Pearce Paul Creasman
October 17th 2003
Revised- Nov. 11th 2003

Possible Beginnings: Development of the Sail

Any newspaper columnist, journalist or reporter will say that there are a few basic elements that make up a good story: who, what, where, when, why and how. These are precisely the elements that archaeologists seek to uncover as well. In the constantly broadening history of the sail and sailing as is currently known, the what is obvious, and the who, where, when and why all have acceptable or at least satisfactory answers, for the time being. That only leaves the how. How did the sail develop? For such a crucial element in seafaring and human history and development very little, if anything, can be said with certainty on this question. In the coming pages I intend to briefly cover the who, what, where, when, and why, and then in more depth explore some proposed ideas for the how; How did the sail develop?

In any field of science or research debate is bound to occur, and when it comes to who developed the sail in the past there has been no shortage. It almost need not be said but if we know who developed the sail we almost certainly know where it was developed, although there are notable exceptions to this type of rule, e.g. the Peoples of the Sea. While it is generally accepted today, as noted by the distinctly small proportion of published works refuting Egyptian dominance in this area, that the Pre Dynastic Egyptians championed the development of the sail. However, works by S. Lloyd, F. Safar, A. Salonen, and R.D. Barnett suggest, or leave open the discussion, that it is possible the sail developed in other areas, such as India, Mesopotamia, and Palestine, but the reason we see the majority of evidence in Egypt is due to the environmental

conditions (Bowen 1960a: 124). Egypt's arid climate is much more friendly to preserving organic materials than other places where sails may have developed. This seems to be slightly overstated as all of the evidence for the beginnings of the sail in Egypt comes from paintings on pottery or tomb/temple iconography, and it is likely that if the sail had developed elsewhere that there would have been similar remains in a similar time period.

If any physical remains do exist from the time of sail inception they would certainly require a good environment for preservation. Even in a great environment for preserving artifacts there will still be holes in the archaeological record. It is likely that boats have been used by the people inhabiting Egypt long before any trace could be left for archaeologists to discover (Petrie 1933: 1). In Egypt the oldest unmistakable records of sail are limited to only a few vase paintings, dating to the late Gerzian period, 3500-3100 BC, (Landstrom: 6). Figure one is dated to approximately 3200 BC, and is the subject of some debate as to the validity of claiming the noted portion a definitive example of a sail (Bowen: a 117). However, figure two represents and unmistakable depiction of a sail and is only about 100 years later than the previous vase painting (Bowen: a 117). I do not see it as unreasonable to take figure one as a valid representation of a sail, as it is only 100 years prior to solid evidence of a sail. Based on the length of time it has taken other ship-related styles (over 1000 years to complete a shift of lashed/laced construction and pure mortise and tenon) to change over time (Bass: 3-30). And just for good measure, it is also argued by Bowen that there is a third vase painting (figure three) that represents an early version of sail contemporary to the first two (a: 119). I will discuss this figure in more depth below.

Another important question in understanding the development of the sail is "why?" Richard Steffy helps to shed some light on this question as he says, "…boats were always the means to an end, and usually that end was profit, convenience, security, or victory" (Steffy: 23). Here Steffy is referring to the purpose of boats in general but this can be very appropriately applied to the introduction of the sail. The sail allowed for greater profit as it is likely that fewer men were required to operate a cargo vessel with a sail as opposed to rowing or paddling. Fewer men require less money per voyage and allow more room onboard for the cargo itself. The sail could also be a measure of convenience as the Nile's winds blow generally up river, thus requiring less human effort to travel in that direction and since sails can be furled or dismantled going down river with flow of the waters would have been convenient. Sails can also make for a faster escape, if a vessel is in danger, than a vessel that is only rowed. For obvious reasons speed and maneuverability can come in handy in a battle situation as well. The sail meets all of these ends with positive returns. It is clear that the addition of a sail supports and enhances Steffy's definition of the purpose of boats in general.

Now that the who, what, where, when, and why have acceptable answers the only question left is "how?" How did the early development of the sail take place? This is a very ambiguous question, so much so that many textbooks and many other publications trend towards vagueness when confronted with this question (Hornell: 25, Laszlo and Woodman: 9 and Landstrom: 2). There are several theories on the early development of the sail, in Egypt two in particular that are very interesting: 1- the sail developed from the use of skin shields in ceremonial purpose on boats and 2- the sail developed from the palm fronds present on the bow of boats. It is important to remember that the analysis of

these theories is based solely on iconographic representations and ethnographic studies, as no confirmed physical vessel remains, of any help here, have been found dating back to the Gerzian or Amratian periods. Also important to keep in mind is that artistic representation and deciphering can be very confusing and is constantly being evaluated and criticized. Thus one person's conclusions about a five-thousand-year-old vase painting may not be the final word.

With the previous concerns noted, there is strong support for the sail as developing from the use of skin shields. Both F. Petrie and Richard LeBaron Bowen support this view (Petrie 1920 and Bowen 1960a). I find that by using Petrie and Bowen's explanations of several wall and vase paintings, I can form somewhat of a link and add support for their argument that the device in figure one represents a skin-shield sail. They point to figure three as the earliest clear evidence for this theory, as this design comes from a vase decorated in the Late Gerzian period style. The design under the second triangle from the left is used as the earliest evidence for this claim (Bowen: a 119). While it is not clear exactly what this figure represents based on only this vase painting alone, it becomes clear when it is compared to other paintings of the same period. Figure four is a Late Gerzian portion of a wall painting found at Hierakonpolis in Upper Egypt (Bowen: a 122). This is clearly one person protecting himself from another with a (leopard ?) skin shield (Bowen: a 122). It only stands to reason that the skin must be stretched over some kind of frame to be effective as a measure of defense. From this representation we can now look at another, figure five, and see clear resemblance of the two "shield-shaped" sketches with a vertical pole (possibly a tail, but if it is a tail why is it extended though the whole of the figure?) extending down from their centers (Petrie

1920: 21). As Petrie points out, this painting is remarkably similar in both style and format as those in figure six, with one notable exception, the shape of the "shields" are much more squared and less resemble an animal skin and more so a sail (Petrie 1920: 21). These squared "skin shield" representations now become very important in justifying the statement that our original figure, figure one dating to 3200 BC, can be see to have the same "skin shield" representation at its bow. Since figures one through six date to the Gerzian period, a legitimate chain can be formed to show the progression from what is surely a skin shield (fig. 4) to the application of it in position to be used as a sail (fig. 1). See Appendix B for figures 1 through 6 arranged in order to better follow this chain.

Now, it is not suggested that someone had an epiphany and decided to use a skin shield as a sail. In fact, Bowen says the opposite; it must have been quite by accident that as a custom of the Nile is to place banners hanging from a pole someone must have hung their shield (1960a: 120-121). Again, it is likely that the shields were hung originally for ceremonial purposes (*ibid:* 121). If shields were regularly placed on boats during religious ceremonies, as banners were, Bowen asserts that it would then be "only a matter of time until man observed that the shield would motivate the boat" (1960a: 119). Since these shields are estimated to be only about four to five feet long, it is suggested that the benefits of hanging a shield would have been first noticed on very small craft (Bowen 1960a: 121).

Although Bowen, uses Petrie's work to support the idea of skin shields gradually developing into the sail, it should be noted that Petrie himself was not is such agreement, as he holds that figures one, two, three, five and six all simply represent sails, period (Bowen 1960a: 120 and Petrie 1920: 21). Petrie's issue seems valid since there are (or

were when he was studying) no other examples of animal skins in similar circumstances. Unfortunately, the earliest hieroglyphs of sails are not dated until the Old Kingdom and cannot be applied to help settle debate in the earlier periods (Bowen, 1960a: 122). However, there is other evidence of later periods that can be used to support the theory that the sail developed from the skin shields.

The structure of the sail, until about 1200 BC with the relief on Rameses III's naval victory, is constant. The sail is confined between both a yard and a boom (Bowen 1960a: 123). What is the advantage of a boom in early sails? Bowen states there is none and it would just be cumbersome and hazardous to those navigating or riding on the boat, yet it was maintained for over 2000 years (1960a: 122). People are conservative and resistant to change; if nothing else, that much is known about virtually all people. There is evidence of this in other aspects of shipbuilding history, again in the transition of laced and mortise-and-tenon built ships; for the difficult sections of the ship (bow and stern typically) the shipwrights revert to their old methods, even when older methods had become obsolete due to the new methods of construction employed. In light of this trend, and support for the existence of a boom from the Old Kingdom until Rameses III's reliefs (Assmann: 157-161), if there is no practical reason for retaining the boom, with regard to the efficiency of sailing, then there must be a cultural significance or trend. Again, Bowen suggests that here it is trend that is responsible. If sails originated from skin shields, then they should have the same or similar framing structure, such as the lower support beam or the boom on a sail (1960a: 123). Also, several representations of Old Kingdom yards curve upwards and, based on the same line of thought that compensates for the boom, Bowen, by way of the Deir el-Gebrawi reliefs, interprets this upward curve

as a remnant of the curvature seen when stretching a skin to fit a frame; the skin sags at the top center (1960a: 123). Why make a curved yard when a straight one will do? Why did the Egyptians use a curved yard when in many other locations evidence reveals straight yards? To these questions Bowen would respond that these are signs of "vestigial evidence showing that the first sails were modeled after shields," (1960a: 123). More vestigial evidence comes in the nature of lifts. By viewing the Deir el-Gebrawi reliefs as well as others it is obvious that the curved yards required lifts. These lifts, for Bowen, are similar to the pole holding up the shields in figures three, five and six. It should be noted that for ships with straight yards, from the Old Kingdom, lifts are not present (*ibid:* 124). All of this evidence certainly lends support to the theory that the sail developed in Pre Dynastic Egypt from skin shields, but it does not confirm this. Another possibility is the development of the sail from the palm fronds on the bow of these early Egyptian vessels.

It is likely that the sail, as seen in figure one, took hundreds of years to develop, and while Bowen's explanation of sail evolution is limited to the period in which figure one is dated, there is evidence that suggests differently in figure seven. On this pottery from the preceding Amratian period, 4000-3500 BC, there is a representation of a palm frond(s) at the bow of boat (Hornell 1945: 25 and Petrie 1933: 13). If a solid case can be made for the development of the sail from palm fronds, it will have the advantage over the "skin-shield" theory in that the palm-frond theory allows more time for development of the sail. Currently, the best time frame that can be offered by the "skin-shield" theory is that the sail must have developed before the late Gerzian period, while the "palm-frond" theory could add a minimum of 300-400 more years to allow the sail to develop,

which seems not unreasonable. It is important to note that from evidence in the Amratian through the Gerzian period the number of palm fronds represented on pottery grows steadily, to the point where Petrie calls the collection on the bow a "grove," (Hornell 1945: 25). It cannot be doubted that the Egyptians at least observed the effect of a breeze on the palm fronds, brushing them about: this could be the seed of "accidental invention" that Bowen suggests also exists with the "skin shield" theory (1960a: 120-121).

Hornell casts doubt in regards to palm fronds representing the origins of the sail as he notes there is ample propulsion (paddles or oars) on the Amratian and Gerzian period vase paintings and thus there is no need for sail development (1945: 25). Yet, redundancies are seen throughout ship building history where one, two, or several patterns/technologies that perform the same function on a single vessel exist side by side (why have a rudder with loose-footed sails unfurled in a windy region if both are for direction, or why have laced and mortise-and-tenon construction on the same ship if both are for rigidity?). It is fortunate that the evidence for bow palms extends back to the Amratian, for nearly 900 years could have passed between the date of the earliest existence for the palm frond (figure seven) and the earliest evidence for the occurrence of the definite sail (figure one). Other than this objection, Hornell falls into much the same category as those mentioned at the beginning of this paper, those who are still ambiguous as to "how" the sail developed.

Hornell does, however, lend a very useful bit of information to the palm frond theory; he notes that there is "…an invariable association of the leaf decoration with the prow," (1945: 25). Noting the position of the frond is important to this theory when combined with Bowen's research on mast position. Bowen's data draws a relation

between age of ship and mast distance from the bow. He found that the older the representation of a ship with a sail, the farther the mast is towards the bow (1960a: 126-128). This information extends from the Gerzian period to the time of Hatshepsut's ships, without exceptions, but is not a complete study (*ibid*). The next logical question is "why does this relationship exist?" Using Hornell's assertion that the palm fronds are always associated with the bow of a ship and that over time there is a multiplying of the fronds (Petrie) and migration of the mast away from the bow (Bowen), it is reasonable to conclude that these larger "groves" of fronds develop into a very practical method of propulsion and may be seen adapting to that purpose. Only through trial and error, and over time, could the Egyptians have discovered that a single mast is better positioned closer to amidships, and this is demonstrated in the archaeological record.

What is not demonstrated in the archaeological record, however, is the "invariable association" of the skin shield near the bow of the boats as is the case with the palm fronds. It seems that on the contrary, the banner poles, to which Bowen suggests the shields would be affixed (1960a: 120), are almost restricted towards the stern end of the boat, or at least aft of amidships (an assessment based on a visual survey of the vase and wall paintings Bowen, Petrie, and Hornell have used to support their arguments and included or noted in publications). Also, Bowen suggests that the shields made of skins are usually placed between the two shrines on the boats (1960a: 119). Again, based on a visual survey, it seems that these "shrines" are usually located at or around amidships. From this information it is safe to say that the skin shields are placed either at or aft amidships, with only one exception to this (figure three) where the figure in question is

only about 1/3 from the bow. Yet, even in figure three the skin-shield/sail is still not near as forward as the palm fronds.

What does all of this discourse on the position of fronds and shields suggest? It suggests that there is no precedent for the placement of skin-shields towards the bow of the boat (based on Bowen, Petrie and Hornell's publications). Since it can be shown that the mast worked its way back towards amidships, and evidence supports a coinciding possibility for the palm fronds, then the "palm-frond" theory here has a leg up on "skin-shield" theory, as "skin-shield" theory lacks support for a similar trend.

I have evaluated a few of the possible early developmental theories of the sail and drawn comparisons and contrasts. The who, be it Egyptians, Phoenicians or Mesopotamians, the what- the sail in this case, the where, when- early Gerzian or Amratian, why- for "profit, convenience, security, or victory" (Steffy: 23), and how- be it from skin shields, palm fronds or other, are again the crucial elements of a story, and archaeology is about uncovering our story. I am not aware of the resources and discoveries available at the time those who I have referenced were working and it is important to build on past research not attack or insult it. I hope that I have not done so specifically in regards to Bowen, Petrie, and Hornell's works. The intent of this paper is to explore the early development of the sail in light of certain theories and I hope to have done as such.

Bibliography

Assmann, E. 1913. “Die Schiffsbilder.” *Das Grabdenkmal des Konigs*. Lepzig.

Barnett, R.D. 1958. Early Shipping in the Near East. *Antiquity,* pp. 222.

Bass, G. F. 1972. *A History of Seafaring Based on Underwater Archaeology.* Thames and Hudson: London.

a- Bowen, Richard LeBaron Jr. 1960. “Egypt’s Earliest Sailing Ships.” *Antiquity*, vol. 34, pp.117-131.

b -Bowen, Richard LeBaron Jr. 1960. “Raising Sail in Third Millenium B.C. Egypt.” *MM*, vol. 46, pp. 1-6.

Hornell, James. 1943. “The Sailing Ship in Ancient Egypt.” *Antiquity*, vol. 17, 27-41.

Hornell, James. 1945. “‘The Palm Leaves on Boats’ Prows of the Gerzian Age.” *Man (Record of Anthropological Science)*, vol. XLV, 19-36, pp.25-27.

Landstrom, Bjorn. 1978. *Sailing Ships*. Doubleday: Garden City, New York.

Laszlo, Veres and Richard Woodman. 1999. *The Story of Sail*. Naval Institute Press: Annapolis, Maryland.

Lloyd, S. and F. Safar.1948. Eridu. *Sumer*. IV, pp. 115-127.

Petrie, W.M.F. 1933. "Egyptian Shipping," *Ancient Egypt and the East* I & II (March and June), pp 1-14, 64-75.

Petrie, W.M.F. 1920. *Prehistoric Egypt.* BSAE 31. pp. 15-49.

Steffy, J. Richard. 1998 “*Wooden Ship Building and the Interpretation of Shipwrecks.”* Texas A and M Press: College Station, Texas.

Vinson, S. 1987. *Boats of Egypt Before the Old Kingdom.* M.A. thesis, Texas A&M University.