Seafaring in Ancient Egypt

Cheryl Ward

For more than 40 years, Abdel Moneim Abdel Halim Sayed sought evidence to expand our knowledge of ancient Egyptian seafaring in texts, images, and along the Red Sea coast. His work in this area provided the first, and for many years, the only physical evidence of a second millennium BCE presence on the Red Sea and inspired a number of students and scholars to further explore questions related to the nature of Egyptian voyages on the Great Green. This brief contribution assesses the impact of Professor Sayed's discoveries at Marsa Gawasis on our understanding of the business of going to sea in the Middle Kingdom through an evaluation of relevant finds from the joint Italian–American expedition at Gawasis currently directed by Rodolfo Fattovich of the University of Naples l'Orientale and Kathryn Bard of Boston University.

The origins of seafaring in the Red Sea are currently ill-defined, but the presence of Red Sea shells at Nile Valley sites in increasing numbers from the Naqada II period onward suggest a growing familiarity with the Eastern Desert and Red Sea coast. At the same time, models, images, and by the early First Dynasty, planked wooden boats at Nile sites show a steady development of boatbuilding technology. Twenty-two ancient Egyptian watercraft built for use on the Nile date from about 3000 to about 500 BCE.[1] As Egyptian construction techniques used to build these riverine vessels differ significantly from those of later Mediterranean seagoing craft, many scholars assumed that Egyptian ships would more closely reflect Mediterranean-type construction. For example, river crafts were built of thick planks fastened by lashing and by mortise-and-tenon joints that were not locked in place with pegs. These wooden boats are built like those of no other culture in the world then or since. I have argued elsewhere that wooden boat building technology evolved independently within Egypt in response to local conditions and within a social structure that relied on boats as a means to legitimize power through participation in a regional trade network at least occasionally accessed via the Red Sea before the third millennium.[2]

Early boat builders in Egypt had sufficient raw materials, easy conditions for traveling on the Nile, and other resources that made travel attractive to sedentary populations. Abundant native timbers and buoyant grasses or reeds allowed experimentation and evolution, both of which are visible archaeologically in the earliest villages in Egypt. Tracing Mediterranean seafaring this early is also tenuous, but possible through inscriptions of the Second Dynasty ruler Khasekhemwy (*c.* 2714–2687 BCE) at Byblos, Lebanon, and by identifying contact with the northern branch of Mesopotamian civilizations along a Mediterranean route.

The Palermo Stone presents scholars with the first secure written evidence for Mediterranean seafaring in a mention of 40 ships, loaded with cedar, in the early Fourth Dynasty reign of Snefru. Cedar, desired for its strength, durability, beauty, ease of working, length, and particularly its incense-like odor, grows even today in the mountains of Lebanon, and its traditional source in Egyptian texts is Lebanon. Two ships disassembled and buried beside Khufu's Fourth-Dynasty Pyramid at Giza are built of imported cedar, and as the Fifth Dynasty King Sahure, Khufu used the epithet "Two Falcons of Gold" inscribed on a gold Egyptian ax head found in Lebanon.

The entire inscription reads "the boat crew 'Pacified-is-the-Two-Falcons-of-Gold' port gang" and epitomizes the standard division of naval crews into groups that reflect the stations of a ship. Sahure's mortuary temple (2458–2446 BCE) at Abusir illustrates 12 ships with fine details of rigging, constructions, and passengers. Recent excavations at Abusir have revealed more decorated fragments that include an incense tree and mention of a trip to Punt along the Red Sea, indicating a broad familiarity with ocean travel that has been unappreciated by many scholars for this early date. Sahure's expedition took place in his thirteenth regnal year and provided not only incense trees but also 80,000 measures of myrrh alone, a capacity that indicates relatively large ships with crews experienced and capable of navigating the reef-lined shores of the Red Sea more than 4500 years ago. These ships were called *kbn.t* (Byblos) or *h'w* ships until the Late Period.

The ships of Sahure have much in common with other Egyptian ships of later date but differ significantly from the ceremonial, and likely towed, river ship of Khufu. Like the illustrations of Hatshepsut's (1502–1482 BCE) Punt ships nearly one-thousand years later, Sahure's ships required reinforcement in order to maintain the hull's integrity and shape. A hogging truss, looped around the outside of Sahure's ship but tied into the hull on Hatshepsut's, was tightened with a simple device known as Spanish windlass in order to keep both of the high and overhanging ends of the ship under tension.

Although no illustrations of seagoing ships seem to have survived from the Middle Kingdom, other sources of evidence for seafaring exist. An abundance of imported cedar was available to nobles and lesser royalty for the construction of cedar coffins and other furniture, and the Eighteenth Dynasty King Senwosret III (*c*. 1878–1843 BCE) was buried with five (or perhaps six) Dahshur boats, suggesting regular traffic with Lebanon for cedar. In addition, the introduction of Red Sea marine motifs in royal jewelry at the time of Senwosret I (1971–1928 BCE) shows a strong connection to the region. Two inscribed stelae identified by Gardiner Wilkinson and James Burton near Wadi Gasus also record visits by officials of Senwosret II (1897–1891 BCE) and Amenemhet II (*c*. 1900 BCE).

It was Abdel Moneim Halim Sayed's archaeological investigation of Marsa Gawasis in 1976 and 1977 that provided definitive evidence of the ancient Egyptian expeditions to the Great Green.[3] The excavation of Middle Kingdom anchors and anchor blanks, shrines built of anchors, stelae describing trips by sea returning to *S3ww*, the named home anchorage of the Egyptian ships, and most intriguing of all, fragments of cedar planks with mortises and plank dimensions that correspond well to those of Nile craft provided tantalizing evidence of maritime activity based at Gawasis. Lengthy inscriptions that describe the construction of ships on the Nile and the Red Sea do not provide extensive details of the process,[4] but it is clear that the ancient Egyptians built ships on the Nile and then carried their ships across the Desert, in what Kenneth Kitchen has called 'ship kits'.

In 1994, the auther directed an underwater archaeological survey of the anchorages at Marsa Gasus and Marsa Gawasis.[5] At both sites, deep sand inside a fringe of coral was the predominant characteristic of the seabed. At Gasus, a single shipping jar was concreted to part of the coral reef, and at Gawasis, archaeologists succeeded in locating a probably 19th century European anchor, buried so deeply that only half a meter of its shank was exposed above the sand. The promise of Gawasis would be fulfilled only by terrestrial excavations, it was clear.

Marsa Gawasis and Wadi Gawasis, 2001–2006

Twenty-five years after Professor Sayed's work along the edge of the fossil coral reef at Gawasis, Rodolfo Fattovich of the University of Naples "l'Orientale" and Kathryn Bard of Boston University began survey and excavations at Wadi Gawasis. Their work revealed a series of carved rooms in the ancient reef during 2004/2005, and also uncovered extraordinary fragments of ship components. They continued to recover the world's oldest remains of seafaring ships during the 2005/2006 excavation season. In addition to the very presence of hull timbers at an archaeological site once located on the fringes of a lagoon linked to the sea, extensive damage to planks and fastenings by the shipworm, or marine borer, provides irrefutable evidence of seafaring. Discoveries at Gawasis prove that Egyptian design and construction techniques were successful both on the Nile and at sea. This report provides a preliminary review of those timbers excavated during 2004–2006 and offers comparisons to other Egyptian watercraft.

Most timbers found at Wadi Gawasis during 2004/2005[6] and those excavated during 2005/2006 were in contexts of discard, reuse, or recycling in ramps, entrances and walkways. Many planks were significantly reduced in size or reworked after being exposed to marine conditions as indicated by the presence of gribble. In addition to 53 individually documented ship components, archaeologists also identified about one-thousand wood debris fragments. These fragments are related to the dismantling of ships in concert with an aggressive hull cleaning and rot-removal process. Much of the wood debitage shows damage from shipworm infestation (Fig. 1).

During 2004/2005, archaeologists Chiara Zazzaro and Cinzia Perlingieri excavated and recorded wood objects recovered in carved rooms WG24 and WG28. Zazzaro's study of two steering oar blades (T1, T2) lying atop a deep deposit of windblown sand in the entrance to carved room WG24 indicates that they were from different oars, one measuring 180 cm in length, and the other 200 cm long. Other small planks are from boxes, furniture, and reworked thick (greater than 15 cm) hull planks. During the 2005/2006 season, planks, plank fragments, and other wood finds with features identifying them as hull components or maritime equipment were assigned numbers T1-T60, not inclusive. Wood debris collected from excavation squares by archaeologists received brief scrutiny and recording.

On site, as archaeologists encountered substantial planks or timbers during excavation, the extent of the plank was defined and then cleaned as quickly as possible for mapping into the site plan while reducing exposure to sun and wind. When possible, the plank was then moved to a sheltered location such as a cave where it was measured, drawn and recorded in detail, and recorded with digital photographs. The condition of some planks required in situ recording, and moving these planks resulted in disarticulation. Most planks are stored on site, but representative examples (plank T34, steering oar blades T1 and T2, and plank T12, among others) were packed into wooden crates and transferred to Supreme Council of Antiquities storage facilities at Quft on the Nile.

Archaeologists noted that wood objects tended to be either soft, powdery and weak, or strong and resilient. Preliminary wood identification of ship timbers by Rainer Gerisch suggests that although acacia is typically a hard and resilient timber, the softer timbers at Gawasis are mostly Nile acacia (*Acacia nilotica)* type and the much better preserved timbers are cedar, *Cedrus libani*, obtained from sources beyond Egypt's borders, or sycomore, a local wood (*Ficus sycomorus*). Whatever wood species was used, the quality was high, typically with fine grain. For example, the Gawasis examples have far fewer knots than the tamarisk Lisht timbers from the Pyramid of Senwosret I[7] and are comparable in quality to cedar used in the ceremonial cedar boats excavated outside the Pyramid of Senwosret III at Dahshur.

Analysis of the hull components revealed strong similarities to Middle Kingdom boat construction technology as illustrated in the Dahshur boats and the recycled working boat planks from Lisht (Fig. 2), but new or slightly different patterns and priorities are visible in the Wadi Gawasis timbers. In addition, thinner, less rigidly fastened planks with waterproofed seams permit speculation about deck-level structures designed to protect precious cargo and crew from the wind and waves of the Red Sea. As expected from analysis of all other ancient Egyptian watercraft, Egyptian shipwrights used paired mortise-and-tenon fastenings to join plank edges but did not lock tenons in place with pegs as later Mediterranean Bronze Age and Classical shipbuilders. No evidence for frames or ligatures and lashing in the portion of hull that would be below the waterline was recorded.

Timber types and fastenings

After documentation, excavated wood finds were classified into five types that reflect original function. Planks and wood fragments of unidentified function are classified as 'other'. Identifiable components of other artifacts, such as boxes or furniture, included in wood debris from excavation units were considered small finds and are not considered here.

Distribution of timber types

Transverse timbers (Type 1)	1
Hull planks (Type 2)	16, possibly 17
Deck planks, chamfered (Type 3)	7, possibly 9
Thin planks with ligatures (Type 4)	5
Auxiliary equipment	6
Other planks, undetermined	12
Fastenings and debitage	T38, T40 and lots W1-W166

A single transverse structural member (Type 1) has been found. Beam T32 is a complete deck-level beam made of cedar that was discovered with its original lower and rounded surface uppermost, in the open area outside of and parallel to the wall of the fossil coral terrace between the entrances to carved rooms 2 and 3. Its position probably reflects its re-use as an architectural element to stabilize sediments around the cave entrances. Ledges to receive deck planking are present on its upper face to either side of a central pedestal. Its ends, adzed into precise shapes that reflect hull curvature, were originally fastened to hull planks through square openings in each end.

A plank shape comparable to plank shapes from other Egyptian watercraft, similar dimensions, and damage from marine mollusks determined whether a timber was classified as a hull plank (Type 2). Sixteen planks are assigned to this category, and all sampled Type 2 planks are cedar. The most straightforward identification in this category is T34 from WG32, a knife-shaped plank (293 cm long, 46 cm wide, 15 cm thick) that is analogous to some planks in the Dahshur and Lisht assemblages (Fig. 3). Other timbers are identified as hull planks on the basis of their size (6.5 cm thick or thicker) in combination with fastening size and pattern (deep, usually paired, mortise-and-tenon joints), and evidence of shipworm damage, usually on one wide face and adjacent edges.

The third timber type consists of short lengths of planking (75–90 cm) with chamfered ends on one wide face, width up to 35 cm, and thickness of less than 5 cm (Figure 4). Type 3 planks are identified as deck planks because of their similarity in proportion and shape to deck planks from the Dahshur boats. Gawasis deck planks are better finished, slightly larger in scale than most Dahshur deck planks (52–68 cm long, up to 29 cm wide and 3.5 cm thick), and at 10 cm the angled portion of the lower face is longer than most chamfered ends of the Dahshur deck planks (4–9 cm).

Most Type 3 examples that were identified are cedar, some are sycamore. Many of these planks have traces of white plaster on at least one wide face; several showed signs of marine borer infestation. Numerous and deep adze marks and red paint over the damaged areas suggest these areas had been marked out for rot removal. That the rot and paint remain suggest the planks were more damaged than expected and were recycled as walkway components or wedged beneath larger planks on entrance walls to compensate for plank curvature. One example (T13, of sycomore) has a series of inscribed marks in the center of its lower face; another (T25) was originally a hull plank (Type 2) and was reshaped with chamfered ends before being recycled in a ramp leading to Cave 3 entrance.

Each Type 4 plank was reused in ramps leading into the entrances to Cave 3 and Cave 4. These planks (2.5–3.5 cm thick) are thinner than planks in the hull of any Pharaonic watercraft. No evidence for marine mollusks is recorded for any Type 4 plank although at least three have a black coating along plank edges that probably represents a waterproofing agent on the inner face. All identified members of this class are of local wood types (acacia and sycomore) and are in good to incoherent condition. They are joined to one another by small mortise-and-tenon fastenings and ligatures (Fig. 5). Mortises are about 7 cm deep with a maximum tenon length of 14 cm. Ligatures consist of 1–1.5 cm-diameter openings that pass through the plank's wide faces and are associated with shallow grooves about 4–5 cm long and 4 mm deep that extend to the plank edge on the inner surface only. No lashing was visible in any of the grooves or openings. In addition, excavators found twisted copper strips 2 cm wide in association with the outer face of several planks of this type.

The auxiliary group (Type 5) comprises of maritime equipment that was not part of a ship's hull, that is a single blade from each of two steering oars recovered during 2004/2005 (T1 and T2), a 1.89-meter-long crutch or stanchion (*Acacia nilotica*), and some small pieces including three from projecting knobs that may be oarlocks or pins. Half-round and round-sectioned fragments also were recorded and may represent the remains of oar looms, poles, spars or battens.

Wood debris and discarded fastenings were separated from bits of branches, twigs, charcoal, boxes, and furniture remains. While many fragments were so eroded that features were indistinguishable, others retained tool marks, fasteners, and properties that provide at least an outline of their use history. For example, a 4-cm-thick acacia plank fragment with a faceted dowel (T50) and faceted dowel W67 (14.2 x 1.2 cm) were not part of the hull itself, but illustrate the use of common carpentry techniques to join wood. Similarly, pegs in fragments of thin planks and wooden boxes resemble loose pegs found in association with ship debitage but are not seen in the remains of hull planks. Fastenings incorporate useful information about construction techniques, even without an entire vessel to study. In the case of Marsa Gawasis planks, this category includes free tenons of several sizes in planks and in upper levels of sediments both inside and outside caves; mortises and lashing channels; openings drilled for ligatures and lashing channels; pegs and dowels; and copper strips.

Type 2 and Type 4 planks were joined by mortise-and-tenon fastenings in standard sizes and patterns. All identified tenons are *Acacia nilotica*. Mortises in Type 2 hull planks (8–9.5 cm wide and 1.5–1.8 cm thick) were cut with chisels into plank edges, extending about 12–15 cm into each plank. Some tenons (size I) found in archaeological sediments are 22–28 cm long, 4–6 cm wide and 1.2–2 cm thick, but those still in the planks were sawn and chiseled at their midpoints so as to break planks away from neighboring planks along plank seams. Most tenons filled the entire width of the mortise; some occupied only half the mortise when excavated. No pegged (locked) mortise-and-tenon joints are present today, but two loose tenon fragments and one mortise on plank T18 have drilled openings 1.2 cm in diameter, possibly for fixing a loose tenon in place as seen on isolated joints in other Egyptian watercraft. As seen in the Lisht timbers, some mortise-and-tenon fastenings were paired one above the other in a double line, providing strong internal framing for the hull. In most planks, fastening spacing is between 40 cm and 60 cm center-to-center.

Mortise-and-tenon fastenings in Type 4 planks were spaced more widely than those in Type 2 planks (60–75 cm), half the depth, and only 5.5–6 cm wide and 1–1.3 cm thick. Tenons (size II) measured 14–15 cm in length, 3.5–5.5 cm at maximum width, and 1–1.2 cm thick. They do not occur in pairs, but about half of those recorded on these planks are directly associated with a ligature fastening. On the plank's inner face, on either side of the tenon, a shallow (4 mm) groove leads from the plank edge to a 1.2-cm-diameter hole through the plank. The openings are offset and one of the lashing channels is usually slightly curved. No trace of the cordage or lashing that passed through these ligatures was found. T8, a Type 3 deck plank, has two sets of opposing ligatures in the same pattern but lacks mortise-and-tenon fastenings. Two size III tenons (11 x 3.5 – 4 x 1 cm) were recovered from sediments but none of comparable size was documented in place.

On Egyptian river craft, lashing channels and ligatures have an ancient pedigree. Other than the low impact ligatures of the thin Type 4 and Type 3 planks, the only sign of lashing at Gawasis is in Type 2 plank T18. On its inner face, about 17 cm from each end, 4 x 4 cm openings create L-shaped lashing channels as they exit on the plank's inboard edge. It is possible that the 4 x 4 cm openings in the each end of beam T32 may also have been for lashing; two of the beams from the Carnegie Dahshur boat had crushed cordage between the bottom of the beam and the notch cut into the sheer strake.

Copper is rare on extant vessels, but present in limited quantities in the superstructure of both the extant Khufu ships. At Gawasis, twisted and bent remnants of copper alloy strips of a constant width are relatively common. A twisted copper metal strap fragment (3.4 x 1.8 cm) was found with a potsherd beneath ligature openings at End 1 on T13. It resembles a fragment from WG24 Cave 2 Room 1 C4 S.U. 53 that is 4 x 2 cm, an individual strap (10 x 2 cm) was associated with a thin dovetail-ended plank T60 (10 x 2 cm), and most definitively, four straps (*c*. 15 x 2 cm) threaded through a single mortise in hull plank T34. The strips are wedged into a mortise through the plank and exit in an 8.5-cm-wide recess on the plank's outer face. Copper strips overlapped one another slightly but were not fastened to each other; they originally linked T34 to the plank below it much like ligatures visible low on the hull of the Khufu ship.[8] Although there are indications that the other copper strip finds were used as fastenings, no other in situ examples were recovered during 2005/2006.

Archaeologists also recovered a number of dovetail tenons, all cut in half at their narrowest point but originally 20–34 cm long, 3.5–3.8 cm thick, and about 6.5–7 cm at their widest point, narrowing to 3–3.5 cm. Such fasteners were commonly used to secure seams between stone architectural elements in ancient Egypt. Late 19th-century reconstructors of the Dahshur boats cut dovetail fastenings into its planks to replace decayed lashing mortises,[9] but their use is not otherwise recorded on ancient Egyptian ships or boats. Although some dovetail tenons were present in the general shell and wood debris from plank cleaning activities in Cave 3, no planks or plank fragments excavated during 2004–2006 retained any trace of mortises to hold these tenons; only stone anchors or blanks had dovetail mortises. As a result, their function is unknown although pry marks made by chisels suggest that wherever they were used, they fit tightly.

Tools, surface treatments and incised marks

In addition to recording dimensions, wood characteristics and fastening patterns for each timber, the auther also examined all wood fragments for tool marks and other features to try to understand patterns of activity at the site. Evaluation of tool marks showed that the expected saws, adzes, chisels, and probably polishers were in use both during the construction and recycling process. A few drilled openings imply use of the bow drill, and axes may have been used in a few cases to reduce plank length (T33).

Two categories of tool marks were readily identified and associated with original shaping or reworking of planks. The original shaping of timbers included careful finishing of most examples so that few tool marks are preserved. A few score marks, shallow dubbing marks of an adze with a blade only a few centimeters wide or even smaller, and crushing caused by a chisel handle on one edge of mortises, and only on Type 4 planks, abundant saw marks on wide faces fall into this category.

Tool marks associated with reworking of planks include saw marks at plank ends, deep and wide gouges made by adzes, chisel marks and pry marks. Another tool of the shipwright stands out, and that is the presence of red paint on finished surfaces that also bear evidence of shipworms. Red paint is present on many of the timbers evaluated during 2005/2006, and also on perhaps 5% of the wood debitage. The author believes that the paint was used to mark areas that needed to be removed, perhaps in accordance with the Old Kingdom word *ßd-(m-)dßr*, translated by John Darnell (1984) as ‘remove the red’. Red paint is present only in areas of extensive re-working or damage.

Some Wadi Gawasis planks also bear incised marks that probably relate to hull construction methodology. Two hull planks (T18, T34) and at least one Type 3 deck plank (T15, possibly T11) bear panels of chiseled marks that include at least one multi-dimensional sign and what seem to be notational marks, some of which extend to the plank’s edge and suggest they might have been matched with marks on an adjacent plank. Such a system is logical in considering how ships built at a Nile shipyard could be easily reassembled on the Red Sea shore, and has a precedent in the marking system on Khufu hull planks and battens.[10]

Preliminary Analysis

Ship timbers at Marsa Gawasis provide the most ancient direct evidence for seafaring in complex watercraft anywhere in the world. Although the vessels of Khufu at the Great Pyramid (*c.* 2550 BCE) and those associated with a funerary monument, probably of Aha, at Abydos (*c.* 3050 BCE) are substantially older, they were designed and built for use on the Nile like the Middle Kingdom craft buried at Dahshur and Lisht (*c.* 1850 and 1950 BCE).[11] Abdel Moneim Abdel Halim Sayed’s (1978, 1980, 1983) initial discovery of stone anchors and a few plank fragments revealed hints at what might be preserved at the site, but it is fair to say that no one imagined the abandonment of complete timbers beyond the cave system or the presence of more than 50 massive coils of rope in Cave 5. Marine incrustations, destruction by shipworms, ship timbers recycled as architectural elements, and debris left by shipbreaking activity are common both inside and outside the caves on the western slope of the coral terrace. Documentation of wood remains shows that the technology and dimensions of hull components are consistent with what might be expected of seagoing ships in the Middle Kingdom. They are similar to, but sturdier than, Dahshur and Lisht planks, and bear marked similarities to boatbuilding techniques seen in those river crafts.

Hull planks up to 22 cm thick provide ample evidence of a characteristic Egyptian construction practice, that is, overbuilding. In this case, because shipworm damage extends up to 5 cm into the plank edge, overbuilding does not seem to be an appropriate term. Some plank fragments (Fig. 1) resembled sponges with a thin layer of finished surface; it is hard to imagine how they provided any protection from the sea. No exterior coating was recorded for any Type 2 plans, suggesting that the resinous nature of cedar, acted as a moderately effective repellent.

The primary activity documented by wood finds outside Caves 2, 3, and 4 at Wadi Gawasis is ship breaking. Inside the caves, work areas identifiable by extensive deposits of chipped and shipworm-infested wood fragments, fastenings cut and broken with tools, and in Cave 3, marine shell mixed with wood fragments, many of which are sponge-like, testify to the trimming and reworking of planks. Examination of wood debitage indicates large-scale removal of damaged wood from ships built of planks like those recorded during 2005/2006.

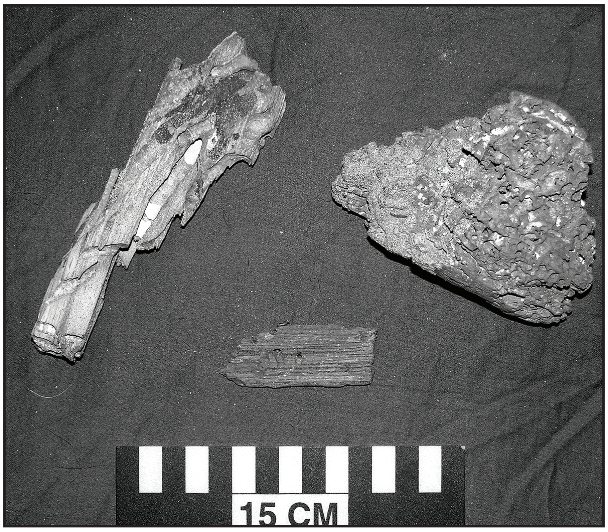
It is likely that once ships returned from their voyage, shipwrights inspected the hulls, perhaps marking unsatisfactory timbers with red paint. Workers then began to remove planks from the hulls by prying seams apart and sawing or chiseling through the tenons, and others likely followed behind them and pulled the planks off the ship from the outside. Once timbers were broken off the ships outside the caves, men carried them into the cave. They walked over ramps reinforced with mudbricks and planks and across walkways made of short and cut-up planks about 80–100 cm long from the entrance across the lower levels of Room 1, Cave 2 into the 19 x 4 m working space. There, workers cleaned and prepared individual planks for a return to shipyards on the Nile, recycling in architectural features on site, storage or discard in the carved rooms, or even as fuel as charcoal samples identified by Rainer Gerisch indicate.

Like other unique artifacts discovered by archaeologists working at Marsa Gawasis, the ship timbers and remains contribute to a broader understanding not only of the role of shipbuilding technology and achievement, but of the vast administrative and bureaucratic nature of ancient Egyptian contacts with the world beyond Egypt's borders. Studying these forgotten ship planks and equipment—the products of shipyards operating under a philosophy not too far removed from an assembly line—at the end of their very long life informs us not only about ship construction technology and shipbuilders, but also about the integration of watercraft as a tool in ancient Egypt.

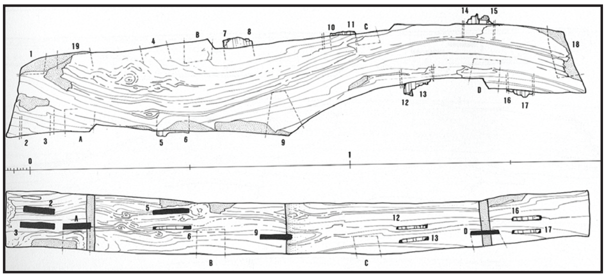
Acknowledgments

For nearly 20 years, Professor Abdel Moneim Abdel Halim Sayed has encouraged my studies of Egyptian watercraft and enthusiastically supported efforts of archaeologists to explore the maritime aspects of the Red Sea. I am grateful to him personally and professionally for his kindness during this time.

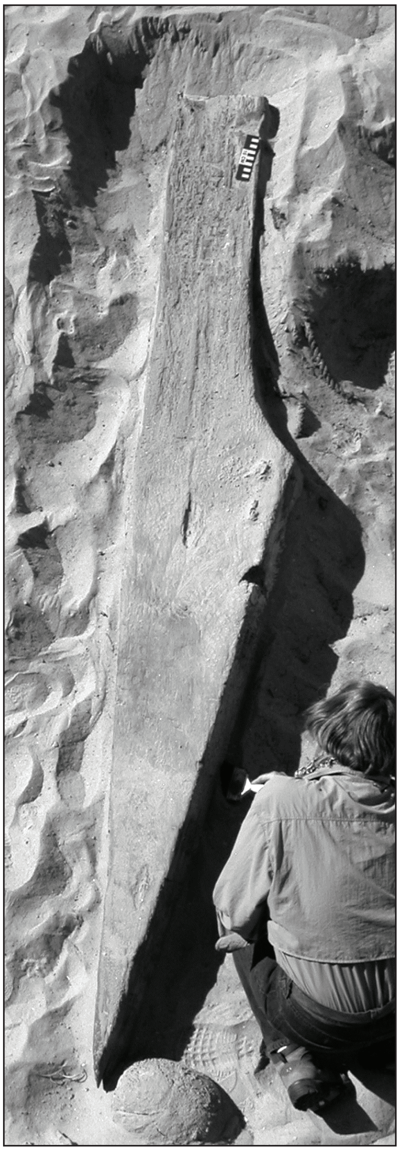
Rodolfo Fattovich and Kathryn Bard have my sincere gratitude for inviting me to work on the ship remains at Wadi Gawasis. Chiara Zazzaro, Cinzia Perlingieri, Andrea Manzo, el-Sayed Mahfouz and Gwendoline Plisson, and many other team members, graciously answered many questions and assisted in recording the wood in all its manifestations. I would also like to thank Mohammed Mustafa Abdel-Hamid for his assistance; Chip Vincent of the Egyptian Antiquities Project for providing conservation materials; and John Wesley Chisholm of Arcadia Entertainment for his generous financial support of this research.



(Fig. 1) The extensive destruction caused by the larvae of marine mollusks provides undeniable proof of the seagoing nature of the Gawasis discoveries.

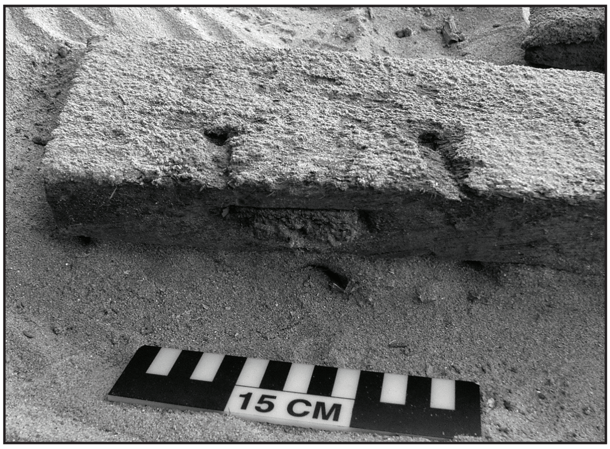


(Fig. 2) Double lines of mortise-and-tenon joints created contiguous transverse reinforcement within planks as this example from Lisht and those at Gawasis.



(Fig. 3) The complete hull plank T34 originally fit against the central strake along its 'blade'-like edge. A series of inscribed marks at the square end likely informed shipwrights about the plank's correct location in the hull.

(Fig. 4) Deck planks were thick edged and chamfered on their lower surface. Here, two were reused in a ramp leading to the entrance of a carved room.



(Fig. 5) Thin planks (Type 4) with small mortise-and-tenon joints, ligatures or stitches, and a dark waterproofing agent along interior plank seams were not immersed in water but may have been used to create shelters on deck.

Notes

1 C. Ward, *Sacred and Secular. Ancient Egyptian Ships and Boats* (Boston, 2000); C. Ward, 'Boatbuilding in Ancient Egypt', in F. Hocker and C. Ward (eds.), *The Philosophy of Shipbuilding* (College Station TX, 2004), 13-24; C. Haldane, 'The Lisht Timbers: A Report on their Significance', Appendix in D. Arnold, *The Pyramid Complex of Senwosret I* (New York, 1992), 102-112, pl. 115-133.

2 C. Ward, 'Boat-building and its social context in early Egypt: Interpretations from the First Dynasty boat-grave cemetery at Abydos', *Antiquity* 80 (2006), 118-129.

3 A.M. Sayed, 'The Recently Discovered Port on the Red Sea Shore', *Journal of Egyptian Archaeology* 64 (1978), 69-71; A.M. Sayed, 'New Light on the Recently Discovered Port on the Red Sea Shore', *CdE* 48 (1983), 23-37.

4 Sayed, *Journal of Egyptian Archaeology* 64, 173.

5 Haldane, 'Archaeology in the Red Sea', *Topoi* 6.

6 R. Fattovich and K. Bard with contributions by T. Arpin, S.T. Child, C.S. Lim, C. Perlingieri, R. Pirelli and C. Zazzaro, *Excavations at Mersa Gawasis, Red Sea, Egypt; of the University of Naples "L'Orientale", Naples, Italy; and Boston University,* Boston, USA, 2004/2005.

7 Haldane, Appendix in Arnold, *The Pyramid Complex of Senwosret I*.

8 Ward, *Sacred and Secular*, 49-50.

9 Ward, in Hocker and Ward (eds.), *The Philosophy of Shipbuilding*.

10 M.Z. Nour, Z. Iskander, M.S. Osman, A.Y. Moustafa, *The Cheops* Boats (n.p., 1960), 8.

11 Ward, in Hocker and Ward (eds.), *The Philosophy of Shipbuilding*.