that arose during this study was determining the type of measurement system, whether metric or British Imperial/US Customary units, used for the construction of the barge. Determining this fact could be an important indication as to the origin of the designer and shipwright of the barge. However, the determination of this question was hampered by the environmental conditions of the wreck, as the humid and salty air have caused the iron and steel on the barge to corrode and rust away, making the effort to get exact and accurate measurements difficult.

When the different measurements are analyzed, it becomes clear that the overall trend suggests that the metric system was used and not the Danish, British or US standards of measurements. Examples of this include: the barge's overall length (17.25m, or 56 ft 7.134in) and width (4.00m, or 13ft 1.46in), the walkway width (0.50m, or 1ft 7.635in) and the angle-iron dimensions of 5x5x1cm. Since the measurements conform more closely to rounded whole numbers and fractions within the metric system, it is reasonable to conclude that the vessel was constructed by shipwrights who employed the metric system. St. Thomas was a port of call for German, French, Spanish/Puerto Rican and Danish companies in the late nineteenth and early twentieth century, and many of these countries changed to the metric system around this time period.[26]

Initial conclusions from the archaeological survey

From archaeological evidence, it is apparent that the barge has a simple design using just four standard items for its construction: iron/steel plate, angle-iron, rivets, and wood for its fender list. This strongly suggests a utilitarian function, but whether this should be interpreted as an indication of local manufacturing or as an indication of a prefabricated and locally assembled vessel is difficult to determine from the material evidence alone. The fact that the dimensions of the barge's measurements correspond primarily with the metric system clearly indicates a Continental European origin for the barge's designer. The complete lack of a rudder and rudder fittings on either end of the barge could be indicative of local manufacture, as this missing feature clearly suggests a very limited use geographically. A towing operation of any distance is facilitated immensely if the towed vessel is able to steer with its own rudder, as yawing and the pressure on the towing cable are reduced and, consequently, speed increases.[27] Therefore, the missing rudder indicates that these types of vessels were used in stowing materials and in a limited navigation capacity only. While these limited functions are ideal within the confines of St. Thomas harbor, the vessel would not in the slightest bit be suitable for towing operations off shore.

[26] For example, the German industry began using the metric sytsem in 1898, while Denmark switched in 1902.Wiborg p. 148.

[27] Personal experience from my previous career as a Navigator and Naval Officer.

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St. Thomas and Careening Cove, Hassel Island- Historical Evidence

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Overview of Primary Resources Consulted

In researching how St. Thomas and Careening Cove were utilized during the late nineteenth and early twentieth centuries, a number of different types of sources were found. Sources included various newspapers from that time period, travel books, harbor regulations, commercial advertising pamphlets, archival material, charts, and general literature on shipping during the period, photographs, postcards, paintings, and some scientific research literature. I have placed the emphases “some”, for this last group of material because the Former late-nineteenth-century Danish West Indies have not been thoroughly researched. However the quality of the research literature available is quite good.

As discussed, the most significant research problem is that the literature, photographs, paintings, and other source material mainly focus on what Cederlund calls “prestigious objects:” the large, expensive or famous ships and harbors.[28].In this research effort it became quickly apparent that barges, lighters, and boats are not included in this prestigious group. Although barges, lighters, small sloops, and schooners do appear in paintings and photographs from St. Thomas harbor, they are generally painted or drawn in a rough sketch format, omitting detail as opposed to the larger vessels in the same paintings. Also, they are usually not mentioned in the captions on the photographs or paintings; this omission in itself signals their lower status and value.

In one way this is a blessing in disguise, as the incentive to manipulate the truth when using barges as a background in paintings must have been minimal, whereas big liners and warships have a much higher probability of being retouched or painted in a more flattering manner. This was done in order to make them appear grand and more splendid than they would have looked in reality after extended periods at sea such as crossing the Atlantic. Thus the information regarding barges, lighters and other utilitarian vessels is more straightforward to interpret and analyze.

Similarly, the sea charts of St. Thomas harbor are also easier to interpret because they serve the utilitarian purpose of guiding shipping to avoid groundings and therefore provide information that is almost completely trustworthy. This applies especially to the later charts dating to the nineteenth and twentieth centuries, whereas charts from the sixteenth century until the early eighteenth century can be somewhat more ambiguous. This is because some of the earlier charts were considered military secrets with built in deceptions requiring caution in their interpretation.

Written sources

[28] Cederlund 1997.

Written sources, including the Harbour Accounting Books for St. Thomas,[29] the List of Ships from Denmark (1891-1917),[30] and the list of non-self-propelled lighters, barges and prams listed with the Nationality and Measurements Letter (1894-1936),[31] do not register any lighters, barges or prams with a homeport in St. Thomas, DWI.

This is not surprising because the harbor accounting records have only five different types of income for the harbor. These included pilot dues, keelhauling fees, ferryboat charges, medical passport dues and ships fees, with the latter only applying for self propelled coastal traders and regular merchant ship trading conducted outside of the St. Thomas and St. John Custom District.

The list of ships from Denmark between 1891 and 1917 only register ships with an international call sign. These were ships that could navigate on their own, unlike the barges and lighters that had to be towed. The list of non-self propelled lighters, barges and prams from the Nationality and Measurements Letter (1894-1936) only lists lighters, barges and prams in Jutland, Zealand and adjoining islands, and none from colonies like DWI, the Faeroe Islands, Greenland or Iceland.

It is certain that there were barges and lighters in the St. Thomas harbor since there is a registry of such vessels operating only in the St. Thomas harbor. More specifically, the Box in Record Group 55, in the U.S. National Archives (Washington, D.C.), mentions a: "*Catalogue of Hulks, Barges … which are Exempt from Measurement and Registration, St. Thomas Harbor, 1896-1918.*"[32] Unfortunately, it has not been possible during this study to access the resources held in the National Archives. Likewise, the newspaper, *The West End News* reported about the many lighters, sloops, and boats that were either sunk or driven ashore during the 1916 hurricane that hit the DWI[33]. Unfortunately, none of these lighters, sloops and boats are mentioned by name, whereas several ships and specialized minor vessels, such as the dredger, *St. Hilda*, were mentioned by name.

During this research it became apparent that these later types of smaller vessels were an essential part of mercantile logistics when using the St. Thomas harbor. Evidence to this effect is mostly available in the charts depicting the St. Thomas harbor from 1820, 1852, 1907 and 1912.[34] These charts show only 1½-2½ fathoms of water close to Charlotte Amalie, whereas there was a steady increase in water depths at French Wharf (currently the cruise ship pier) and along Hassel Island.
These shallow waters would have made it nearly impossible for ships of any significant size to load and off-load at the historically documented waterfront wharfs that fronted the

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29 Danish National Archive: Havneregnskaber: St. Thomas 1907-1917.

30 Søfartsstyrelsen: Danmarks Skibsliste (List of Ships from Denmark) from 1891 to 1917.

31 Danish National Archive: Fortegnelse over ikke selvbevægende lægtere, pramme med mere forsynede med nationalitets- og målingsattest 1894-1936.

32 National Archives in DC, Record Group 55, (Records of the Government of the Virgin Islands Danish West Indies, 1672-1917); Box 305 - Catalog of Hulks, Barges … which are Exempt from Measurement and Registration, St. Thomas Harbor, 1896-1918.; Box 1059 - Records Concerning Shipping, Ship Registration and Shipwrecks in the Danish West Indies, 1871-1916.; Entry 595. Lists of Horses, Boats, Barges, Carriages, Carts, Autos and Trades for Tax Purposes (Heste, Baade, Pramme, Vogne, Karrer, Auto, Handlende), 1881-1920. 5 inches. (Box 1482)

33 West End News, the 12 & 13 Oct. 1916.

34 See Appendix B: Charts

town of Charlotte Amalie. Only small schooners, sloops, barges, lighters, and longboats would have been able access and dock at these piers. [35] The larger ships such as brigs, frigates, barks, and steamers, were forced to anchor away from the shoreline or at Hassel Island or at French Wharf. Consequently, they would have had to use barges, lighters, and longboats to load and off-load to be able to ship goods from the warehouses that were located just behind the town's wharfs and piers. It is apparent that these harbor procedures would have to have been followed from the very beginning of European occupation until the Danish transfer of the islands to the United States and, quite possibly, even longer, as will be discussed in the analysis of the pictorial and other graphic resources.

Additional proof that this mode of harbor operation continued to be necessary can be found in the complaints about the continual silting of the harbor, even in the deeper waters. In 1861, the Royal Mail Steam Packet Company (RMSPC) Caribbean Director complained to the governor about the steady loss of depth at the company's pier on the northeast end of Hassel Island. The board of directors for the St. Thomas Marine Repairing Slip Company (known as the Creque Marine Railroad after 1910) did so on the same day in what appeared to be a coordinated move.[36] Although these complaints only concerned the deeper parts of the harbor and the coaling pier areas, they do indicate that, if silting was a problem in deeper waters, it would certainly remain a problem along the town's waterfront. Although, the East Asiatic Company (EAC), RMSPC, and the Hamburg American Line (HAL)[37] had store houses on Hassel Island alongside their coal depots, it is most likely these were used for storing coal in order to keep some of this fuel dry in their depots[38]. Therefore, the fact that these companies had storehouses does not affect the basic premises: that a large ship's merchandise still had to be transported by shallow draft vessels from those ships anchored in deeper water or docked at these coaling and repair stations in order to get or receive goods from the merchant's warehouses in Charlotte Amalie.

In determining who owned and operated the barge in Careening Cove we can start with a process of elimination. The transfer of headquarters for the RMSPC and Compagnie Générale de Transatlantique (CGT) from St. Thomas to Barbados and Martinique, respectively, in the 1880s, makes it less likely that the barge in question was owned by one of these companies, even though they continued to operate at a reduced level on St. Thomas with regular packet ship calls and owning coal yards on St. Thomas. [39]

The relocation of these companies followed a general downward trend in trade going through St. Thomas, which is apparent in both Gøbel's research[40] and in the descriptions Kjær and Taylor provide in their books[41] on shipping. This downward trend in trade through St. Thomas harbor was not entirely compensated for by the arrival of the German HAL in

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35 Longboat/-s as defined in Merriam-Webster's 11th Collegiate Dictionary: a large oared boat usually carried by a merchant sailing ship.

36 Gøbel in Handels & Søfartsmuseets på Kronborg (Elsinore) Yearbook 2001 p. 41-43.

37 Gøbel in Handels & Søfartsmuseets på Kronborg (Elsinore) Yearbook 2000 p. 30 & KB DWI photos no. 3566 and 3570.

38 Sjöhistoriske Årsbok 1977-1978 p. 70-73.

39 Taylor 1888, p. 56.

40 Gøbel 2000, p. 19-28.

41 Kjær 1934 & Taylor 1891.

1873. The German HAL set up its regional headquarter in St. Thomas harbor, but German merchants only accounted for between six and seven percent of the ships that came to St. Thomas from 1870 until 1917[42], whereas British flagged shipping grew from 59 percent to 73 percent during the same period. The placement of the HAL wharf and yard on Hassel Island provides a strong case for a possible HAL ownership of the barge that is presently lying in Careening Cove. The HAL coal depot and shipyard were placed on the southern shore of Careening Cove, where it remained until transfer of the DWI in 1917, when the HAL yard, stores, and ships on St. Thomas were confiscated by the US Navy. This change of ownership through confiscation may also explain the welded repair to the midship balk described earlier in the archaeological evidence. The US Navy would have had access to welding technology around the outbreak of World War II, if not earlier. Unfortunately, it was not possible to access the HAL archives in Bremen, Germany during this study. Even if it was possible to access these archives, it is doubtful as to how much information it would have provided on the barge; the Deutsches Schiffahrt Museum's on-line database lists a multitude of ships[43] that were used or built by German companies, but it was not possible to find an HAL barge or one that was between 15 m. and 20 m. in length that would compare with the barge in Careening Cove. However, this does not eliminate the possibility that the barge could be from HAL, as the database from Deutsches Schiffahrts Museum places more emphasis on larger, more significant vessels, whereas the barges and lighters are described in the cursory fashion of Cederlund's claims.

Finally, there is the question of what the Careening Cove barge was used for. Was it used to transfer goods to Charlotte Amalie or as a coal barge, an assumption based on a postcard depicting a similar vessel loaded with coal? Evidence points either way, as St. Thomas was extremely well supplied with coal yards with docking piers, with at least six in operation around the turn of the century (i.e. St. Thomas Marine Repairing Slip, RMSPC, EAC, Brøndsted & Co, HAL and CGT).[44] The efficiency of the coaling operation on St. Thomas is something that was commented on by travellers and mariners alike.[45] This contradicts the notion that the barge in Careening Cove would have been a dedicated coal barge since coaling from a pier is more efficient than having to load a barge and then off-load on to the coaling ship. In fact, this doubles the work required. In 1891, Taylor specifically mentions this as being one of the advantages of St. Thomas harbor when compared to its rivals on St. Lucia and Barbados, where all coaling was done by lighters.[46] This serves as strong evidence for the general use of different piers for coaling, even though Taylor's pamphlet from 1891 is a propaganda script to persuade the US to buy St. Thomas and use it as a naval and coaling station for the US Navy. In fact, this is the title of the pamphlet: "St. Thomas as a Naval and Coaling Station." This shows the emphasis and importance that contemporary commentators placed upon St. Thomas, as a place for safe and efficient coaling operations.

This does not mean that ships were never coaled by barges, as peak periods would probably have required barges to have been used. Gøbel writes "*en passant*" in the

42 Gøbel 2000, p. 27.
43 http://www.dsm.museum/Schiffsliste/Suche.php
44 See Appendix B: The Long Bay Project Chart from 1912.
45 Taylor 1888, p. 96.
46 Taylor 1891, p. 12-13.

caption to a picture from the French or CGT wharf,[47] even though it is difficult to see if the ship in question is actually coaling or if it is something else that is being loaded or off-loaded from the barge. It could be either, as the barge in question lies close to both of the forward coal chutes and one of the forward holds of the steamer that it's alongside. Kjær, who was related to one of the ship chandlers on St. Thomas by marriage, does not divulge much information about the specific use of barges, although his description of the trade in St. Thomas is in general agreement with Taylor's descriptions.[48]

Finally, Kjær also writes that Brøndsted & Co. earned a huge amount of money during the Spanish-American War of 1898. Brøndsted & Co. had the commission for coal to the US Navy, but Kjær does not divulge any information about the coal delivery method. Both Kjær and Taylor's books help in understanding the St. Thomas harbor's general and everyday "modus operandi."[49]

The various newspapers and advertising pamphlets also failed to provide any specific information about the use of barges and lighters, but they do provide us with a cost for the use of lighters (with or without a crew). In 1876, the use of lighters was five dollars per day for vessels weighing between 7 to 10 tons, while coal was hoisted and shovelled at 25 cents per ton.[50] In 1880, the rates for lighters was five to eight dollars per day and labor costs between $1.00 and $1.25 per day per worker, depending on whether the worker received food or not, whereas the price on coal hoisting and shovelling had not changed.[51] It is also interesting to note that the tax on row boats, sail boats, deck boats and lighters are listed (for lighters 10 dollars per annum), which corresponds quite closely to the box titles in the National Archives in Washington, D.C. that were described earlier.[52]

It is interesting to note that the only advertisement for a coal company is for the Cape Bretton Company, of Sydney C.B., through the agent-ship of Wm. H. Kidson, London and Feddersen, Willink & Co, St. Thomas.[53] This same agent-ship was later owned by Brøndsted & Co. Coal Company in 1883.[54] This corresponds well with Gøbel's claim that major steam companies like RMSPC, CGT and HAL, provided their own ships with coal from their own depots. This left Feddersen, Willink & Co and later Brøndsted & Co with a virtual coal monopoly until the West Indian Coal Depot was established. However, it has not been possible to confirm this monopoly claim entirely. From the pictorial evidence below it will be shown that at least HAL took other companies ships alongside their Coal Pier on Hassel Island, though these ships could be from a company which had some kind of collaboration agreement with HAL. Gøbel also writes that the price for coaling in 1914 was six dollars per ton if alongside a coaling pier, whereas coal delivered by barge or lighter was slightly more expensive.[55] This indicates that the most efficient way of coaling was alongside a pier, but does not exclude the possibility of coaling by barge or lighter.

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47 Gøbel 2000, p 18.
48 Kjær 1934, p 16-17.
49 Kjær 1934, p. 83-84.
50 Philips & Co 1876, p 53.
51 The St. Thomas Almanac and Popular Mercantile Advertiser of 1880, p 36.
52 The St. Thomas Almanac and Popular Mercantile Advertiser of 1880, p 36.
53 The St. Thomas Almanac and Popular Mercantile Advertiser of 1879, p 33.
54 Gøbel 2001, p. 54.
55 Gøbel 2001, p 54.

Pictorial sources

The subjects represented in graphic resources can be divided into five main categories: the harbor in general, harob charts, Careening Cove, and barges/lighters and other small vessles.

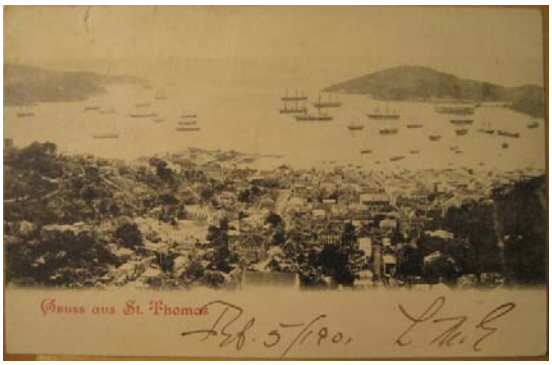
The first two categories; the harbor and the charts are interconnected, as an analysis of these two categories on their own does not give a complete understanding of how St. Thomas harbor was utilized. Analyzed together, these sources narrow down the possible ways the Careening Cove barge was utilized by providing a pattern in the use of barges, lighters, and longboats in St. Thomas harbor. Even if the barge in Careening Cove were to fall outside this general pattern, the information still provides insight into the way the harbor worked throughout the decades up to and also after the Virgin Islands were transferred to the US, establishing the historic context in which the barge in Careening Cove was used.

Paintings and photographs that depict the harbor, like the drawing and photograph below, provide a general representation that corresponds extremely well with the written documents and the sea charts of St. Thomas harbor.[56] In examining the paintings and drawings it is clear that there are a lot of smaller vessels close to shore ,just outside Charlotte Amalie's Kings Wharf. While the type of boat is not readily apparent, as they are sketched rather than properly drawn vessels, but the bigger vessels further out in the harbor are drawn with a greater attention to detail.[57]

KB DWI, Picture 2625e. (est. to be from the 1860-1880).

[56] See appendix B: Charts.

[57] Photos Appendix The picture can be seen in greater detail in the photos Appendix, as the pictures shown between the text parts of this study have been scaled down to fit in.



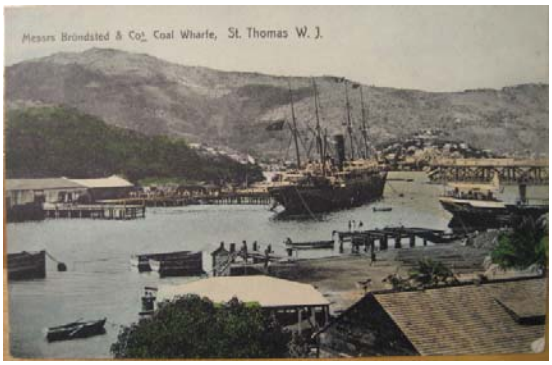
Picture: KB DWI, 3579e. (A postcard photo taken before 1901).

The placement of the depicted vessels in accordance to size corresponds well with the information provided in historic charts of the harbor. The accumulated evidence leads to the conclusion that this was the way that St. Thomas harbor operated from colonization through the nineteenth to the turn of the twentieth century. In sum, the larger vessels had to anchor in the deeper water of the harbor and from there loaded and offloaded their merchandise and cargoes to and from the barges and lighters that provided the only viable mode of transport between the deeper parts of the harbor and the warehouses in Charlotte Amalie.

Drawings and photographs of Careening Cove mainly date to the period before Brøndsted & Co's dissolution in 1907.[58] Many postcards bear a caption that identifies the location of the scene as either DWI or USVI, indicating whether the postcards were from before or after the transfer of the DWI in 1917. Research at the Maritime Museum in Elsinore and the Royal Library in Copenhagen found that many of the postcards in these repositories are the same and that there are not many photographs of Careening Cove. These photographs are in various states of preservation. The photographs in the Royal Library are generally in better condition, and have more information concerning their date of production than the Maritime Museum's photographs.

Generally, the photographs and drawings of Careening Cove either depict the HAL side, the Brøndsted & Co facility, or both sides at the same time. In one image (KB DWI 3569), a steamer is alongside Brøndsted & Co's Coal Pier, but it is also apparent that another steamer rests alongside the HAL coal pier in the right side of the picture. A floating dock is in the background of the picture toward Charlotte Amalie.

[58] Adams 1999, Chronological listing of Developments relating to Hassel Island.



Picture: KB DWI, 3569e, seen from HAL coal depot towards the north, from before 1907.

Most interesting in this depiction are the three barges and lighters and the rowing boat lying in the lower left corner of the photograph. This is something that is observable in almost all of the pictures depicting steamers coaling. Almost no pictures or photographs show barges or lighters alongside steamers while coaling, except for a couple of photos, including one from the CGT wharf in Long Bay[59] and another showing a wharf with many rowing boats, barges of different types, and a small white steam boat.[60] This corroborates the conclusion drawn from the written sources that the standard procedure was to coal alongside a pier when coaling in St. Thomas harbor. However, it still does not exclude the possibility of coaling from a barge or a lighter. It also corresponds well with the evidence from the charts and the pictures that suggest that trading goods were delivered to and loaded from warehouses in Charlotte Amalie, while coaling was conducted on Hassel Island or Long Bay if the ship were from the CGT and possibly other affiliated companies.

In a photograph taken after 1917 (pictures 018e), the barge pictured in the lower right of the image bears a striking resemblance to both Plan A and to the barge in Careening Cove. The barge in the photograph has appears to have a slighty raised bow to the right and a stern to the left, but no apparent rudder visible, just like the barge in Careening Cove. The oil storage tanks on the hill above the former site of the HAL coal depot that were put in place by the US Navy and the diesel powered US Navy warships in the photograph also suggest that this picture dates to around the time of World War ll.

[59] See Gøbel 2000, p. 18.

[60] Photos Appendix: KB DWI photo no. 3593 & 3606 (no. 3606 is also on the front page in the study).

Picture: Double-Ended Barge, Ken's final handover picture 018e, from after 1917.

Another photo,(KB DWI 3606) also depicts a similar barge. In this picture the vessel is located on the left side of the photograph. The vessel has construction details identical to those in the Careening Cove barge, such as a mid ship balk (partly covered by coal or earth material), side walkways, and an angle-iron in the "bow" end running from side to side (forward of the bollards).

There is a likeness of the buildings and barges in photos KB DWI 3606 and H&S 3498[61],. KB DWI 3606 was found in an envelope with primarily pictures from around 1916, whereas H&S 3498 is dated to the period of 1900-1910 ,and depicts with certainty the HAL Wharf.

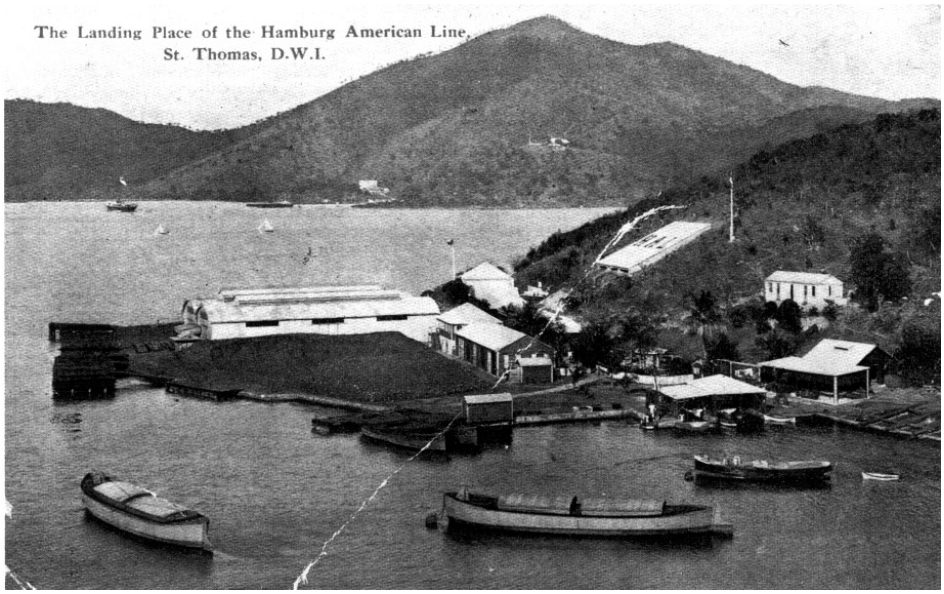
Picture: H&S 3498, HAL Wharf from 1900-1910, notice the white roofed buildings on the opposite (HAL) shore and the barge to the right in the Cove, comparable buildings are seen on the photo KD DWI 3606 on the cover page of this study. The barge on the right side of the Cove also bears a likeness to the barge on

[61] Photo Appendix: KB DWI 3606, H&S 3496, 3497 & 3498.

the front page and to the Barge in Careening Cove, unfortunately the clarity in this photo does hamper the analysis.

This observation leads to the conclusion that the barge in Careening Cove was probably owned by HAL before 1917. Given its similarity to the barge depicted in the photograph of Brøndsted & Co Coal Wharf, it is likely that the barge was constructed before 1907.[62] As with other vessels, the barge probably was confiscated by the US Navy in 1917 during the transfer of the DWI to the United States and continued to be used possibly through World War ll.

Further evidence to support this conclusion is the resemblance of the barge in the top right of the photograph, KB DWI 3606, to the two barges lying off HAL coaling pier in the photo below. These two larger barges (at left and center) and the smaller barge in KB DWI 3606 have sliding roofs over the holds, strongly indicating a similar origin since this is quite ingenious and a rare construction detail[63].

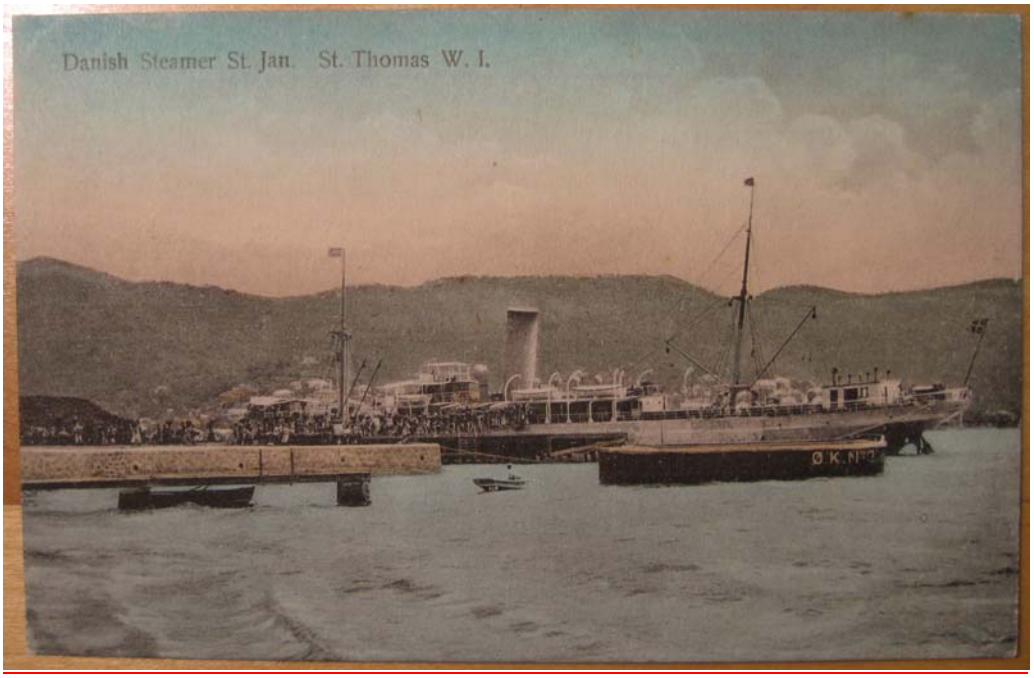


Double-Ended Barge, picture Kens final handover picture 013, from before 1917.

Unfortunately, it has not been possible to name the barge in Careening Cove because this study has not located any photographs, drawings, or literature that identifies it with a name or a number. Other drawings and photographs with barges, lighters, longboats and prams indicate that the barge in Careening Cove most likely had a name or a number, as two photographs reveal vessels with company initials and the number abbreviation, but unfortunately the numbers were illegible.[64] This corresponds to the evidence inthe written

62 Photo Appendix: Double-ended Barge, Brøndsted & Co Coal Barge.
63 Hansen, C. 1910,
64 Photo Appendix: KB DWI 3596 and H&S 3468

sources described in this paper in which barges were identified by some kind of registration marking, either a name, number or both[65].



Picture: KB DWI 3596, showing barge with ØK No … Name/Registration.

There are the "other" drawings and photographs from which three photographs have been selected for this study. The first two photographs are representative of the use of barges, lighters, and prams in the St. Thomas harbor. The third and last photograph contradicts Gøbel's conclusion that HAL, RMSPC, CGT and EAC only coaled their own ships at their own coal piers.

The photograph, H&S 3479e on the following page was taken on transfer day in 1917. It shows a passenger steamer in the rear left with four barges, lighters, or longboats alongside. This is representative of pictures and photographs that depict ships lying at anchor a bit out in the harbor's deeper waters. These barges could have been offloading coal, but only in one photograph (KD DWI 3606) is it possible to identify anything resembling coal in a barge. It has not been possible to identify coal chutes in any of the images of steamers lying in the St. Thomas harbor even though coal chutes can be seen in several pictures from other harbors including Hamburg and Bremen.[66] This discrepancy may be explained by the fact that barges probably were used for coaling only during peak shipping periods on St. Thomas, as the harbor had at least six coaling piers. One reason

[65] Photo Appendix: H&S 3445.-3449. Johannessen, Ole Stig: ØK Skibe – The EAC Fleet, p 312-314. and Record Group 55 in the National Archive, Washington DC, box 305.

[66] Wiborg 1997.

could be that the coal piers were exclusive, as Gøbel claims, but the companies' *raison d'etre* is to make a profit, so it would make sense to sell coal to as many ships as possible, even for companies like HAL or RMSPC, if they had enough coal to supply both their own and other ships.

Picture: H&S 3479e.

Further strengthening this assumption is the second category of "other" drawings and photographs represented below,[67] that depicts a steamer alongside a coal pier being coaled by African American women, just as Kjær and Taylor describe it,[68] while a barge and several smaller rowing boats are sitting idle. This is the typical pattern in almost all of the drawings and photographs of the St. Thomas harbor. It is especially noticeable that wherever there is a barge, there are also one or more rowing boats. These row boats may have provided the towing power inside of the St. Thomas harbor, though the only photograph of rowing boats towing barges is from Frederikssted on St. Croix[69]. It was only possible to identify one photo with a tug, which is also lying idle.[70] The last photographs that show this "typical" disposition are by Alexander Alland from 1939 and 1940[71] in which four identical barges are lying at anchor at Ballast Island in the Northwestern part of the St. Thomas harbor[72].

[67] Photo Appendix: H&S 3482, photo from before 1907 according to a caption on the jacket to the photo, making it possible that it shows Brøndsted & Co Coal Pier, as this company was closed in 1907.
[68] Taylor 1888.
[69] Photo Appendix: H&S 3433.
[70] Photo Appendix: KB DWI 3593 from .
[71] Photo Appendix: The Photographic Archive at the Royal Library in Copenhagen, search words: Alexander Alland.
[72] See Chart Appendix: St. Thomas 1907.

Picture: H&S 3482e.

A third photograph was selected because it depicts a ship's funnel mark with a large K on the steamer at the HAL coal pier. This K represents a ship from a different company than the pier's owner, since HAL's funnel mark was a tri-colored black, white, and red band.[73] This ship's K funnel mark thereby contradicts Gøbel's conclusion that the coal piers of HAL, RMSPC, EAC and CGT were exclusive. It is possible however; that this steamer with the K funnel mark was associated with an affiliated company. Further research can provide more insight into this.

Picture, KB DWI 3588e, Showing a Steamer with a "K" funnel mark alongside the HAL Coal Pier.

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[73] Kludas 1979 & 1980.

Conclusion

All of the evidence; archaeological, written and pictorial, indicates that the barge in Careening Cove dates to the HAL tenure on Hassel Island and that it was later confiscated by the US Navy around the transfer day in 1917. It was probably used as a general purpose transport vessel and not exclusively as a coal barge, as has been assumed tentatively for some years. This was the general purpose of a barge in the St. Thomas harbor during the late-nineteenth and early-twentieth century.

The measurements are one of the indicators pointing toward this conclusion, as they are in the metric system almost without doubt, indicating that a European shipbuilder was responsible for the barge's construction. The lack of a rudder indicates a local St. Thomas origin of the barge, as it would have been difficult to tow across open water. Even though it is possible that the barge was prefabricated and transported from Europe to St. Thomas, this is somewhat unlikely, as the missing rudder must have been a local St. Thomas adaptation. If the conclusion drawn from the measurements being in metric units is correct, this also gives a probable "after dating," as the German shipbuilding industry adopted the metric system in 1898, whereas Denmark switched in 1902. Many other European countries that owned colonies in the Caribbean like Spain and France, adopted the metric system even earlier. However 1898 is the likely starting date as revealed in photographs that predate 1907, a date that is affirmed by the presence of Brøndsted & Co. and also depict barges like the one in Careening Cove at the German HAL, their Caribbean Hub. It should be noted that the barge could have been previously owned by Brøndsted & Co, but before 1907, as Brøndsted & Co. closed that year at which time it is possible that HAL could have purchased the vessel. Additional evidence about the presence of this vessel comes from the photographs predating 1917 evidenced by the HAL presence in the photographs, or post dating 1917 evidenced by the US Navy's presence in the photographs.

The cover photograph of this report provides the surest evidence that the barge in Careening Cove prelates 1916. The barge in this photograph is most certainly of the same construction as the barge in Careening Cove, even though it could be a "sister" barge. An important feature of this photograph is the buildings behind the wharf and the other barge with buildings on the HAL wharf, just as the other barge is unmistakeably of the same construction as the two barges with the sliding roofs in the photo depicting the HAL coal pier. These provide strong evidence for HAL ownership of the barge until 1917, when the barge was probably confiscated by the US Navy, when the DWI became the USVI. Evidence to that effect is available in one photograph that depicts the oil tanks that were installed by the US Navy, and the same barge as depicted before 1916 as lying in the inner part of Careening Cove, that looks just like the barge lying in Careening Cove today[74]. This photograph also suggests that the US Navy used this vessel into the 1940s. This would account for the welded repairs and dents that are evident on the barge in several places, which can only have been made after 1918/20, when welding started to be used in ship construction on a small scale. However, welding would have been used on a large scale by the 1940s.

[74] Photo Appendix: Double- Ended Barge, Ken's final handover picture 018.

The purpose of the barge currently in careening Cove was probably for general use and not restricted specifically to transferring coal, even though the barge with the most similarities in the photographs is most likely loaded with coal (Cover photograph). As argued all indications point toward a use of barges primarily as the transportation link between the merchant ships and the wharfs and warehouses of Charlotte Amalie, whereas coaling was conducted at the coaling piers on Hassel Island or at CGT coal pier on the Long Bay side of St. Thomas harbor. The lack of images of barges or steamers with coal chutes, except for one or two photos out of a total of about 262 pictures, supports this conclusion.[75] Likewise the written sources mention lighter prices and coal shovelling prices as separate entities in advertisements and harbor regulations, while descriptions of the coaling operations comment on the speediness in St. Thomas harbor compared to other harbors like Barbados and St. Lucia, where lighters were used. This clearly points towards coaling being done as a rule alongside a pier and not from barges. The primary role of barges, lighters, longboats, and prams in the St. Thomas harbor was to transport merchandise between the warehouses and wharfs of Charlotte Amalie and the merchant ships in the deeper parts of the St. Thomas harbor, a practice that had continued for several centuries.

An attempt to assign a name to the barge in Careening Cove was made, but as already shown, this type of vessel was of comparably low value and strictly utilitarian in purpose. In practice, barges, lighters, longboats, and prams were only intermittently named or even numbered[76]. The barges in the St. Thomas harbor most likely had at least a number, as there is written evidence to that effect both in Denmark and in the National Archives in Washington DC. Unfortunately, the evidence in Denmark only lists these types of vessels from Jutland, Zealand and adjoining Islands, while the documents in Washington, DC were outside of the reach of this study. This leaves the barge in Careening Cove unnamed until further research can be done in the National Archive in Washington, DC.

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[75] Photo Appendix: The Folders KB DWI and H&S.

[76] Johannessen, Ole Stig: ØK skibe – EAC Fleet, Forlaget Nautilus.

Bibliography

Adams Jr., Alton A.: A Treasure in Distress, the Creque Slip, Hassel Island, U.S. Virgin Island, 1999

Andersen, H.N.: Betragtninger i anledning af Havneprojekt paa St. Thomas, Hertz's Bogtrykkeri, København 1912.

Bidstrup, Ole (red.): Kunstnere i tropesol, Dansk Vestindisk Selskab i samarbejde med Nikolaj Udstillingsbygning, 1992.

Bowens, Amanda (Ed.) Underwater Archaeology, The NAS Guide to Principles and Practice, Nautical Archaeology Society, Portsmouth, UK, 2009.

Bro-Jørgensen, J.O. and Rasch Aa.: Asiatiske, vestindiske og guinesiske handelskompagnier, Rigsarkivet, København 1969*.

Brøndsted, Johannes (red): Vore gamle tropekolonier, vol. 1-2. Fremad 1966.

Buttenschøn, Claus og Ries, Olaf: Det Sorte Guld, Danmark og Slaveriet, Alinea, 2003.

Cederlund, Carl Olof: Nationalisme eller Videnskap, Svensk Marinearkaeologi i ideologisk belysning, Carlsson Forlag, Stockholm, 1997.

Dansk Vestindien i gamle billeder/The Danish West Indies in old pictures, The American Danish Friendship Festival, 1967.

Døygaard, Heino: Danmarks fjerne kolonier I syd og nord. Gyldendal, Købenavn 2002.

Døygaard, Heino & Bodil: Dansk Vestindien, fra slavekoloni til moderne turistparadis, Skarv – Høst & Søn, 1995.

Eilstrup, Per & Boesgaard, Niels Eric: Fjernt fra Danmark, Billeder fra vore Tropekolonier, Slavehandel og Kinafart, Lademann, 1974.

Feldbæk, Ole:, Storhandlens tid, Dansk Søfarts Historie 3, 1720-1814, Gyldendal, København, 1997*.

Föreningen Sveriges Sjöfartsmuseum i Stockholm: Sjöhistorisk Årsbok 1977-1978 - Flottans Män Berätter, Föreningen Sveriges Sjöfartsmuseum i Stockholm, 1979.

Gould, Richard A.: Archaeology and Social History of Ships, Cambridge University Press, Cambridge, 2000.

Greandjean, Louis E.: Skibsfartens Hjælpetropper, Bidrag til bugseringens historie, Høst & Søns Forlag, København, 1948.

Greenhill, Basil: The Archaeology of Boat and Ships. An Introduction, Conway Maritime Press, London, 1995.

Gronemann, Signe Trolle og Vindberg, Rikke: I Orkanens Øje, Beretninger fra Orlogsskibet Valkyriens togt til Dansk Vestindien 1915-1917, Dansk Vestindisk Selskab/Poul Christensens Forlag, 2005.

Gøbel, Erik og Degn, Ole: Skuder og Kompagnier, Dansk Søfarts Historie 2, 1588-1720, Gyldendal 1997*.

Haagensen, Reimert: Decription of the Island of St. Croix in America in the West Indies, The Virgin Islands Humanities Council, St Croix, US Virgin Islands, 1995.

Hansen, Thorkild: Slavernes øer. Gyldendal 1970.

Hansen, C.: Skibsbygnings kunst, Nielsen & Lydiche, København, 1910.

Hassø, Arthur G.: Københavns Frihavn, tilblivelse og virksomhed 1894-1944., Kjøbenhavns Frihavn-Aktieselskab, København, 1946.

Hedén: Götaverken, Aktiebolaget Götaverken, Göteborg 1924.

Henningsen, Lars N: Flensborgskibe 1790-1850, Sydslesvigsk Forening and Studieafdelingen ved Dansk Centralbibliotek for Sydslesvig, 2005*.

Hornby, Ove: Kolonierne i Dansk Vestindien, København, 1980.

Johannessen, Ole Stig: ØK Skibe – The EAC Fleet, Forlaget Nautilus.

Johnson, Matthew: Archaeological Theory – an Introduction, Blackwell Publishers, London, 2000.

Karting, Herbert: Vom Holz zum Stahl (1860-1909), Band I, Verlag H.M. Hauschild Gmbh., Bremen, 1993.

Karting, Herbert: Die Peterswerft und ihre Schiffe, Verlag H.M. Hauschild Gmbh., Bremen, 1996.

Kludas, Arnold: Die Schiffe der Hamburg-Amerika-Linie. - Band 1: 1847-1906, Koehler,

Kludas, Arnold: Die Schiffe der Hamburg-Amerika-Linie. - Band 2: 1907-1926, Koehler, 1980.

Kludas, Arnold: Die Schiffe der Hamburg-Amerika-Linie. - Band 3: 1927-1970, Koehler, 1981.

Lawaetz, H.: Billeder fra Dansk Vestindien, København, 1910*.

Lawaetz Erik J.: St. Croix – 500 Years, Pre-Coloumbus to 1990, Eric J. Lawaetz, Christiansted, St Croix 1990.

Lauring, Kåre: Københavns Havn 1840-1940, Gyldendal, København 2006.

Liisberg, Bering: Danmarks Søfart og Søhandel – Fra de ældste tider til vore dage, I bind, Nyt Nordisk Forlag, København, 1919.

Mentze, Ernst: Dansk Vestindien, København 1981

Mertens, Eberhard (Ed.): Die HAPAG – RIESEN, Der Imperator-Klasse, Olms Presse, Hildesheim, Germany, 1974.

Mortensøn, Ole, Christensen, T. P., Danker-Petersen, P., Keitsch, Christine & Kiedel, K.-P.: Gamle havne – nye udfordringer, Skandinaviske og vesteuropæiske havne i fortid og nutid. Forlag H. M. Hauschild Gmbh, Bremen, 2006.

Morton, Henry: St.Croix, St.Thomas, St.John: Skitsebog og dagbog fra Dansk Vestindien, København, 1975.

Murta, Wm. The St. Thomas Times Almanac, and Popular Mercantile Advertiser, 1878-1880, St. Thomas, D.W.I., 1878-1880.

Møller, A.M., Dethlefsen, H. & Johansen, H.C.: Sejl og Damp, Dansk Søfarts Historie 5, 1870-1920, Gyldendal 1997.

Nationalmuseet og Forfatterne, (ed) Nielsen, Per: Fra Slaveri til Frihed, Det dansk vestindiske slavesamfund 1672-1848, Nationalmuseet, 2001.

Nielsen, Per: Flåden og Dansk Vestindien- Den danske flådes togter til Caribien 1671-1917, Forlaget Marinehistoriske skrifter og Dansk Vestindisk Selskab, 1997.

Oldendorp, Christian Georg Andreas: Historie der Caribischen Inseln Sanct Thomas, Sanct Crux und Sanct Jan, verlag für Wissenschaft und Bildung, Dresden, 2002.

Olwig, Karen Fog: Cultural Adaptation and resistance on St. John. Gainsville, U.S.A., 1985*.

Philips, G. A.: Commision Merchants, Ship Brokers, St Thomas, D.W.I. 1876.

Rasmussen, Tom (Ed.): Flytende Kulturminner, En innføring i fartøyvern, Riksantikvaren, Oslo, 1998.

Rigsarkivet: Koloniernes Centralbestyrelse, vejledende arkivregistraturer XX, København 1975.

Rothe, L.: Harbour Regulations for St. Thomas 1880 & 1893, St. Thomas, D.W.I. 1880 & 1893.

Rumm, John: St Thomas Marine Repair Slip (1840-1910) – Creque Marine Railway (1910-1950's), Historic American Engineering Record.

Taylor, Chas. Edwin: Leaflets from the Danish West Indies, St Thomas, D.W.I., 1888.

Taylor, Chas. Edwin: St. Thomas as a Naval and Coaling Station, St Thomas, D.W.I., 1891.

Taylor, Chas. Edwin: An Island of the Sea, Taylor's Bookstore, St Thomas, D.W.I., 1895.

Towle, Edward L., Marx Robert F. & Albright, Alan B.: Shipwrecks of the Virign Islands (1523-1825) 2nd. edition, Islands Resource Foundation, 1976.

Tyson G: Register of Virgin Islands Shipwrecks (1523-1917) IRF, St. Thomas, 1983. (Unpublished).

West, Hans, Beyträge zur Beschreibung von St Croix, nebst einer kurszen Uebersicht der benachbarten Inseln St Thomas, St Jean, Tortola, Spanishtown und Krabbeneyland, , Prost, Sohn und Compagnie, Kopenhagen, 1794.

Wiborg, Susanne & Klaus, The World is our Oyster, HAPAG-LLOYD, Hamburg, 1997.

Øregård Museum and the Authors: Hugo Larsen i Dansk Vestindien 1904-1907, Øregård Museum 2006*.

Archival Material

Record group 55 in the National Archive, Washington DC.

Rigsarkivet København/National Archive Copenhagen:

- Arkivskaber/Archiv creator: Reviderede Regnskaber, Vestindiske Regnskaber
Arkivserie/Archive serie: Antegnelser med bilag til hovedbog: St. Thomas og St. Jan 1755-1916. Magasinenhed: 1891 – 1907.

- Arkivskaber: Reviderede Regnskaber, Vestindiske Regnskaber
Arkivserie: Havneregnskaber: St. Thomas 1907-1917
Magasinenhed: 1907 – 1910.

- Arkivskaber: Reviderede Regnskaber, Vestindiske Regnskaber
Arkivserie: Havneregnskaber: St. Thomas 1907-1917
Magasinenhed: 1910 – 1913.

- Arkivskaber: Reviderede Regnskaber, Vestindiske Regnskaber
Arkivserie: Havneregnskaber: St. Thomas 1907-1917
Magasinenhed: 1913 – 1916.

- Arkivskaber: Reviderede Regnskaber, Vestindiske Regnskaber
Arkivserie: Havneregnskaber: St. Thomas 1907-1917
Magasinenhed: 1916 – 1917.

- Arkivskaber: Reviderede Regnskaber, Vestindiske Regnskaber Arkivserie: Bilag og antegnelser til St. Thomas havneregnskab 1913-1917.

- Arkivskaber: Søfartsstyrelsen, Skibsregistrator
Arkivserie: Fortegnelse over ikke selvbevægende lægtere, pramme med mere forsynede med nationalitets- og målingsattest 1894-1936.

Rigsarkivet (1. Afd.): Kort- og tegningssamlingen, Registraturafskrift,

Rentekammersamlingen Nr. 1-662., 1986.

Periodicals and Newspapers

Göteborg Museum Årstryck (Yearbook)1933.

Handels- og Søfartsmuseet på Kronborg, Yearbook 1991.

Handels- og Søfartsmuseet på Kronborg, Yearbook 2000.

Handels- og Søfartsmuseet på Kronborg, Yearbook 2001.

Das Logbuch, heft 4 – 2008.

Maritime History, Vol. 3. No. 1. April 1973 (RMSPC in 1875-1900 in WI and South America).

Maritime History, Vol. 4. No. 1. March 1974 (RMSPC in 1875-1900 in WI and South America).

Maritime History, Vol. V. No. 1. Spring 1977 (The Cardiff Coal Trimmers Union, 1884-1914).

Rhein-Museum Koblenz, Beiträge zur Rheinkunde, heft 53/2001.

Sanct Thomæ Tidende, 1857-1875.

Sjöhistoriske årsbok 1977-1978. Flottans Män berätter. Foreningen Sveriges Sjöfartsmuseum, Stockholm 1979.

Scandinavian Economic History Review, No 1 - 1983, article by Erik Gøbel: Danish Trade to the West Indies and Guinea 1671-1754.

St. Thomas Slag-Tidende, KBH 1885.

Søfartsstyrelsen: Danmarks Skibsliste (List of Ships from Denmark) from 1891 to 1917.

West End News, Frederikssted, St. Croix 1916.

Internet sources

Dansk Vestindisk Selskab
http://www.dwis.dk

Deutsches Schiffahrtsmuseum
http://www.dsm.museum

Handels- & Søfartsmuseet
http://www.maritime-museum.dk

HMS Victory
http://www.hms-victory.com/

Jan Tuxen Hugo Larsen side
http://www.tuxen.info/hugo_larsen/

Mary Rose
http://www.maryrose.org/

Orlogsmuseet
http://www.orlogsmuseet.dk

Rigsarkivet
http://www.sa.dk/ra

Rigsarkivets registratur over de vestindiske lokalarkiver
http://www.virgin-islands-history.dk

St. Thomas Historical Trust
http://www.stthomashistoricaltrust.org/ and http://hasselisland.org/

USVI NPS
http://www.nps.gov/viis/

USS Constitution
http://www.ussconstitution.navy.mil/

Wikipedia Danish
http://da.wikipedia.org

Plans

Photos Appendix

2CD ROM's or the Photographic Archive at Handels & Søfarts Museet (The Mercantile and Maritime Museum) at Kronborg (Elsinore). Using search words: Dansk Vestindiske Øer/ Danish West Indies. The Photographic Archive at the Royal Library (Det Kongelige Bibliotek) Copenhagen. Using search words: St Thomas, Zeilau, Astrid Helweg-Larsen, Gerda Helene Cold, Alexander Alland and the Lilian Hopfner Langfords post card collection at the same place (not registered in the electronic database yet).