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FREDERICK M. HOCKER

The Brown's Ferry Vessel: An Interim Hull Report

In 1971, sport diver Hampton Shuping discovered the brick-filled remains of a wooden vessel in the Black River, above Georgetown, South Carolina. Artifacts associated with the wreck suggested a colonial date; and in 1976, the vessel and cargo were excavated by the South Carolina Institute of Archeology and Anthropology (SCIAA) under the direction of Alan Albright, the State Underwater Archaeologist. The hull itself was raised and transported to a storage pond until conservation began in a purpose-built facility in Columbia, South Carolina (Albright and Steffy 1979). Conservation in polyethylene glycol was completed in 1990, and the vessel now awaits transportation to its final home, the Rice Museum in Georgetown, where it will be reassembled for display.

The cargo, approximately 25 tons of building bricks probably destined for Georgetown or Charleston, was also recovered, along with a small selection of ceramics and other finds, in addition to a large quantity of debris from the 18th through 20th centuries (including two automobiles) that had accumulated over the site. The amount of debris has complicated the dating of the vessel, but those artifacts most closely associated with the hull consistently date to the mid-18th century. Unfortunately a firmer date is not possible; the timbers of the hull were sampled for dendrochronological analysis, but the results were inconclusive. Wood analysis did reveal that the hull is built entirely of local timber, primarily cypress, pine, and live oak.

At the time of its excavation, the Brown's Ferry vessel was the earliest American-built vessel yet discovered, with the possible exception of the so-called *Sparrowhawk* from Massachusetts. Despite the discovery in the 1980s of craft of earlier date, such as the Hart's Cove, Water Street, and Lyons Creek vessels, and the Quebec bateaux, little is known about the technical aspects of North American ship- and boatbuilding in the colonial period. Moreover, many of the other colonial finds seem to be more or less in the mainstream of European

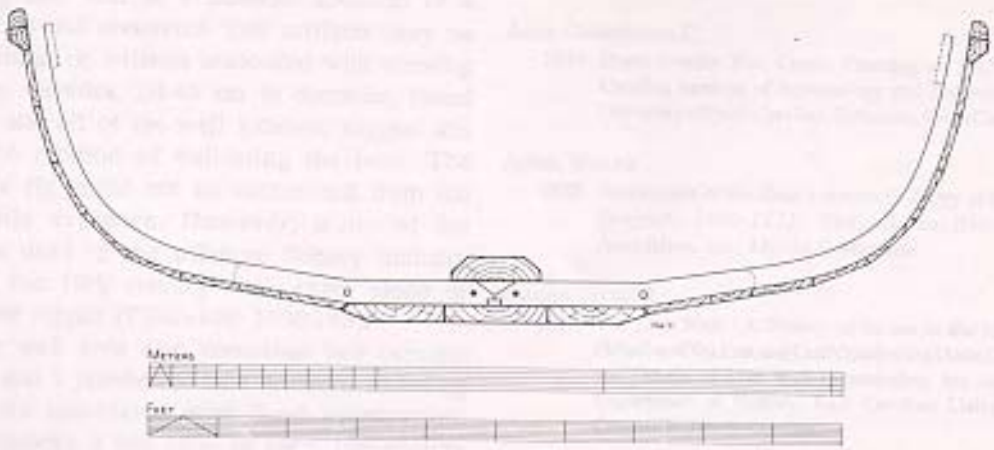

FIGURE 1. Brown's Ferry Vessel construction section amidships, from aft.

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boatbuilding, representing the dominant clinker and carvel traditions, while the construction of the Brown's Ferry vessel is unique, possibly mixing Old World methods of design and construction with elements ultimately derived from Native American craft. Oddly, while the Brown's Ferry vessel is the earliest example of a distinctly "American" boatbuilding tradition (with the possible exception of the Quebec bateaux) and bears some conceptual resemblance to later American vessel types (particularly the gundalows of New England and the goelettes of the St. Lawrence), it seems to be something of a dead end in the South. Approximately two-thirds of the primary structure of the vessel survives with most of the missing material lost at the stern. Both sides were preserved to nearly their full height amidships although a large section of the starboard side had broken off at the turn of the bilge and lay alongside. A long section of the wale also survived from the starboard side. The lower portion of the stem was still in place, but little of the sternpost and its associated structure remains. Nothing survives of the deck, except a possible knee, but a windlass and its bitts were recovered from the bow. Most of the timber was in good condition at the time of recovery, but there was extensive gribble damage to the exterior surfaces of the bottom and lower side planking. After conservation, the softwood components (bottom, keelson, and planking) are in remarkably good condition, but the live oak frames and posts have twisted, shrunken, and checked rather badly in places.

Scantlings strongly indicate that the vessel was built using Imperial measurements, with most timbers finished to dimensions in whole or half inches. As reconstructed, the vessel was 50 ft. 3 in. (15.32 m) long exclusive of the missing rudder, with a moulded beam of 13 ft. 7 in. (4.14 m), extreme beam of 14 ft. 2 in. (4.32 m), and a sheer height of 4 ft. (1.22 m) amidships. The recovered cargo suggests a maximum deadweight capacity of 25 tons, but this leaves very little freeboard.

The principal feature of the hull, in both shape and structure, is the bottom (Figure 1). This is a flat, lanceolate platform originally approximately 46 ft. (14 m) long and 4 ft. 5.5 in. (1.36 m) wide, made up of three, straight, pine planks from 3-3.5 in. (7.6-8.9 cm) thick and up to 18.75 in. (47.6 cm) wide. The irregularities in plank thickness are all accommodated on the interior surface, leaving steps of up to 0.5 in. (1.3 cm) between adjacent planks. Steffy (1979) suggested that the bottom planks were aligned by 0.75 in. (1.9 cm) edge dowels, but careful probing of the seams revealed no trace of such dowels. The stem and sternpost assemblies are fastened directly to the upper surface of the bottom, and a bevel for the garboard is worked in the upper, outboard edge.

The stem is made up of three live oak timbers (Figure 2): the stem proper, a light false stem, and an apron—all but the false stem treenailed to the bottom. The preserved portion of the stem is a relatively broad (moulded up to 15 in. (38 cm), straight timber with a narrow rabbet cut into the after edge. Its lower end sits in a shallow rebate cut in the upper surface of the bottom and hooks over the forward end of the bottom. The false stem was originally moulded up to 4.5 in. (11.4 cm) and sided 3 in. (7.6 cm) but has deteriorated badly. The apron is a large knee spanning the stem-bottom joint and continuing up the inner face of the stem to an undetermined height. In addition to supporting the stem, the apron acts as the primary nailer for the hooding ends of the planking. The upper portion is relatively light, moulded 3-4 in. (7.6-10.2 cm) and sided 6.75-8 in. (17.1-20.3 cm), but the lower portion attached to the bottom is a broad foot (sided 19.25 in./48.9 cm at the after end) that also supports the forward end of the keelson, two frames, and a step for a bitt. The three components are fastened together by two iron forelock bolts 1 in. (2.5 cm) in diameter and numerous iron spikes.

Very little of the sternpost survives as it lay at or above the surface of the mud, but the basic structure appears similar to that at the bow. A straight post (now missing) was reinforced by a stern knee with a broad foot attached to the upper surface of the bottom. Only the lower portion of the stern knee remains, but enough

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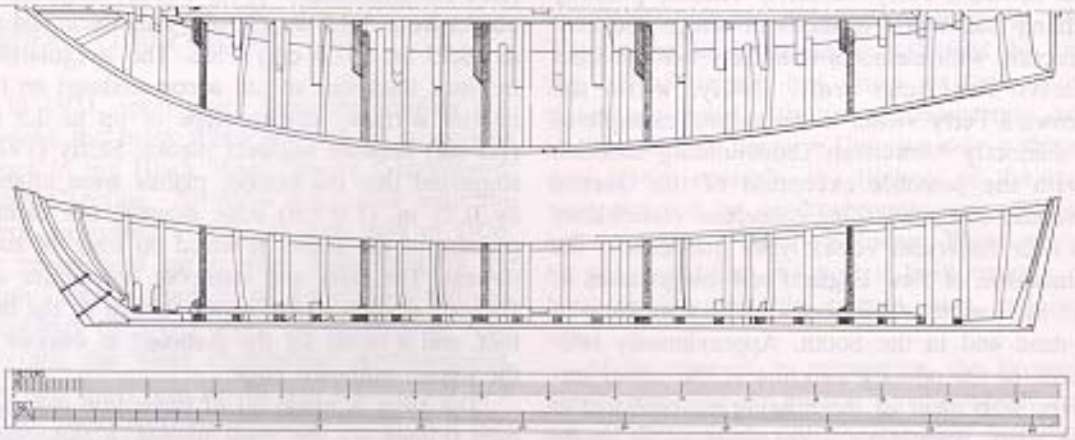

FIGURE 2. Framing plan; the shaded frames have the futtocks and floor timbers fastened together.

of the after face survives to indicate a sternpost rake of approximately 15° from the vertical.

Twenty frames, numbered consecutively from the stern, are treenailed to the bottom, with two smaller frames fastened to the upper surface of the apron (Figure 2). Each consists of a roughly symmetrical floor timber and two futtocks; except for the forwardmost frame, the futtocks are set behind their respective floor timbers. The floor timbers are sided from 4-6.5 in. (10.2-16.5 cm) and originally moulded a nominal 4.5 in. (11.4 cm), but reduced in places by joggling to fit the uneven surface of the bottom planks. Each floor has a rectangular limber hole cut near the centerline. Futtocks are less regular than the floor timbers, often preserving

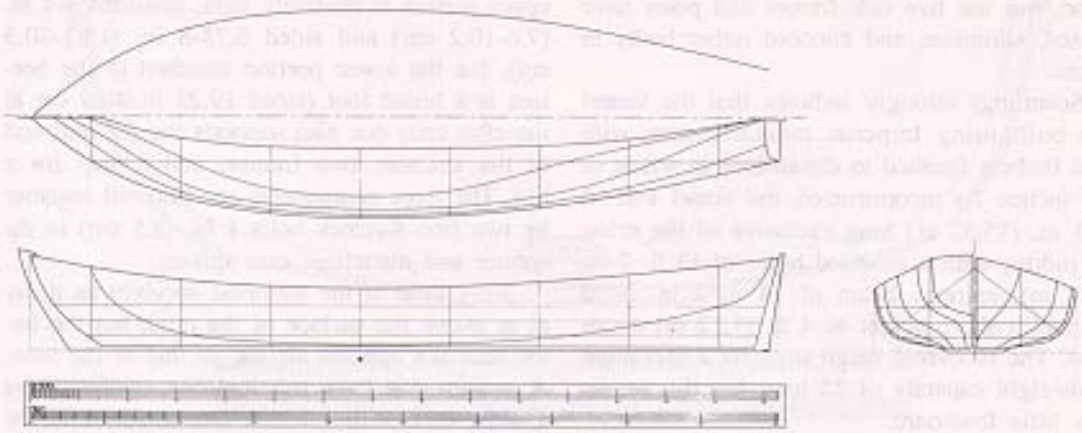

FIGURE 3. Preliminary line drawing.

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sapwood and even bark in places, but are slightly smaller in scantling, sided from 3.5-5 in. (8.9-12.7 cm). Five frames, including the midship frame (Figure 2), have floors and futtocks fastened together by two nails and a treenail at each joint; the other futtocks are free.

In addition to the regular framing, there are a number of free, intermediate futtocks that may be later additions. These are arranged in pairs in every third room, beginning forward of frame three. Two of the regular frames (numbers 8 and 14) are reinforced by second futtocks in line with the floor timbers. It is possible that these are actually the lower ends of standing knees to support beams.

Most of the frames are clamped to the bottom by a cypress keelson 36 ft. 4.6 in. (11.08 m) long, sided up to 15.75 in. (40 cm), and moulded up to 4 inches (10.2 cm). The timber is essentially rectangular in section but with deep chamfers on the upper edges (Figure 1). The forward end is fastened to the upper surface of the apron, but the after end rests atop the second frame from the stern. At nearly every frame, the keelson is fastened through the floor timber to the bottom by a pair of treenails; the second frame has no fastenings, several frames toward the stern have only a single treenail, and the keelson is fastened to the ninth frame by a pair of iron spikes. Two rectangular maststeps are cut directly into the keelson, one at the forward end, atop frame 20, and the other aft of amidships, between frames 11 and 12.

The hull is planked with pine 1.125-1.25 in. (2.9-3.2 cm) thick. The planking is arranged in 8 strakes on either side, each strake comprised of 2 to 4 planks up to 11.25 in. (28.6 cm) wide. Planks meet in butts which are staggered but roughly symmetrical from side to side. In the preserved portion of the hull, the strakes are continuous, without stealers or drop strakes. Each plank is typically fastened to each frame by one nail and one treenail, but there are exceptions. The planks (except for the garboard) were backed out with an adze to fit the curvature of the regular frames rather than the frames dubbed flat to take the planks. The free intermediate frames, on the other hand, were dubbed to fit the planking. The forward ends of some of the upper planks were kerfed with an adze to facilitate bending them into the bow. The lower edge of the garboard is bevelled to fit the "rabbet" formed by the bevel in the upper edge of the bottom. The seams appear to have been caulked, as indicated by the impressions of caulking irons, but no remains of caulking material seem to have survived.

The hull is strengthened by a cypress wale 4 in. (10.2 cm) wide and 3.5 in. (8.9 cm) thick, with a broad chamfer along the lower edge. A section 24 ft. (7.32 m) long survives from the starboard side, but the after end is badly eroded. It is irregularly nailed or treenailed to most frames, and two large iron bolts are preserved at frames 4 and 12. At the mainmast step, there is a pair of eroded vertical holes, 5.5 in. (14 cm) apart, bored through the wale; these are probably the attachment points for the mainmast shrouds. A rail 3 in. (7.6 cm) square is nailed to the upper surface of the wale. Nails for this rail are preserved far enough aft in the wale to suggest that there were no raised bulwarks in the stern.

The sequence in which the Brown's Ferry vessel was constructed can be deduced with some confidence from the preserved remains. The bottom was the starting point, as a panel assembled from straight, heavy planks. Once this panel was laid up and temporarily fastened or clamped together, it was cut to the lanceolate shape that determined the shape of the rest of the hull. The posts were attached and the rabbet/bevel worked in the upper edge. With the backbone complete the midship frame (number 13) was gotten out, fastened together, and treenailed to the bottom at its widest point. Unlike the other frames, the midship frame was not joggled to fit the bottom but the bottom fayed to the frame. The shapes of the other made frames, numbers 4, 9, 16, and 20, were determined and the frames gotten out and erected on the bottom. With these 5 key frames and the posts in place, the garboards and probably the wales could be added. Besides providing more attachment area for the other frames,

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the garboards and wales offered clear indication of the deadrise at each frame and the location of the heads of the frames. As the shape of each frame consists essentially of a single, unchanging bilge curve combined with the deadrise at the bottom, little more information was necessary to determine the shapes of the remaining timbers. Once framing was complete, the keelson could be fastened in place and the rest of the plank hung.

The final shape of the hull is surprisingly graceful for a river barge, in spite of the flat bottom (Figure 3). There is a small amount of deadrise outboard of the bottom, even amidships, with full but moderately soft bilges. Towards the ends, the deadrise increases significantly, forming a chine at the garboard seam and contributing to hollows at the forefoot and skeg. The full bilges are carried well forward and aft but rise appreciably, with no tumblehome. The entrance is fine, with some hollow, and the run is quite long and fine. The rake of the stem is moderate in the surviving portion, contributing to the fineness of the entrance. At the stern, the vessel was originally reconstructed as a double-ender with a curved sternpost (Steffy 1979), but the length of the preserved portion of the wale and the full curvature of frame 4, most of which survives, indicate a straighter run of the upper strakes into a flat stern. The details of shape and structure are unknown because so little of the stern survives, but the shape of frame 4 suggests a deep, narrow transom.

It is curious that such a complex shape should be found in a river vessel ending its life carrying bricks. The design effectively negates two of the normal advantages of flat-bottomed construction: increased carrying capacity for a given draft and simplicity of construction. The bottom flat is relatively narrow, and the moderately soft bilges combined with the long, fine run further reduce carrying capacity from the potential maximum. The refined shape also requires large quantities of compass timber and the determination of changing frame shapes over the length of the hull. In many ways, the Brown's Ferry vessel is less a flat-bottomed boat than a conventional round-bottomed boat with a very wide, flat keel. It seems likely that the heavy, flat bottom's primary purpose was functional, to serve as a broad foot when the vessel took the ground for loading and unloading at the relatively undeveloped port facilities along the rivers of colonial South Carolina (Nylund 1988).

There are strong indications that the shapes of the key frames were determined by whole moulding. The curvature of the bilge is constant in all of the preserved frames except those in the extreme bow but rises and narrows along fair lines. The substantial hollow in the ends is typical of cruder forms of this design method as is the development of curves that can be difficult to plank in the bow. In the case of the Brown's Ferry vessel, the hollows may have improved lateral resistance in such a shallow hull by presenting more vertical surface to water at the ends, but it is difficult to say whether such an effect was intentional.

The construction falls conceptually into a boatbuilding tradition in which the bottom, rather than the shell or skeleton, is the primary element of design and construction. Many boats built in this tradition, mostly flat-bottomed, inland craft, are known from northwestern Europe, particularly England and the Low Countries, from the Roman Period onward. The so-called "celtic" vessels of England and the Rhine, medieval cogs, and Dutch vessels of the Renaissance are all "bottom-based" in their design and construction (Hocker 1991). The concept was brought to the New World by European settlers and flourished on the inland waterways of the colonies. A large number of bottom-based vessels are known from New England and Canada: bateaux, dories, gundalows such as the Revolutionary War gunboat *Philadelphia*, and the goelettes of the St. Lawrence. In each case, the bottom is an essentially flat panel made up of straight planks and sawn to shape. This panel, temporarily fastened together on trestling, is stabilized by the addition of heavy floor timbers. The rest of the vessel is built on this structure using conventional clinker or carvel construction, but the basic struc-

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tural concept behind the process is neither a "shell" nor "skeleton" philosophy but a separate, distinctive idea based on the bottom as the primary element.

That said, it is entirely possible the Brown's Ferry vessel is not the product of a European bottom-based boatbuilding tradition transferred directly to the Carolinas but the combination of conventional European carvel construction with Native American elements. Early travelers through the Carolinas and Georgia report the widespread use of dugouts of Native American type and "periaugers," vessels larger than dugouts but still based on a log bottom (Fleetwood 1982). Where a single tree was not large enough, a completed dugout might be split longitudinally and a central plank or planks inserted. In such an environment, it seems likely that the Brown's Ferry vessel is the ultimate development of the periauger that is still recognizable as such. The flat bottom made of three heavy planks is the vestigial remnant of the dugout-derived log base, but the remainder of the vessel is squarely in the European whole moulded, carvel tradition. The reason such craft appear to be a dead end in the later Carolinas may be that, once wharves and piers were more widespread, there was less need for the heavy bottom and it disappeared, leaving an otherwise conventional boat. Where flat-bottomed boats continued to be used, they were not of the Brown's Ferry type but more typical straight-sided, hard-chined craft, such as the ubiquitous rice barge.

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Frederick M. Hocker
Institute of Nautical Archaeology
Texas A & M University
College Station, Texas 77843