



OVERLAND BOAT TRANSPORTATION DURING THE PHARAONIC PERIOD: ARCHAEOLOGY AND ICONOGRAPHY

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ABSTRACT

Pharaonic Egyptian needs for waterborne transport surpassed the convenience of geography. Several obstacles—chiefly the lack of a water passage from the Nile Valley to the Red Sea and the unnavigable waters of the Second Cataract—had to be overcome. The Egyptians achieved this by techniques of hull construction, by architectural means, and by the employment of vehicles. Vehicles also functioned for the ceremonial transport of boats and boat-shaped shrines. This paper is a survey of the methods of overland boat transportation during the pharaonic period, with an emphasis on the archaeological and iconographic evidence.

For the ancient Egyptians, the material world of everyday life encompassed three major bodies of water: the Nile, the Mediterranean, and the Red Sea. While the Nile provided pharaonic Egypt with its “superhighway,” greatly facilitating the north- and southbound transportation of cargo and passengers,¹ it also presented obstacles in the form of cataracts beyond the Nubian border. Furthermore, until the creation of a canal during the Late Period,² it provided no east/west corridor to the Red Sea, which was the marine route not only to the nearby Sinai Peninsula (with its valuable turquoise, malachite, and copper ores) but also to the Arabian and east African coasts.³ What accident of geography omitted, the Egyptians themselves engineered to provide: where water could not be brought to boats, boats were brought overland to water. The terrestrial geography of Egypt had thus a profound effect on its nautical technology.⁴

The archaeological record, including texts, iconography, artifacts, and site features, provides a variety of information on which to base interpretations of the general nature and importance of overland boat transportation during the pharaonic period. However, just as with the transportation of stone,⁵ Egyptian administrative records and monumental inscriptions omit most logistical details regarding the conveyance of watercraft over land.

EASTERN DESERT PORTAGE

Although also reachable by the Nile and overland routes, the land of Punt (identified with the region now occupied by Eritrea, northern Ethiopia, and eastern Sudan, as well as southern Arabia)

was the focus of the Red Sea trade, and from there came valuable exotic commodities, including frankincense and ebony.⁶ The Red Sea was, for the Egyptians, “land-locked” in pharaonic times, accessible from the Nile Valley only through the wadis of the Eastern Desert.⁷ Absence of sufficient resources to support an independent coastal boatbuilding industry made naval operations there dependent upon the importation of watercraft, either as timber, as boat parts, or as more or less constructed watercraft.

Although the Red Sea trade could date from as early as the Naqada II period,⁸ the earliest textual evidence suggesting the transport of boats or boat timbers through the Eastern Desert dates to the reign of Pepy II. Pepynakht called Heqaib records an expedition undertaken during this reign into the “country of the *ʿ3mw*.”⁹ Although the inscription does not specify the location of the expedition,¹⁰ the *ʿ3mw* are generally taken to be the predecessors of Eastern Desert Bedouin.¹¹ Pepy II charged Pepynakht with fetching back the corpse of an officer named Anankhet, whom the *ʿ3mw* had slain. Anankhet and his soldiers, who were also killed in the attack, were in the region to construct (*spt*, literally “bind”)¹² a “Byblos” boat (*kbnt*) for a journey to Punt. Though it was formerly suggested that Byblos boats were necessarily built on the Syrian coast by Syrian shipwrights,¹³ it is now generally accepted that the term derives from the seagoing run on which such boats were first employed.¹⁴

While it has been conjectured that fully constructed watercraft could have been transported through the desert,¹⁵ the evidence (linguistic and otherwise) better supports the more usual contention that expeditions brought timbers and that assembly

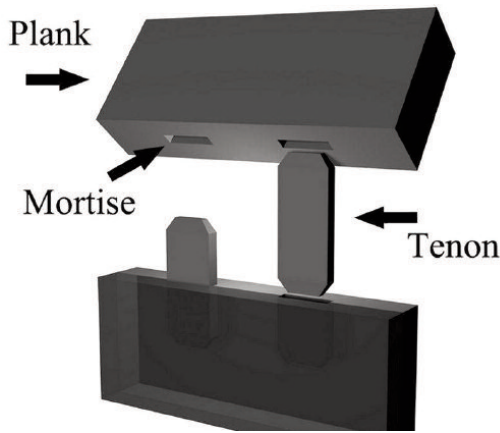


Figure 1. Unpegged mortise-and-tenon joint.

took place on the shore.¹⁶ A general description of such an expedition, led by the “Keeper of the Door of the South,” Henu, dates to the reign of Mentuhotep III.¹⁷ In setting off on his journey to Punt, Henu “went forth from Koptos upon the road” (i.e., the Wadi Hammamat) with an army of three thousand men (this was perhaps an ideal, if not standard, complement; an inscription at Ayn Soukhna also mentions three thousand men¹⁸). Donkeys accompanied them, but their only listed burdens are sandals. Once on the coast, Henu “made this ship” (*iri hꜥww pn*). On the return through the wadi, after the naval expedition had secured the “gifts” and completed the round trip, Henu and his men picked up blocks of stone hewn from the hills.

The large number of men and the variety of their tasks (security, transportation, boatbuilding, sailing, well-digging, and quarrying) indicate the logistical complexity of the expedition. Unfortunately, as this is a commemorative inscription and not an administrative document, Henu omits details critical to understanding the organization and execution of the expedition. The text indicates specifics of neither boat transport nor boat construction, and there is no corresponding iconography from any period related to overland transport toward—or boat assembly on—the Red Sea coast.¹⁹

However, two coastal sites, Mersa Gawasis/Wadi Gawasis and Ayn Soukhna, provide direct archaeological evidence. Scholars have known of the pharaonic site at Mersa Gawasis/Wadi Gawasis for at least fifty years²⁰ but did not fully understand its significance until the last decade, when it became the focus of revived attention that remains ongoing.²¹ The site is located at the eastern end of the Wadi Gawasis, north of the Wadi Hammamat. At least seven chambers hewn from the limestone terrace served as warehouses.²² Evidence of occupation has been confirmed for the Old and Middle Kingdoms, when the site likely served as a seasonal harbor for expeditions, especially to Punt. Here too are found disarticulated ship timbers and a host of other ship-related components displaying the characteristics of the Nilotic boatbuilding tradition: unpegged mortise-and-tenon joinery, dovetails, and lashing channels.²³

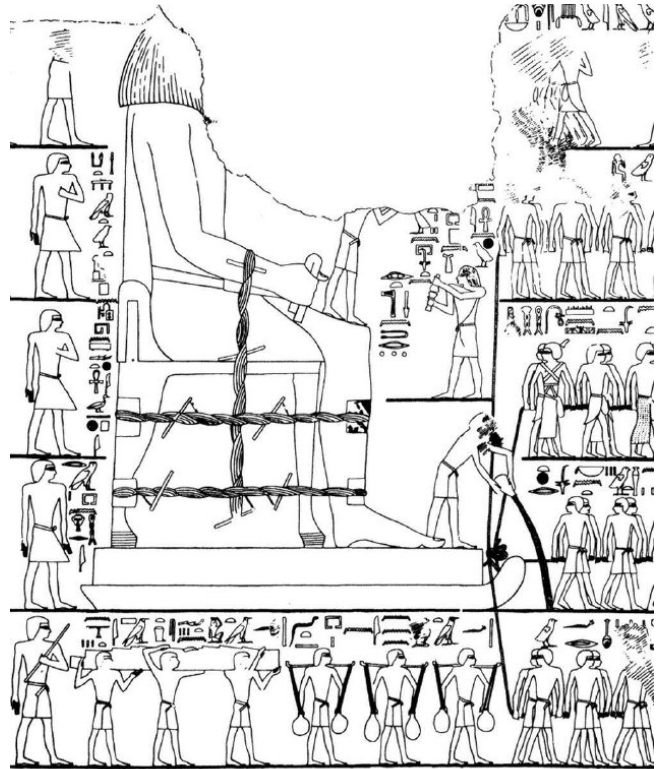


Figure 2. Transportation of a colossal statue by means of a sledge; porters carry a timber in hand, after Newberry and Fraser, *El Bersheh Part 1, The Tomb of Tehuti-hetep* (1895), pl. xv.

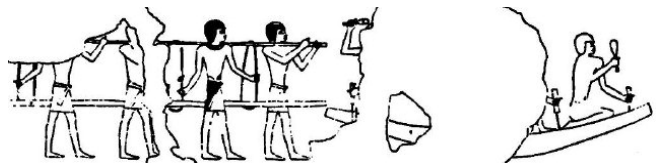


Figure 3. Log or timber carried to a boatyard slung from a carrying pole, after Davies, Crum, and Boulenger, *The Rock Tombs of Deir el Gebrâwi I* (1902), pl. XXIV.

The pharaonic site at Ayn Soukhna, which includes at least nine galleries dug into the base of a mountain overlooking the sea, presents similar evidence.²⁴ No fewer than three galleries date to the Old Kingdom,²⁵ and others are of tentative Middle Kingdom date. Numerous cedar ship planks (and at least two oak planks) with characteristically Nilotic unpegged mortise-and-tenons (Figure 1) yield carbon dates of approximately 2000 BCE.²⁶

The sites have not yet yielded the precise means by which timbers initially arrived. None of the inscriptions indicate any means of conveyance, although working scenes attest to timbers carried in hand (Figure 2)²⁷ and slung from carrying poles (Figure 3).²⁸ Definitive traces of construction on the shore are also lacking, and indeed, as Ward and Zazzaro point out, “it is hard to imagine what might indicate ship-assembly rather than disassembly” at a



Figure 4. Funerary procession, after Naville, *Das Ägyptische Totenbuch der XVIII. bis XX. Dynastie I* (1971), Taf. III.D.a.

site such as Wadi Gawasis.²⁹ At both this site and Ayn Soukhna, stored timbers represent the end (or at least intended middle) stage in the existence of the seagoing ships from which they came. At Wadi Gawasis, damaged timbers were marked before disassembly of the vessel, and workers removed barnacles and other marine incrustations before storing timbers in the caves—all indications of intent to reuse.³⁰ Like the disassembled Khufu I boat interred at Giza, the Ayn Soukhna timbers were stacked in an organized manner, ready for future application.³¹

Ship-breaking with the aim of preserving the utility of at least some timbers was made practical by the prevalent form of construction employed in the hulls; this was, to all evidence, a deliberate goal of pharaonic shipbuilders.³²

Evidence of lashings (cordage run from plank to plank in order to essentially “sew” the boat together) on the inboard faces of timbers can be found on the remains of most pharaonic vessels, beginning no later than the Early Dynastic, as represented by the boat burials at Abydos.³³ Repurposed boat timbers were found in the First Dynasty cemetery at Tarkhan,³⁴ while timbers “recycled” for the construction of a Twelfth Dynasty ramp appeared at Lisht.³⁵ All of these—in addition to the timbers from Ayn Soukhna and Wadi Gawasis, the Fourth Dynasty Khufu I vessel at Giza,³⁶ and possibly the boats from the pyramid complex of Senwosret III at Dahshur³⁷—likely demonstrate evidence of lashing. This would have made the boats easily disassembled (or, indeed, as evidenced by the modern reconstruction of Khufu I,³⁸ easily reassembled) using a few specialized tools.³⁹

The second key element of hull joinery is characterized by what it lacks: *pegged* mortise-and-tenons. In absolute terms of hull integrity, pegged mortise-and-tenon joinery is more effective than unpegged; locking tenons and planks together by means of a peg prevents the planks from slipping laterally or longitudinally when subjected to stresses.⁴⁰ In the construction of other objects, Egyptian carpenters did lock tenons in this manner and had since as early as the Naqada III period,⁴¹ and even used the technique for boat deckhouses (Khufu I) and rudders,⁴² but they seem to have entirely avoided it for hull construction.⁴³ Nevertheless, beginning in about the fourteenth century BCE, pegged mortise-and-tenon joints proved so effective that they became the dominant shipbuilding technology in the Mediterranean for about the next two thousand years.⁴⁴ Such joinery is meant to be permanent: disassembly

of a pegged hull would have required breaking timbers, or at least drilling or hammering out hundreds of pegs per vessel, appears not to have suited the pharaonic Egyptian shipwrights’ purpose. Although it would have resulted in improved seaworthiness, pegging would have limited the reuse of timbers and would have made the regular disassembly of hulls an excruciating and impractical task. The concession seems clear: more time invested in construction (and perhaps maintenance) of lashed and unpegged hulls was exchanged for savings when the vessels were in use. The returns on the initial construction investment would have compounded each time a vessel was disassembled and reassembled.

Ease of disassembly should also be considered in the context of large Nilotic vessels, particularly obelisk barges. The volume of timber required to transport such architectural elements downstream from the quarries would have been astounding, and towing a vessel of such large proportions upstream *to* the quarries (either from the shipyard where it was constructed or back from its last port of call) might not have been practical. The river current, which could reach 4 knots,⁴⁵ could have proved impassable when the barge was headed southward. Disassembly of a barge, for subsequent transport of the timbers on smaller, more streamlined vessels, might have been a better option.⁴⁶

SLIPWAYS AND VEHICLES

The wooden runners of sledges, with their characteristic blunt and usually upturned forward ends, often appear in paintings and reliefs showing the transport of large or heavy objects. Items transported by this method included stone blocks and finished architectural features such as colossal statuary, columns, and obelisks,⁴⁷ as well as considerably less massive but no less unwieldy statuary.⁴⁸ Boats composed another significant class of objects transported in this manner.

Most of the iconographic evidence for such boat transport comes from the context of ceremony⁴⁹ rather than depictions of working watercraft in scenes of daily life. A shrine aboard a ceremonial craft, which might be a large model rather than a working vessel, houses an image of the deity or the mummy of the deceased, which is taken either along a ritual circuit (in the case of a god) or from the embalming station to the tomb (in the case of a mummy; see Figure 4). Model barques are borne aloft on the

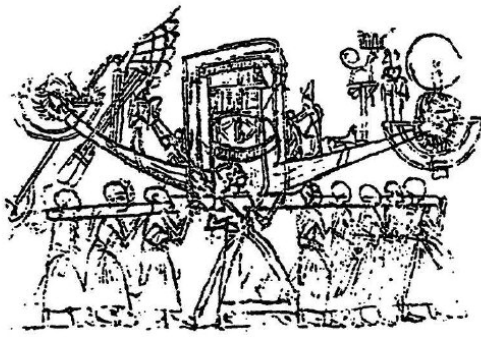


Figure 5. Portable sacred barque of Amun. O. BAM 21 446, Deir el-Medina, after Emma Brunner-Traut and Hellmut Brunner, *Osiris, Kreuz und Halbmond: die drei Religionen Ägyptens* (Mainz am Rhein: von Zabern, 1984), 52 fig. 36.



Figure 6. Funerary procession, after Caminos, “Fragments of the ‘Book of the Dead’ on Linen and Papyrus,” *Journal of Egyptian Archaeology* 56 (1970): pl. LIII.1.

shoulders of priests (Figure 5), a loftier version of the presumably original practice of drawing boats along on sledges (suggested by the fact that two or more horizontal carrying poles⁵⁰ commonly support a sledge upon which the barque sits).

In the iconography, funerary vessels large enough to accommodate the mummy and its coffin are the ceremonial craft far more likely to be shown being dragged on sledges.⁵¹ Although frequently referred to as boats, many of the objects represented in the iconography have a nature that transcends the nautical: they are, rather, a type of wooden funerary shrine. “Boatless” versions of these shrines appear mounted on sledges or wagons (Figure 6).⁵² In some cases, the shrine encases the hull; that is, only stem and sternpost appear (such as in Figures 7 and 8). These instances may represent shrines fitted with finials to give the appearance of a boat. Although excavation has revealed no examples of these boat-shaped shrines, two such finials—a matching set of stem and stern of New Kingdom date—are known.⁵³ A scene of carpenters at work (Figure 7) shows that shrine, boat, and sledge were constructed as elements of a single object. This is further underscored by an instance in which a tow-rope is tied not to the sledge or other vehicle but to the bow of the “boat” being transported (Figure 9). In some cases, the sledge runners might never have been intended to facilitate transport of the object; it has been noted, for example, that neither the little golden shrine of Tutankhamen⁵⁴ nor a small sledge from Lisht (probably intended for a canopic chest⁵⁵) has been dragged. In rare instances, wagon-mounted sledges (discussed further below) have transverse beams

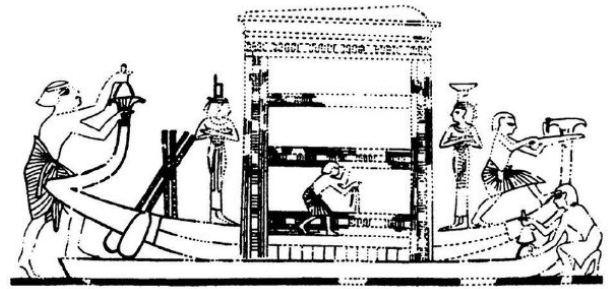


Figure 7. Construction of a funerary shrine (TT51), after Davies, *Two Ramesside Tombs at Thebes* (1927), pl. XXXVI.



Figure 8. Wagon-mounted funerary shrine, after Orazio Marucchi, *Guide du Musée Égyptien du Vatican* (Rome: Imprimerie Polyglotte Vaticane, 1927), 40 fig. 11.



Figure 9. Wagon-mounted funerary shrine, after John H. Taylor, *Death and the Afterlife in Ancient Egypt* (London: British Museum Press, 2001), 188 no. 131.

beneath the runners (Figures 8 and 9), which would, of course, render a sledge impractical for dragging. While these could be taken for elements of the wheeled vehicle that carries the sledge (also discussed below), in one case particularly (Figure 9), it is evident that the beams (or blocks?), being outside the wheels, are associated with the sledge runner and not the wagon body, which seldom appears in the iconography. These wooden members were probably added to facilitate lifting the shrine from the ground.⁵⁶

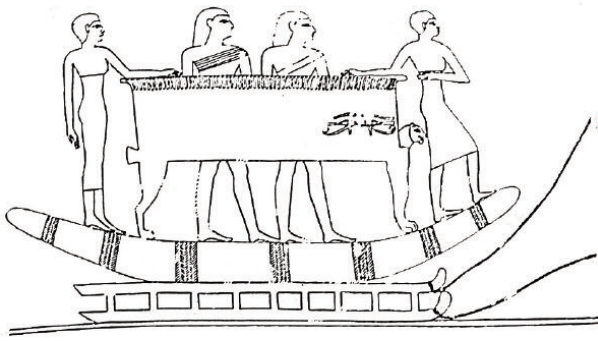


Figure 10. Papyrus or papyriform funerary boat towed on a sledge by six men (not shown), after Davies and Gardiner, *The Tomb of Antefoker* (1920), pl. XIX.



Figure 11. Detail of funerary sledge, after Vandier d'Abbadie, *Deux tombes ramessides á Gournet-Mourraï* (1954), pl. XIII.

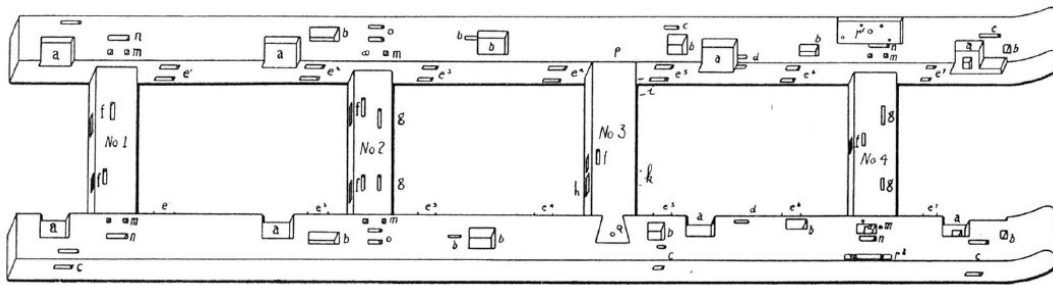


Figure 12. Sledge from Dahshur, from Reisner, *Models of Ships and Boats* (1913), 89 fig. 326.

While such observations warrant caution in drawing interpretations about functional nautical details from these objects, they do not negate the use of wagons or sledges to move bulky objects such as boats; these shrines will thus be treated as evidence without prejudice.

The usual convention is to show a single runner, but on rare occasions, both runners appear—as, for example, in the tomb of Intef-iker (Figure 10). This has the advantage of showing both tow-ropes clearly tied not to a beam between the runners but to the runners themselves.⁵⁷ Typically, no means of attachment is shown, and the line of the rope simply terminates at the sledge, though in some images a ring (presumably metal) affixed to the runner serves as a purchase to tie rope(s) (Figure 11).⁵⁸ In other cases, ropes (which in the iconography can appear as one or two in number⁵⁹) are tied directly around the runners (Figure 10).

Few working sledges (Figure 12) are known.⁶⁰ One was found—along with as many as five boats—buried beyond an outer enclosure wall southwest of Senwosret III's pyramid at Dahshur;⁶¹ presumably, it carried at least one, if not all, of the boats to the site for burial. Each runner, which has the same upturned end that appears in paintings and reliefs, measures 4.21 m in length and has an L-shaped mortise running between the upper and outer side face immediately behind the upturn (presumably for fastening a tow-rope). The overall width of the sledge is approximately 80 cm. Four crossbeams span the space between the runners. The extant sledges, or records thereof, seem to indicate that 4 m by slightly less than 1 m could be considered common dimensions.

In funerary scenes, such boat-bearing sledges are pulled by a team of men,⁶² cattle,⁶³ or both (men following cattle,⁶⁴ or men and cattle on different ropes⁶⁵). Liquid (perhaps milk?) was poured in advance to purify the way,⁶⁶ but pouring sufficient quantities of water would also have the effect of slicking the roadway for readier passage of the sledge runners.⁶⁷ Nile silt makes a highly effective lubricant: once moistened, “it becomes as slippery as ice.”⁶⁸ Iconography attests to the fact that the Egyptians took advantage of this property for the overland transportation of heavy objects.⁶⁹ Indeed, it has been observed that the underside of at least one of the extant sledges did not have scratches, which indicates that, if it was dragged it all, it was not pulled over (or at least not damaged by) rough surfaces.⁷⁰

In nautical terminology, “slipway” refers to a sloping section of shore on which ships and boats can more easily be moved to and from the water. The term has been more widely applied to any path across which an object may be dragged, pushed, or towed.⁷¹ Kemp defines the term more narrowly as a mud-lubricated roadway,⁷² which may or may not be reinforced with stone, timber, or mudbrick. Slipways without some kind of reinforcement are likely to have been overlooked, reclaimed by the Nile or desert, or otherwise obscured from the archaeological record. Most were probably convenient paths reinforced as necessary for the task at hand and later disassembled to reuse the materials, thus leaving little, if any, evidence. Occasionally, more permanent facilities were devised, such as the launching slipway at the quay at Karnak⁷³ and the portage slipway at Mirgissa.⁷⁴

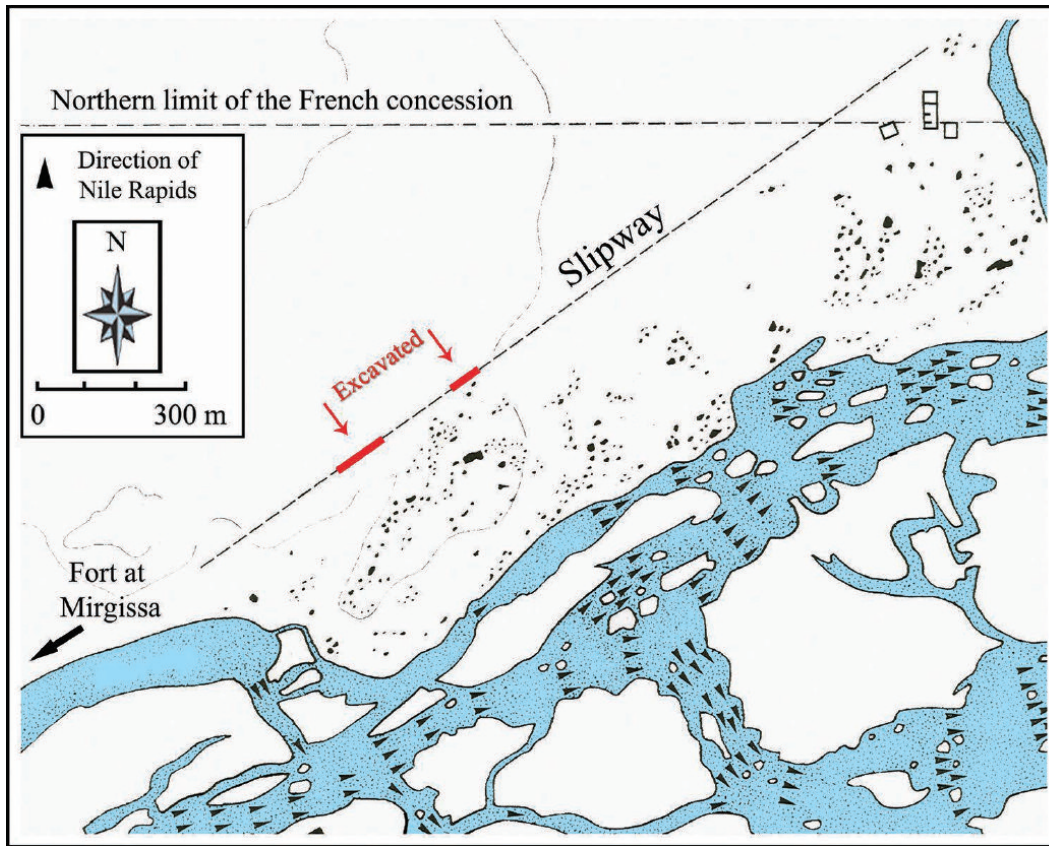


Figure 13. Slipway around the Second Cataract at Mirgissa, after Vila, “Les vestiges de la plaine,” in Vercoutter, *Mirgissa I* (1970), 193 fig. 1.

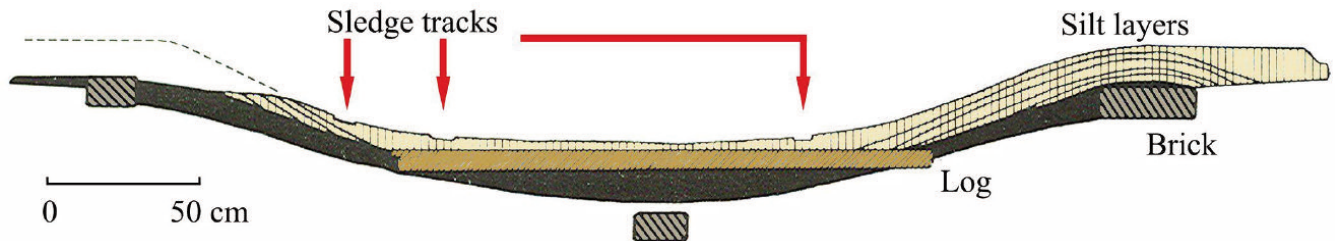


Figure 14. Transverse section of the Mirgissa slipway, after Vila, “Les vestiges de la plaine,” in Vercoutter, *Mirgissa I* (1970), 209 fig. 16.

Aptly conceived as a “boat road,”⁷⁵ the Mirgissa slipway, the only known example of its type, was constructed to avoid the least navigable portion of the Second Cataract (Figure 13);⁷⁶ in the vicinity of the rock of Abu Sir, south of Wadi Halfa, the Nile became “scarcely navigable for a considerable distance.” This was the customary end-and-return point for nineteenth- and early twentieth-century European tourists venturing up the Nile.⁷⁷ During the inundation, the rocks and islands of the cataract might be submerged, turning this portion of the river into a stretch of rapids; when low, from roughly December to July, the river ran very shallow.⁷⁸

Because neither trade, exploration, nor war wait for high waters, slipways to ensure safe portage were prudent investments of potentially great strategic advantage. That labor and resources

were invested to construct such an elaborate portage suggests the significance, in quality or quantity, of the traffic. It is certainly by intent that the southern end of the slipway was in close proximity to the fort of Mirgissa (for monitoring and protection), with the northern end perhaps at Matuga or Abu Sir.⁷⁹ It ran straight for no less than 1.5 and perhaps as much as 4 km.⁸⁰

Used at least as late as the reign of Amenemhat III and possibly into the New Kingdom,⁸¹ the slipway was not a simple ditch or rut, but had a support structure of mud bricks, packed mud, and lateral wooden ties “rather like [a] railroad” (Figure 14).⁸² The slipway itself is approximately 3 m wide,⁸³ more than enough to accommodate the maximum beam (width) of the Twelfth Dynasty Dahshur boats (2.15–2.43 m⁸⁴) and would provide ample clearance for the width of a sledge such as

that found at Dahshur (approximately 0.8 m).⁸⁵ Sledge tracks were, in fact, evident on the slipway, the last travels baked into the watered silt road;⁸⁶ incised a few centimeters into the silt by the weight of the sledge and its load,⁸⁷ these are easily distinguished as parallel impressions approximately one meter apart, a figure corresponding tolerably well to the width of the sledge found at Dahshur. Hoof- and footprints were also found in the boat track. In this case, people (watering the silt? drovers?) walked in front of cattle⁸⁸ that dragged a sledge while one or more persons followed behind. This provides an archaeological parallel to the iconographic examples of sledge-towing in funerary scenes discussed above.

Photographs of the Mirgissa slipway (Figure 15) appear to indicate that an additional mode of portage was employed along the slipway: dragging a boat directly on the silt. Vercoutter noted: “The silt still shows long track where either the sledge *or the boat itself* rubbed on the [wet] silt” [emphasis added];⁸⁹ however, it seems that both events occurred.

A certain set of raised striations is easily overlooked, but nonetheless presents convincing evidence for direct contact of a boat hull on the silt. These striations are much thinner than the sledge tracks and likely resulted from the seams of a boat coming into contact with the wet silt. They are remarkably consistent and spaced approximately 15–20 cm apart from the next⁹⁰—spacing that recalls the dimensions of hull timbers on the Dahshur boats.⁹¹ Between the marks of the boat’s seams, it may also be possible to see the even smaller striations left by the grain of the dragged timbers themselves.⁹² If a sledge had been employed, a boat should not have come into contact with silt and left such marks.

In exceptional cases in the iconography, there is no sledge beneath the funerary boat in processional scenes.⁹³ Sledges are also missing from a couple of two-dimensional depictions of working boats being actively moved across land: one from the tomb of Meryneith at Saqqara,⁹⁴ the other from TT40, the tomb of Huy (Figure 16).⁹⁵ There is no doubt that the former image, associated with workshop scenes, represents the festive launch of a royal traveling boat. Two gangs of men pull at ropes; what seems to be a makeshift truss, with the mast serving as a truss stanchion, prevents the ends of the hull from bending downward, or hogging. The rudder is not present. The Theban scene, associated with the collection of tribute from Nubia, is more ambiguous. Here each cargo boat (also rudderless) is fitted with a more conventional form of hogging truss. These trusses are also associated with depictions of (the same?) boats elsewhere on this wall, with crewmen aboard and rudders mounted. One of the rudderless boats is being simultaneously pushed and pulled. The ground before (but not behind) the hull is depicted as an irregular surface above the painted baseline, suggesting, as Davies says, “the mud-flats near the river.” Although it is impossible to discount the possibility that this is, like Meryneith’s scene, a launch, it is tempting to view this as the slipway, either at Mirgissa or elsewhere.⁹⁶

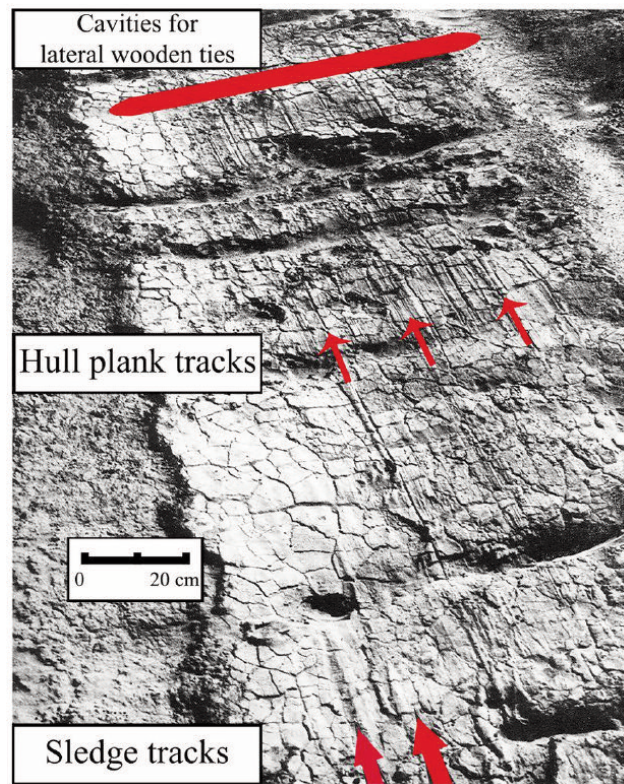


Figure 15. Surface of Mirgissa slipway with features labeled, after Vila, “Les vestiges de la plaine,” in Vercoutter, *Mirgissa I* (1970), 207 fig. 13.

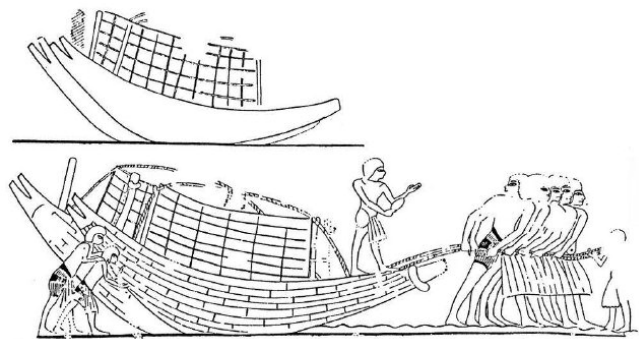


Figure 16. Boats dragged or launched, after Davies, Gardiner, and Davies, *The Tomb of Huy, Viceroy of Nubia in the reign of Tutankhamun (No. 40)* (1926), pl. XVIII.

A water-slicked mud surface was not the only means the Egyptians used to lessen friction for the transportation of heavy loads: wooden rollers facilitated the passage of sledges bearing stone blocks or statuary,⁹⁷ some of which may have surpassed one thousand tons in weight.⁹⁸ Such mass is a serious obstacle when employing rollers,⁹⁹ but even the largest boats were not nearly so heavy; the largest extant pharaonic vessel, the approximately 43.5 m long Khufu I,¹⁰⁰ consists of approximately 38 tons of Lebanese cedar.¹⁰¹ While rollers are a hypothetical possibility for the portage of boats, the available evidence is disputable.

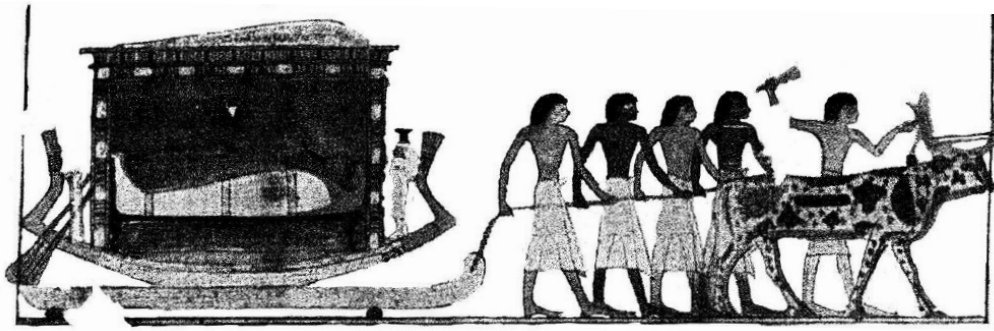


Figure 17. Funerary procession, after Corteggiani, *The Egypt of the Pharaohs at the Cairo Museum* (1987), 92 no. 53.



Figure 18. Funerary procession, tomb of Sobeknakht (II), from Tylor, *Wall Drawings and Monuments of El Kab* (1896), pl. II.

A purported example from the New Kingdom can be found in a vignette from the funerary papyrus of Maiherpri (Figure 17).¹⁰² The funerary barque sits on its customary sledge and is dragged by a combined team of men and cattle. The sledge does not rest on the ground line, but instead on two small solid circles that have been interpreted as rollers.¹⁰³ A similar scene from a New Kingdom linen at Dartmouth College Museum (no. 39-64-6623), in which a team of cattle drag a “boatless” funerary sledge with three circles beneath it, has been similarly interpreted (Figure 6).¹⁰⁴

The use of the wheel in Egypt has been dismissed as impractical on account of the nature of the ground in both floodplain and desert.¹⁰⁵ However, additional evidence reveals that this scene almost certainly represents wheels rather than rollers;¹⁰⁶ although spoked wheels were well known by the New Kingdom, disk wheels made their first identified appearance in the record in Egypt at the bottom of a siege ladder in a painting of late Fifth or early Sixth Dynasty date.¹⁰⁷

Another parallel roughly contemporary with the Maiherpri vignette appears on an Eighteenth Dynasty stele in the collection of the University of Liverpool (no. E.30).¹⁰⁸ Here it is not a boat being transported but a sledge bearing what appears to be a compartmentalized crate for a variety of agricultural produce. Pulled by a team of at least two oxen tended by a drover, the vehicle rides low to the ground. There is no sign of a separate wagon frame beneath the sledge—only a pair of circles. Kitchen con-

cedes that these could represent wheels, but strongly prefers to interpret them as rollers.¹⁰⁹ Whether the arrangement of captive rollers (i.e., affixed to the sledge)¹¹⁰ would in Egypt be any more effective than wheels seems dubious. It also bears noting, regarding the utility of wheels in Egypt, that chariots sometimes appear in agricultural and garden scenes.¹¹¹

Furthermore, among the Karnak talatat, fatted cattle appear on what are indisputably wheeled wagons.¹¹² Unlike chariots of the period, these wagons have disk wheels; the axle and linchpin securing each wheel are clearly portrayed in relief, distinguishing them from rollers. Each vehicle is equipped with *three* pairs of wheels to convey the enormous weight of the livestock. Similarly, barque-shrines with nominal stem and stern (associated with the burial of the Buchis bull in the Ptolemaic period) have what *appear* to be four pairs of disk wheels.¹¹³

Other examples of solid wheels exist in association with boats. Earliest of these is the wall painting in the Seventeenth Dynasty tomb of Sobeknakht (II) at el Kab (Figure 18),¹¹⁴ in which a shrine containing the mummy sits aboard a small boat of typically funerary form. The vessel sits on a sledge that in turn is provided with solid wheels through which the axle terminals protrude.¹¹⁵ As with the wheeled vehicle in the Liverpool stele, there is no evidence for a wagon body. Whether the sledge itself has been fitted with wheels—or rests upon a wagon undepicted *except* for its wheels—is impossible to say. As with scenes of sledge-dragging (and also paralleling evidence from the

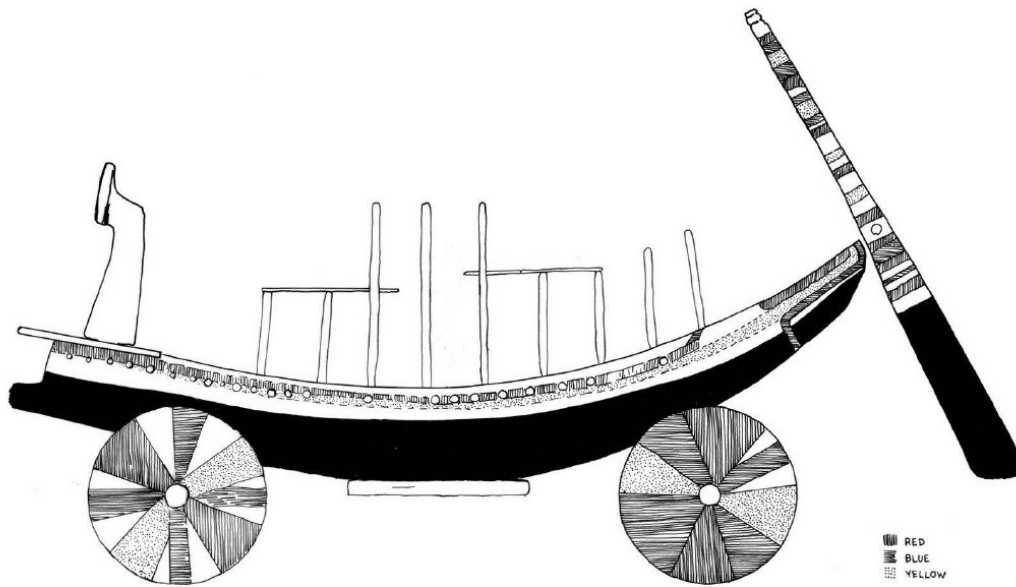


Figure 19. Wheeled boat model, after Brunton and Engelbach, *Gurob* (1927), pl. LII.

Mirgissa slipway), cattle pull Sobekhnakht’s vehicle, before which walk men, one of whom purifies the way. Tylor’s interpretation of the scene as a representation of a wagon drawn over rollers (on account of the artist’s unfamiliarity with the function of wheels) was discounted at an early date.¹¹⁶

Wheels of this sort appear with a boat model found in a tomb at Gurob (Figure 19).¹¹⁷ Unlike most other boat models, this one is generally considered to be a child’s toy;¹¹⁸ the hull form differs from other boat models and does not match well with Egyptian ritual watercraft. Aside from a pierced rectangular piece of wood that served to attach the boat to its conveyance, of the supporting vehicle only the four wheels remain. However, the polychrome decoration of each wheel is vaguely reminiscent of some post–New Kingdom representations of disk wheels (see, e.g., Figure 9) that appear in scenes of funerary processions with wagons towed by men or by men and cattle. While in some cases it is ambiguous whether the wheels depicted are rather impressionistically rendered spoked wheels, one example with concentric circles overlain by petal shapes on its wheels seems more likely to represent decorated solid wheels.¹¹⁹ With the interpretation of the object from Gurob in dispute (toy or representation of wheeled ritual craft?), it is difficult to infer much information from it regarding the portage of working watercraft.

A low wagon with four small solid wheels and thus a very low profile—dubbed by some a “trolley”¹²⁰—is known from the Ptolemaic Period (Figure 20).¹²¹ Found at Medinet Madi, the

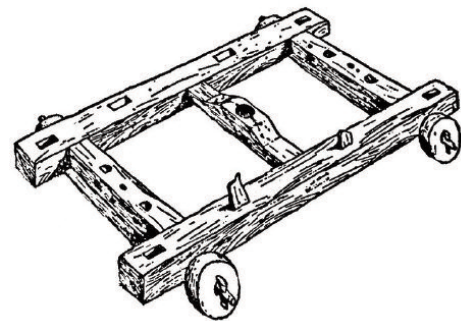


Figure 20. Wagon from Medinet Madi, after Dittmann, “Der Segelwagen von Medinet Madi,” *MDAIK* 10 (1941), 64 Abb. 3.

wooden frame of the wagon measured 2.09 m in length and 1.23 m in breadth (excluding the two axles, each of which measures 1.70 m from end to end). The solid disc wheels, affixed to the axle with a linchpin and each 31 cm in diameter, are probably not strong enough to support large stone loads. However, less weighty loads, including small vessels of perhaps 15 m or less (about the size of the Dahshur boats), would not be unreasonable. It has been suggested that a sledge or other structure would have been secured atop the wagon.¹²² Although there is no evidence that this vehicle carried a boat, it is entirely possible that just such a trolley was what the artists of the examples mentioned above intended to represent.¹²³

More sophisticated spoked wheels also appear with funerary boat transport. Most of these are post-pharaonic, but the earliest example comes from the tomb of Ahhotep (I). A model wagon, made of copper alloy and wood, was found in association with two exceptional model boats, one of gold and one of silver.¹²⁴ The wagon (Figure 21) has two pairs of four-spoked

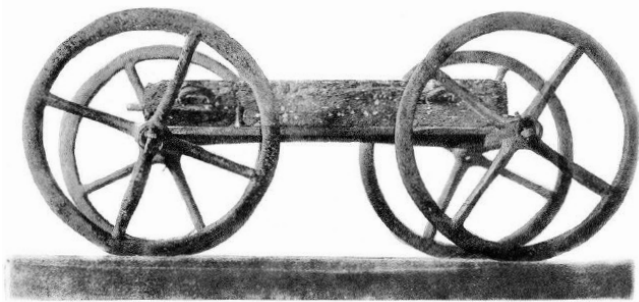


Figure 21. Model wagon from the tomb of Ahhotep, after von Bissing, *Ein Thebanischer Grabfund aus dem anfang des neuen reichs. Neudruck der Ausgabe* (1900), Taf. X.



Figure 22. Funerary procession, tomb of Petosiris at Tuna el-Gebel. Photograph by Noreen Doyle.

wheels¹²⁵ on fixed axles that run under the extreme ends of the wagon frame. Atop the frame sits a block of wood to which one or the other of the hulls was fastened; both block and hulls have protruding, horizontal metal eyes, two on each side, with the block having an additional eye on one short side.

There is debate as to which model boat belongs mounted on the wagon. As currently displayed, the gold model is placed there.¹²⁶ It has the characteristics of a funerary barque with papyriform finials turned inboard, but bears no chapel, has a single quarter rudder (extremely unusual for the period¹²⁷), and includes a complement of oarsmen. Unlike two-dimensional representations of vehicle-borne boats or any other boat models, both metal hulls are provided with rings by which each could be fastened to corresponding rings on the (or a) wagon. Furthermore, the presence of the crews with their oars or paddles¹²⁸ calls into question the purpose of setting either boat onto a wagon. Possibly they are toys, a function that relieves them of any need to accurately represent a working, real-world arrangement; in no known representations of ceremonial overland boat transport from the period is rowing or paddling portrayed, although this would not, of course, be impossible.

Representations of wagons at least nominally bearing a boat or boat-shaped shrine became more common during the Third Intermediate Period and thereafter.¹²⁹ Some are processions associated with gods and temples, which are (along with the festival of Opet) probably ancestral to the festival of the local saint, Abu el-Haggag, celebrated annually even today at Luxor with a wagon-borne boat.¹³⁰ However, most of the post-pharaonic, pre-Islamic examples occur in association with funeral processions.

The wagons themselves are not well defined in two dimensions, and seldom provide any interpretively useful information. They appear most commonly as sledges perched atop wheels, with little clear evidence of any structural connection between the two elements. As discussed previously, it is possible that what appear to be beams parallel to the axles in two examples (Figures 8 and 9) might belong to the shrine being carried rather than to the wheeled vehicle: note that such beams do not appear on the models or the Medinet Madi wagon. Another possibility is that the cart body itself is deliberately archaized as a sledge.¹³¹ On the funerary wagon in the tomb of Petosiris at Tuna el-Gebel (Figure 22),¹³² a bar appears running between the two wheels; it passes “behind” the felloe of the rear wheel but runs “over” the felloe and spokes to the hub of the forward wheel, almost as if it were intended to represent (in some kind of perspective) the axle. But it seems highly doubtful that this is a two-wheeled cart rather than a four-wheeled wagon. The zigzag lines between this bar and the bottom of the poles that support the boat (whether decorative or intended to indicate some structural element) are likewise difficult to interpret.¹³³

Even if most of these wheeled processional wagons never carried working boats, a notable account of the transport of working (as opposed to ceremonial) watercraft by wheeled conveyance does exist. The Gebel Barkal Stele of Thutmose III describes the event as part of that king’s eighth Asian campaign, in his thirty-third year, when the Egyptian army had to cross the Euphrates.¹³⁴ The king ordered boats (*ḥꜥw*) to be made or hewn (*mdh*)¹³⁵ in the hills near “the Mistress of Byblos.” The term *ḥꜥw* is a common term used to refer to Nile boats used for purposes as diverse as fishing and war.¹³⁶

These vessels were transported to the river by ox-drawn carts (*wrrywt*). Faulkner’s claim that this is the “first recorded use by the Egyptians of wheeled transport as distinct from the light two-wheeled chariot”¹³⁷ is incorrect, as the previously discussed iconographic evidence of wheeled vehicles (some predating Thutmose III) attests. The term *wrrywt* is, in fact, usually translated as “chariot.” Chariots occasionally appear in agricultural scenes, apparently to transport officials into the fields,¹³⁸ but sometimes also to haul loads. Ox-drawn chariots are known too,¹³⁹ but in this context, “cart” (meaning a two-wheeled vehicle other than a chariot) is probably intended.¹⁴⁰ They might have generally resembled those that appear later in the Battle of Kadesh reliefs (Figure 23)¹⁴¹ or, more nearly contemporary with the inscription, the two-wheeled ox-drawn cart with railed sides known from a fragmentary relief of an agricultural scene.¹⁴²

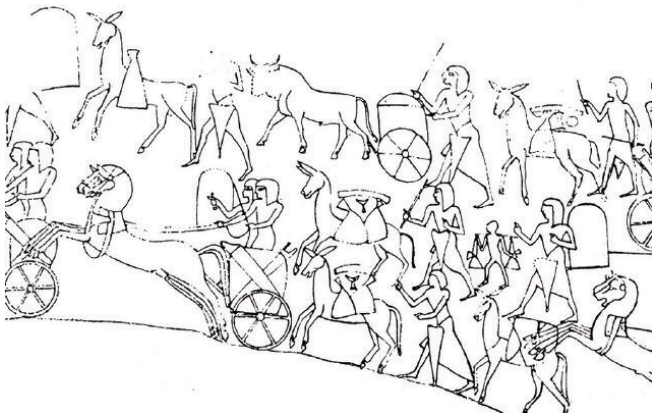


Figure 23. Carts at the Battle of Kadesh, after Wreszinski, *Atlas zur altaegyptischen Kulturgeschichte II* (1935), 170.

Faulkner suggests that, given the distance and roughness of the terrain that Thutmose III's army would have encountered, its boats must have been transported in sections.¹⁴³ This is certainly possible and even probable; sometimes even chariots had to be disassembled for mountain crossings.¹⁴⁴ For most watercraft, timbers approaching 4 m in length would probably have been rare. For example, of the 99 structural timbers used in the construction of the Cairo Dahshur boats, only one exceeds 4 m in length, with only eight exceeding 3 m. The majority, 51, are less than 2 m, and an additional 39 timbers are 2–3 m; all such lengths could easily be transported on two-wheeled carts. Over rougher terrain unsuitable for wheeled vehicles, a single fit porter would find a 2 m timber manageable, and certainly donkeys or teams of porters could transport longer timbers (Figures 2 and 3); few timbers would have required special overland travel arrangements.¹⁴⁵ This account strongly suggests that whoever “hewed” the boats at Byblos did so using Nilotic building techniques.

CONCLUSIONS

While there is insufficient evidence to indicate that the need for overland transportation—especially as disarticulated timbers—inhibited the development of boat and ship construction and technologies, it was at least a consideration for the pharaonic shipbuilder. This consideration (or necessity) may have had further ramifications on Egypt's prowess as a seafaring power, especially from the New Kingdom onwards, as other Mediterranean cultures adapted more efficient construction technologies such as pegged mortise-and-tenons.

For working watercraft of relatively modest size, portage without disassembly was certainly possible by several means, but the available evidence suggests this practice was probably confined to exceptional regions (such as the Second Cataract) and/or circumstances (e.g., ritual contexts). In the latter case, portage preserved the Egyptian ideal of water transport, even if the boat carrying the deceased to the tomb was more semblant than authentic.

NOTES

1. The ease of Nile navigation is often overstated by scholars, though seldom by travelers, whose accounts are often filled with frustrations occasioned by storm, lack of wind, and other delays and hazards. For a review of the challenges, see Angus Graham, “Plying the Nile: Not Plain Sailing,” in Kathryn Piquette and Serena Love (eds.), *Current Research in Egyptology 2003: Proceedings from the Fourth Annual Symposium* (Oxford: Oxbow, 2005), 41–56.
2. Carol A. Redmount, “The Wadi Tumilat and the ‘Canal of the Pharaohs,’” *Journal of Near Eastern Studies* 54 (1995): 127–135. Belief in such a canal prompted, for example, Carl Sölver (“Egyptian Shipping of about 1500 B.C.,” *The Mariner's Mirror* 11 [1936]: 430–469) to suggest that it “would have been much easier to build ships on the Nile and send them by its eastern arm to the Red Sea than to transport materials for shipbuilding from the Nile by land to the coast of the Red Sea” (454). Torgny Säve-Söderbergh (*The Navy of the Eighteenth Egyptian Dynasty* [Uppsala: Lundequistska Bokhandeln, 1946], 13) also believed that Hatshepsut's Punt expedition traveled from the Red Sea to the Nile by some water passage, because “no desert traveling is depicted” in the scenes of the event at Deir el-Bahri.
3. Evidence of a maritime corridor between the Nile and the Oases and the Faiyum to the west is scant. A notable exception could be the Lahun-Hawara gap connecting the river and Lake Moeris, especially during the annual floods; see James Harrell and Thomas Bown, “An Old Kingdom Basalt Quarry at Widan el-Faras and the Quarry Road to Lake Moeris,” *Journal of the American Research Center in Egypt* 32 (1995): 71–91.
4. For a discussion of the development of ancient Egyptian waterborne transportation from a geoarchaeological perspective, see Fekri A. Hassan, “The Dynamics of a Riverine Civilization: A Geoarchaeological Perspective on the Nile Valley, Egypt,” *World Archaeology* 29 (1997): 51–74.
5. Barbara G. Aston, James Harrell, and Ian Shaw, “Stone,” in Paul Nicholson and I. Shaw (eds.), *Ancient Egyptian Materials and Technology* (Cambridge: Cambridge University Press, 2000), 5–77.
6. For a current review of the literature and summary of the evidence regarding Punt and its location, see Kathryn A. Bard and Rodolfo Fattovich, “Introduction,” in K. A. Bard and R. Fattovich (eds.), *Harbor of the Pharaohs to the Land of Punt: Archaeological Investigations at Mersa/Wadi Gawasis Egypt, 2000–2005* (Napoli: Università degli Studi di Napoli “L'Orientale,” 2007), 17–27.
7. See, for example, Lanny Bell, Janet H. Johnson, and Donald Whitcomb, “The Eastern Desert of Upper Egypt: Routes and Inscriptions,” *Journal of Near Eastern Studies* 43 (1984): 27–46.
8. Juris Zarins, “Ancient Egypt and the Red Sea Trade: The Case for Obsidian in the Predynastic and Archaic Periods,” in A. Leonard and B. Williams (eds.), *Essays in Ancient Civilization Presented to Helene J. Kantor* (Chicago: Oriental Institute, 1989), 339–368. Zarins suggests that foreign obsidian could have found its way into Egypt via Red Sea trade based at Koptos, at the end of the Wadi Hammamat, as early as the Naqada II period.

9. Text: Kurt Sethe, *Urkunden des Alten Reichs I* (Leipzig: J. C. Hinrichs'sche Buchhandlung, 1933), 131–135. Translations: James Henry Breasted, *Ancient Records of Egypt Volume 1: The First Through Seventeenth Dynasties* (Chicago: University of Chicago, 1906), 161–164; Alessandro Roccati, *La littérature historique sous l'Ancien Empire égyptien* (Paris: Editions du Cerf, 1982), 208–211; Miriam Lichtheim, *Ancient Egyptian Autobiographies, Chiefly of the Middle Kingdom: A Study and an Anthology* (Freiburg: Universitätsverlag, Vandenhoeck & Ruprecht, 1988), 15–16; Nigel C. Strudwick, *Texts from the Pyramid Age* (Atlanta: Society of Biblical Literature, 2005), 333–335.
10. Säve-Söderbergh (1946, 11) suggested Suez as the location, but the two sites discussed below, Mersa/Wadi Gawasis and Ayn Soukhna, are distinct possibilities.
11. Breasted 1906, 163, n. e; Strudwick 2005, 377 n. 27; Roccati 1982, 182. For a discussion of the identity of the *šmw*, see Janice Kamrin, “The Aamu of Shu in the Tomb of Khnumhotep II at Beni Hassan,” *Journal of Ancient Egyptian Interconnections* 1.3 (2009): 22–36.
12. Translations of *spt* vary: “build” (Breasted 1906, 163; Percy E. Newberry, “Notes on Seagoing Ships,” *Journal of Egyptian Archaeology* 28 [1942]: 64–66; Strudwick 2005, 333); “equip” (Lichtheim 1988, 16; Pierre Montet, “Notes et documents pour servir à l'histoire des relations entre l'ancienne Égypte et la Syrie III: Byblos et les navires giblites,” *Kémi* 13 [1954]: 63–75). For a list of occurrences of this verb, first used for “binding” a papyrus raft, see Dilwyn Jones, *A Glossary of Ancient Egyptian Nautical Titles and Terms* (London: Kegan Paul International, 1988), 222, VI.76. The type of watercraft indicated here is not, however, a “reed boat,” as translated in Strudwick.
13. Newberry 1942, 65.
14. R. O. Faulkner, “Egyptian Seagoing Ships,” *Journal of Egyptian Archaeology* 26 (1941): 3–9; Shelley Wachsmann, *Seagoing Ships and Seamanship in the Bronze Age Levant* (College Station: Texas A&M, 1998), 19. It is still sometimes suggested that during the Old Kingdom, Syrian shipbuilders were responsible for the construction of these vessels; see Steve Vinson, “Seafaring,” in Elizabeth Froid and Willeke Wendrich (eds.), *UCLA Encyclopedia of Egyptology* (Los Angeles: UCLA Department of Near Eastern Languages and Cultures), escholarship.org/uc/item/9d93885v (accessed March 26, 2009).
15. Robert Partridge, *Transport in Ancient Egypt* (London: The Rubicon Press, 1996), 61.
16. For example, Sølvér 1936, 453; Newberry 1942, 63; Cheryl A. Ward, *Sacred and Secular: Ancient Egyptian Ships and Boats* (Philadelphia: University of Pennsylvania Museum, 2000), 140; C. A. Ward and Chiara Zazzaro, “Evidence for Pharaonic Seagoing Ships at Mersa/Wadi Gawasis, Egypt,” *International Journal of Nautical Archaeology* 39.1 (2010): 26–43; Abdel Monem A. H. Sayed, “Discovery of the Site of the 12th Dynasty Port at Wadi Gawasis on the Red Sea Shore,” *Revue d'Égyptologie* 29 (1977): 140–178; A. M. A. H. Sayed, “New Light on the Recently Discovered Port on the Red Sea Shore,” *Chronique d'Égypte* 48 (1983): 23–37.
17. Breasted 1906, 429–433; Jules Couyat and Pierre Montet, *Les Inscriptions hiéroglyphiques et hiératiques de Ouâdi Hammâmât* (Cairo: l'Institut français d'archéologie orientale, 1912), 81–84, pl. XXXI; Lichtheim 1988, 52–54.
18. Mahmoud Abd el-Raziq, Georges Castel, and Pierre Tallet, “L'exploration archéologique du site d'Ayn Soukhna (2001–2004),” in Jean-Claude Goyon (ed.), *Proceedings of the Ninth International Congress of Egyptologists/Actes du Neuvième Congrès International des Égyptologues, Grenoble, 6–12 septembre 2004* (Leuven: Uitgeverij Peeters en Departement Oosterse Studies, 2007), 1:61–68.
19. For Nilotic boat construction scenes, see Edward M. Rogers, “An Analysis of Tomb Reliefs Depicting Boat Construction from the Old Kingdom Period in Egypt” (master's thesis, Texas A&M University, 1996), nautarch.tamu.edu/Theses/pdf-files/Rogers-MA1996.pdf (accessed December 16, 2008).
20. Leo A. Tregenza, *Egyptian Years* (London: Oxford University Press, 1958), 182. See also the following by Abdel Monem A. H. Sayed: 1997; “The Recently Discovered Port on the Red Sea Shore,” *Journal of Egyptian Archaeology* 64 (1978): 69–71; “Observations on Recent Discoveries at Wadi Gawasis,” *Journal of Egyptian Archaeology* 66 (1980): 154–171; 1983.
21. See, for example, Bard and Fattovich 2007 and Ward and Zazzaro 2010.
22. Trina Arpin et al., “Fieldwork,” in Bard and Fattovich, *Harbor of the Pharaohs to the Land of Punt*, 37–99.
23. See Ward and Zazzaro 2010 and also Ward and Zazzaro, “Finds: Ship Evidence,” in Bard and Fattovich, *Harbor of the Pharaohs to the Land of Punt*, 135–164.
24. Mahmoud Abd el-Raziq, Georges Castel, and Pierre Tallet, “Dans le golfe de Suez, les mines de cuivre d'Ayn Soukhna,” *Archéologia* 414 (2004): 10–21; “Ayn Soukhna et la mer Rouge,” *Égypte, Afrique et Orient* 41 (2006): 3–6; “L'exploration archéologique du site d'Ayn Soukhna (2001–2004),” in Goyon, *Proceedings of the Ninth International Congress of Egyptologists*, 61–68; Institut français d'archéologie orientale – Le Caire, “Ayn Soukhna.” *Travaux archéologiques*. www.ifao.egnet.net/archeologie/ayn-soukhna (accessed March 15, 2010).
25. *Pharos: Newsletter of the Alexandria Centre for Maritime Archaeology & Underwater Cultural Heritage* 1 (2009): 2.
26. Patrice Pomey, “A Pharaonic Sea-Going Ship of the Middle Kingdom (c. 2000 B.C.) from Ayn Soukhna” (paper presented at the Twelfth International Symposium on Boat and Ship Archaeology, 2009).
27. For example, the plank carried in association with the transport of the colossus depicted in the tomb of Djehutyhotep (Percy E. Newberry and George Willoughby Fraser, *El Bersheh Part 1, The Tomb of Tehuti-hetep* [London, Egypt Exploration Fund, 1895], 20, pl. xv). Compare, too, the transport of a mummy case cradled in the arms of four men who carry it to the tomb (TT277, Ameneminet; Jeanne Marie Vandier d'Abbadie, *Deux tombes ramessides à Gournet-Mourraï* [Cairo: Imprimerie de l'Institut Français d'Archéologie Orientale, 1954], pl. XIV, XV.2, XVI.1–2).
28. Norman de Garis Davies, W. E. Crum, and George Albert Boulenger, *The Rock Tombs of Deir el Gebrâwi I* (London: Egypt Exploration Fund, 1902), pl. XVI, XXIV; Klaus P. Kuhlmann and Wolfgang

- Schenkel, *Das Grab des Ibi, Obergutsverwalters der Gottesgemahlin des Amun (Thebanisches Grab Nr. 36)* (Mainz am Rhein: Verlag Philipp von Zabern, 1983), 1:95, 2: Taf. 31, 103, 104b.
29. Ward and Zazzaro 2010, 14.
 30. Ibid.
 31. Pomey 2009. See also *Pharos* 1 (2009): 2.
 32. Ward 2000, 140.
 33. David O'Connor, *Abydos: Egypt's First Pharaohs and the Cult of Osiris* (London: Thames and Hudson, 2009), 183–194; Cheryl A. Ward, “Sewn Planked Boats from Early Dynastic Abydos, Egypt,” in C. Beltrame (ed.), *Boats, Ships and Shipyards: Proceedings from the Ninth International Symposium on Boat and Ship Archaeology, Venice 2000* (Oxford: Oxbow Books, 2003), 19–23. Some of timbers of the Khufu I boat were inscribed with complementary hieroglyphs, suggesting step-by-step assembly instructions (Ward 2000, 140).
 34. Steve Vinson, *Egyptian Boats and Ships* (Buckinghamshire: Shire, 1994), 18–19; William F. Flinders Petrie, Gerald A. Wainwright, and Alan H. Gardiner, *Tarkhan I and Memphis V* (London: School of Archaeology in Egypt, 1913), 24, pl. 9.
 35. Dieter Arnold, *Building in Egypt: Pharaonic Stone Masonry* (Oxford: Oxford University Press, 1991), 86–92; Ward 2000, 110–112; Cheryl Ward Haldane, “Boat Timbers from El-Lisht: a New Method of Ancient Egyptian Hull Construction. Preliminary Report,” *The Mariner's Mirror* 74 (1988): 141–152; C. W. Haldane, “The Lisht Timbers: a Report on Their Significance,” in Dieter Arnold (ed.), *The Pyramid Complex of Senwosret I: The Southern Cemeteries of Lisht* (New York: Metropolitan Museum of Art, 1992), 102–112.
 36. Mohammad Zaki Nour, Zaky Iskander, Mohammad Salah Osman, and Ahmad Youssef Moustafa, *The Cheops Boats* (Cairo: General Organisation for Government Printing Offices, 1960); Abdel Moneim Abubakr and Ahmed Youssef Moustafa, “The Funerary Boat of Khufu,” *Beiträge zur ägyptischen Bauforschung und Altertumskunde* 12 (1971): 1–16; Paul Lipke, *The Royal Ship of Cheops* (Oxford: British Archaeological Reports, 1984); P. Lipke, “Retrospective on the Royal Ship of Cheops,” in Sean McGrail and Eric Kentley (eds.), *Sewn Plank Boats* (Oxford: British Archaeological Reports, 1985), 9–18; J. Richard Steffy, *Wooden Shipbuilding and the Interpretation of Shipwrecks* (College Station: Texas A&M Press, 1994), 24–28; Ward 2000, 47–60; Samuel Mark, “The Construction of the Khufu I Vessel (c. 2566 B.C.): A Re-Evaluation,” *International Journal of Nautical Archaeology* 38.1 (2009): 133–152.
 37. Their method of construction is a matter of debate (see Pearce Paul Creasman, “A Further Investigation of the Cairo Dahshur Boats,” *Journal of Egyptian Archaeology* [forthcoming]); however, even these boats demonstrate hallmarks of easy disassembly.
 38. Lipke 1984.
 39. Vinson 1994, 44.
 40. See Creasman, forthcoming, for a brief discussion of the structural merits of pegged versus unpegged mortise-and-tenon joinery.
 41. Ward 2000, 32; see also William Matthew Flinders Petrie, Guy Brunton, and Margaret Alice Murray, *Lahun II* (London: Bernard Quaritch, 1923).
 42. See Creasman, forthcoming, and Ward and Zazzaro 2010, 34 (fig. 10), for an illustration of rudder blades with pegged mortise-and-tenons.
 43. Cheryl A. Ward, “Boatbuilding in Ancient Egypt,” in Frederick M. Hocker and C. A. Ward (eds.), *The Philosophy of Shipbuilding: Conceptual Approaches to the Study of Wooden Ships* (College Station: Texas A&M University Press, 2004), 13–24.
 44. For further discussion, see Vinson 1994, 37–41.
 45. Vinson 1994, 7.
 46. Björn Landström, *Ships of the Pharaohs* (New York: Doubleday, 1970), 130. However, there is also an argument for the towing of such barges upstream; see J. V. Wehausen, A. Mansour, M. C. Ximenes, and F. Stross, “The Colossi of Memnon and Egyptian Barges,” *International Journal of Nautical Archaeology* 17 (1988): 295–310.
 47. Newberry and Fraser 1895, 17–26, pl. xii, xv; Aston, Harrell, and Shaw 2000, 18–19; Mark Lehner, “Construction of Pyramids (Old Kingdom),” in Kathryn A. Bard (ed.) *Encyclopedia of the Archaeology of Ancient Egypt* (London: Routledge, 1999), 639–645; Partridge 1996, 131–137; Harrell and Bown 1995, 82–83; George Goyon, “Les navires de transport de la chaussée monumentale d'Ounas,” *Bulletin de l'Institut français d'Archéologie orientale* 69 (1971): 11–41, pl. I–VII; Arnold 1991, 275–280.
 48. For example, Vandier d'Abbadie 1954, pl. X, XI.
 49. See, for example, Arvid Göttlicher, *Kultschiffe und Schiffskulte im Altertum* (Berlin: Mann, 1992), 13–75; Alan R. Schulman, “A Memphite Stela, the Bark of Ptah, and Some Iconographic Comments,” *Bulletin of the Egyptological Seminar* 2 (1980): 83–109, pl. 1–2; W. B. Kristensen, “De Symboliek van de Boot in den Egyptischen Godsdienst,” *Koninklijke Akademie van Wetenschappen, Verslagen en Mededeelingen: Afdeling letterkunde* 5.4 (1919): 254–288; Claude Traunecker, “La barque processionnelle d'Amon,” *Les Dossier Histoire et Archéologie* 61 (1982): 49–54; G. A. Gaballa and Kenneth A. Kitchen, “The Festival of I Sokar,” *Orientalia* (New Series) 38 (1969): 1–76; Catherine Graindorge-Hérel, *Le dieu Sokar à Thèbes au Nouvel empire* (Wiesbaden: Harrassowitz, 1994); L. B. Mikhail, “The Festival of Sokar: An Episode of the Osirian Khoiak Festival,” *Göttinger Miscellen* 82 (1984): 25–44; Epigraphic Survey, *The Festival Procession of Opet in the Colonnade Hall with Translations of Texts, Commentary, and Glossary* (Chicago: Oriental Institute, 1994).
 50. Georges Legrain, “Le logement et transport des barques sacrées et des statues des diex dans quelques temples égyptiens,” *Bulletin de l'Institut français d'archéologie orientale* 13 (1917): 1–76, pls. I–VII, 1–13.
 51. On occasion, funerary boats are elevated, such as depicted on the Nineteenth Dynasty Memphite relief of Merymery (see P. A. A. Boeser, *Die Denkmäler des neuen Reiches: Gräber* [Milano: Cisalpino, 1911], pl. XV; Hans D. Schneider and Maarten J. Raven, *De egyptische oudheid* [s-Gravenhage: Staatsuitgeverij, 1981], 98, no. 84b). Not only is the sledge-mounted model funerary boat carried on poles by men, but a rope is held in hand by three additional men and is fastened to a team of two cattle. Merymery thus enjoys all possible advantages of every form of conveyance.

52. Iconographic and actual examples abound, but see: Norman de Garis Davies and Alan H. Gardiner, *The Tomb of Antefoker, Vizier of Sesostris I, and of His Wife, Senet (No. 60)* (London: G. Allen & Unwin, 1920), pl. XXI (TT60); Nina de Garis Davies and Norman de Garis Davies, *The Tombs of Menkheperasonb, Amenmose, and Another (Nos. 86, 112, 42, 226)* (London: Egypt Exploration Society, 1933), pl. XXXVIII (TT42); Torgny Säve-Söderbergh, *Private Tombs at Thebes 1: Four Eighteenth Dynasty Tombs* (Oxford: Griffith Institute, 1957), pl. XXIV (TT17); Norman de Garis Davies, "The Tomb of Tetaky at Thebes (No. 15)," *Journal of Egyptian Archaeology* 11 (1925): 10–18, pls. II–V, pl. V (TT15); Edouard Naville, *Das Ägyptische Totenbuch der XVIII. bis XX. Dynastie I* (Graz: Akademische Druck & Verlagsanstalt, 1971), Taf. III.P.e., L.a, L.e; Ahmed Fakhry and Jürgen Osing, *Denkmäler der Oase Dachla* (Mainz am Rhein: von Zabern, 1982), Taf. 22c, 24a, 31b; Marianne Eaton-Krauss and E. Graefe, *The Small Golden Shrine from the Tomb of Tutankhamun* [Oxford: Griffith Institute, 1985].
53. S. R. K. Glanville and R. O. Faulkner, *Catalogue of Egyptian Antiquities in the British Museum II: Wooden Model Boats* (London: Trustees of the British Museum), 67, pl. XIIb–c (BM 36848).
54. Partridge 1996, 137.
55. Arnold (1992, 59) suggests that the lack of scratches "might" indicate ceremonial rather than practical use.
56. Note that in TT49 (Norman de Garis Davies, *The Tomb of Neferhotep at Thebes I–II* [New York: Metropolitan Museum of Art, 1933], pl. XXV) two shrine-bearing boats arrayed with other funerary furniture before the tomb-owner sit either on a sledge set on what is apparently a set of carrying poles (lower register) or is set directly onto carrying poles, which are set upon blocks to keep them off the ground (upper register).
57. The watercraft in this scene—which supports a funerary lion-headed bier, the coffin, and, presumably, the mummy—could be either a papyrus craft or a wooden papyriform vessel. Remains of papyrus watercraft, which surely existed as everyday working craft, are not known from the archaeological record.
58. For example, Vandier d'Abbadie 1954, pl. VIII, X; George Foucart, *Le tombeau d'Amonmos (tombeau no. 19)* (Cairo: L'Institut français d'archéologie orientale, 1932), 37, fig. 5; pl. IV, 9.
59. Occasionally, the rope is omitted entirely; see Earl of Carnarvon and Howard Carter, *Five Years' Exploration at Thebes* (London: H. Frowde, 1912), pl. LXIII (TT37: man driving two cattle with a brace between their horns for the rope, pulling a sledge-borne barque with two steering oars).
60. In addition to the sledge from Dahshur (George Andrew Reisner, *Catalogue général des antiquités égyptiennes du musée du Caire, 68, Nos. 4798–4975 et 5034–5200: Models of Ships and Boats* [Cairo: l'Institut français d'Archéologie orientale, 1913], 88–89; Jacques de Morgan, *Fouilles à Dâbehour: Mars–Juin 1894*. [Vienna: Adolph Holzhausen, 1895], 81–83), a small sledge, approximately 1.70 cm in length, from Senwosret I's pyramid complex at Lisht is known (Dieter Arnold, *Pyramid Complex of Senwosret I at Lisht* [New York: Metropolitan Museum of Art, 1992], 59; William Hayes, *The Scepter of Egypt: A Background for the Study of the Egyptian Antiquities in the Metropolitan Museum of Art I* [Cambridge: Harvard University Press, 1953], 193). Arnold (1992, 26) hypothesizes that at least one other large sledge, approximately 4.2 m, was also present at that site, but the wood was too degraded to confirm the suspicion. It is possible that another full-sized sledge exists. On display at the Cairo Museum is a sledge labeled "5460," presumably corresponding to the *Catalogue General*. However, "GC 5460" is an amulet (G. A. Reisner, *Amulets, Catalogue General 5218–6000 et 12001–12527* [Cairo: L'Institut français d'Archéologie orientale, 1907], 35). The sledge on display is often (correctly) identified as the sledge from Senwosret III's pyramid complex at Dahshur ("GC 4928" in Reisner 1913, 88–89). For example, Partridge (1996, 131–133) explicitly reconciles the visual differences between Reisner's recordings of the Dahshur sledge and the one on display, but no one has clarified the conflicting labels. Comparison of Reisner's drawing (1913, 89, fig. 326) of the Dahshur sledge with the one labeled GC 5460 produces a near-identical match. Records associated with a sledge "5460" report that it came from the New Kingdom and has similar dimensions to the Dahshur sledge (Waheed Edwar, personal communication, June 4, 2004). A photograph of the sledge, with Arabic label legible, can be found in Pearce Paul Creasman, "The Cairo Dahshur Boats" (master's thesis, Texas A&M University, 2005), associates.imrd.org/pcreasman-MA2005.pdf (accessed December 12, 2009), 123, fig. 57. To the best of our knowledge, the records of the Cairo Museum sledge (JE?) "5460" are otherwise unpublished.
61. Reisner 1913, 88–89; de Morgan 1895, 81–83. For the Dahshur boats and their discovery, see Diana Craig Patch and Cheryl Ward Haldane, *The Pharaoh's Boat at the Carnegie* (Pittsburgh: Carnegie Museum of Natural History; 1990), Ward 2000, 83–102; Pearce Paul Creasman, Benjamin Vining, Samuel Koepnick, and Noreen Doyle, "An Experimental Geophysical Survey at the Pyramid Complex of Senwosret III at Dahshur, Egypt, in Search of Boats," *International Journal of Nautical Archaeology* 38.2 (2009): 386–99; P. P. Creasman, Douglas Sassen, S. Koepnick, and N. Doyle, "Ground-Penetrating Radar Survey at the Pyramid Complex of Senwosret III at Dahshur, Egypt, 2008: Search for the Lost Boat of a Pharaoh," *Journal of Archaeological Science* 37.3 (2010): 516–524; Creasman, forthcoming.
62. For example, Vandier d'Abbadie 1954, pl. X (TT277); Naville 1971, Taf. III.P.e.
63. For example, Marcelle Baud and Étienne Drioton, *Le tombeau de Roj (tombeau no. 255)* (Cairo: l'Institut français d'Archéologie orientale, 1928), fig. 7; Naville 1971, Taf. III.P.j., L.e.
64. For example, TT78 (Annelies Brack and Arthur Brack, *Das Grab des Haremheb: Theben nr. 78* [Mainz am Rhein: P. von Zabern, 1980], Taf. 16, 55b); TT16 (Marcelle Baud and Étienne Drioton, "Le tombeau de Panehsy," in Georges Foucart, M. Baud, and E. Drioton (eds.), *Tombs thébaines: Nécropole de Dirâ' Abû'n-Naga: Le tombeau de Roj [tombeau no. 255]; Le tombeau de Panehsy [tombeau no. 16]; Le tombeau d'Amonmos [tombeau no. 19]; Le tombeau d'Amon-am-anit [tombeau no. 277]* [Cairo: L'Institut français d'archéologie orientale, 1935], pt. 2, 11, fig. 3).

65. Foucart 1932, 37, fig. 5, pl. IV (TT19).
66. For example, Baud and Drioton 1928, 12, fig. 7 (TT255); Naville 1971, Taf. III.D.a. For the ritual, see Foucart, 52–63; Davies 1925; Norman de Garis Davies, “An Apparent Instance of Perspectival Drawing,” *Journal of Egyptian Archaeology* 11 (1926): 110–112; Miriam Lichtheim, “Situla No. 11395 and Some Remarks on Egyptian Situlae,” *Journal of Near Eastern Studies* 6.3 (1947): 169–179.
67. Barry Kemp, “Soil (Including Mud-Brick Architecture),” in Nicholson and Shaw, *Ancient Egyptian Materials and Technology*, 78–103.
68. Jean Vercoutter, “Excavations at Mirgissa II (Oct. 1963–March 1964),” *Kush: Journal of the Sudan Antiquities Service* 13 (1965): 62–73; see also J. Vercoutter, “Desert Highway Built for Ships,” *The UNESCO Courier* (December 1964): 36–37.
69. Kemp 2000, 93.
70. How likely an explanation this is for the lack of scratches mentioned by Arnold (1992, 59) is unknown. The undersides of other extant sledge(s) have not, to our knowledge, been similarly examined.
71. For example, there are quarry- and construction-related slipways at Lahun (Petrie, Brunton, and Murray 1923, 2, 12, 34, pl. XIII, XV) and Lisht (Arnold 1991: 86–92; Ward 2000, 110–112; Haldane 1992; Haldane 1988), both reinforced with disarticulated boat timbers. Sometimes pyramid ramps are referred to as slipways (James Frederick Edwards, “Building the Great Pyramid: Probable Construction Methods Employed at Giza,” *Technology and Culture* 44.2 (2003): 340–354, 349; Mark Lehner, *The Complete Pyramids* (London: Thames and Hudson, 1997), 215–217; Dows Dunham, “Building an Egyptian Pyramid,” *Archaeology* 9.3 (1956): 159–165. For a summary of road-building in context of quarries, see Aston, Harrell, and Shaw 2000, 18–20.
72. Kemp 2000, 93.
73. Jean-Claude Golvin, “Temple of Amen-Re at Karnak,” in Bard, *Encyclopedia of the Archaeology of Ancient Egypt*, 400–404, fig. 53; Partridge 1996, 8, fig. 5.
74. Jean Vercoutter, *Mirgissa I* (Paris: Direction Générale des Relations Culturelles, Scientifiques et Techniques, Ministère des Affaires Étrangères, avec le concours du Centre National de la Recherche Scientifique, 1970), 13–15, 173–180; André Vila, “Les vestiges de la plaine,” in Vercoutter, *Mirgissa I*, 193–221.
75. That is, a road intended for boats and distinct from roads made of boat timbers, like those previously mentioned at Lahun and Lisht. A 70 m segment of the nearly 10 km quarry road between Widan el-Faras and Lake Moeris was constructed of silicified wood (Harrell and Bown 1995, 80, fig. 15), but it is not clear if the wood was silicified prior to use in the road. Regardless, there are no indications the wood was from a repurposed boat(s), nor is there a clear interpretation of when this road was constructed.
76. Vercoutter 1964, 37–38; Vercoutter 1965, 62–73; Vila 1970, 204–214. Ironically, the slipway is now submerged and likely lost due to the creation of Lake Nasser/Nubia.
77. *Cook’s Tourists’ Handbook for Egypt, the Nile and the Desert* (London: Thomas Cook and Son, 1892), 243.
78. H. E. Hurst, *The Nile: A General Account of the River and the Utilization of Its Waters* (London: Constable, 1952), 73. Before the Nile was dammed, the floods typically began in June, reaching their apex in September. The waters would quickly recede, ultimately reaching their lowest levels in May (John Ball, *Contributions to the Geography of Egypt* [Cairo: Survey and Mines Department, Ministry of Finance, 1939], 204; Harrell and Bown 1995, 83).
79. Vercoutter 1965, 69.
80. The total length of the slipway is unknown. The French concession only included the southernmost 1.5 km (Vila 1970, 193, fig. 1; Vercoutter 1970, 12–13, fig. 4), and the remaining portion was not surveyed prior to the flooding of the region.
81. Alessandra Nibbi, “A Group of Stone Anchors from Mirgissa on the Upper Nile,” *International Journal of Nautical Archaeology* 21.3 (1992): 259–267; Vercoutter 1970, 18–23.
82. Vercoutter 1965, 69; Vercoutter 1964, 37.
83. Vercoutter 1965, 68.
84. Creasman, forthcoming, table 1; Ward 2000, 84, table 8.
85. Reisner 1913, 88.
86. Vila 1970, 209, figs. 13, 15, 16.
87. See Vila 1970, 207, fig. 13 (“Les traces de patins de traîneau sont indiquées par les fleches blanches”); 209, fig. 16 (“empreintes des patins”); 215, fig. 22, at bottom.
88. Note that the carcasses of draft cattle were found in the builders’ debris from the Eleventh Dynasty complex of Mentuhotep at Deir el-Bahri (Lehner 1997, 203; Arnold 1991, 64).
89. Vercoutter 1965, 68.
90. See, especially, Vila 1970, figs. 13, 22.
91. For hull plank dimensions, see Creasman 2005, 37 (table 1), 49 (table 2), 85 (table 7), 92 (table 8).
92. See, especially, Vila 1970, fig. 13.
93. On the side of a *rishi* coffin in the Metropolitan Museum of Art (William Hayes, *The Scepter of Egypt: A Background for the Study of the Egyptian Antiquities in the Metropolitan Museum of Art II* [Cambridge: Harvard University Press, 1959], 31, fig. 14), two cattle, driven by a man with a stick, drag a funerary boat directly on the ground. It should be noted that Hayes described the style of painting on this coffin as “somewhat crude”; the absence of the sledge could be merely an artistic oversight, or even the result of concern for fitting the entire scene into the narrow register.
94. René van Walsem, “The Tomb of Meryneith at Saqqara. Results of the Dutch Mission 2001–2003,” *Bulletin of the Australian Centre for Egyptology* 14 (2003): 117–134, pl. 12.
95. Norman de Garis Davies, Alan H. Gardiner, and Nina de Garis Davies, *The Tomb of Huy, Viceroy of Nubia in the Reign of Tutankhamun (No. 40)* (London: Egypt Exploration Society, 1926), pl. XVIII.
96. First proposed very briefly in Noreen Doyle, “Iconography and the Interpretation of Ancient Egyptian Watercraft” (master’s thesis, Texas A&M University, 1998), nautarch.tamu.edu/Theses/pdf-files/Doyle-MA1998.pdf (accessed December 16, 2008), 32. If

- Huy's is not a depiction of a slipway, it could instead be a visual manifestation of a boast encountered, for example, in autobiographies in which the tomb-owner specifies that he has built watercraft for a particular task appointed to him by the king—see, e.g., the inscription at Qubbet al-Hawa in the tomb of Sabni, which states: “The majesty of my lord sent me to construct two great barges in Wawat so as to ship two great obelisks north to Heliopolis” (Strudwick 2005, 339; also Roccati 1982, 214–215; Lichtheim 1988, 17).
97. Karl Martin, “Obelisks: Quarrying, Transporting and Erecting,” in Bard, *Encyclopedia of the Archaeology of Ancient Egypt*, 587–589; Arnold 1991, 273–275.
 98. Martin 1999, 588; Somers Clarke and Reginald Engelbach, *Ancient Egyptian Construction and Architecture* (Oxford: Oxford University Press, 1930), 34.
 99. Arnold 1991, 275. Note that even the colossus being transported in a scene from the tomb of Djehutyhotep (Figure 2), estimated to have weighed about sixty tons (Clarke and Engelbach 1930, 85), was moved on a sledge without rollers.
 100. See Nour, Iskander, Osman, and Moustafa 1960; Abubakr and Moustafa 1971; Lipke 1984; Lipke 1985; Steffy 1994, 24–28; Ward 2000, 47–60; Mark 2009).
 101. Mark 2009, 133. Rowena Gale, Peter Gasson, Nigel Hepper, and Geoffrey Killen, “Wood,” in Paul Nicholson and Ian Shaw (eds.), *Ancient Egyptian Materials and Technology* (Cambridge: Cambridge University Press, 2000), 334–371, offer a figure of 40 tons “displacement.” However, displacement is “the weight of a vessel and all of its burden” (Steffy 1994, 251–252; emphasis added). The Khufu I vessel could have held far greater; the figure of 40 tons *displacement* is too low. It is, in any case, extremely unlikely that such a large vessel would be transported overland as a single unit, given the stresses that would be placed on the hull when removed from the water.
 102. Jean-Pierre Corteggiani, *The Egypt of the Pharaohs at the Cairo Museum* (London: Scala, 1987), 92–93, no. 53.
 103. Arnold 1991, 275.
 104. Ricardo A. Caminos, “Fragments of the ‘Book of the Dead’ on Linen and Papyrus,” *Journal of Egyptian Archaeology* 56 (1970): 117–131. Pointing to the unusual number of circles beneath the sledge, Caminos preferred to interpret them as rollers.
 105. Partridge 1996, 76; similarly, the use of wheeled vehicles at Deir el-Medina is said to “rarely have occurred, if ever” (Jacques J. Janssen, *Donkeys at Deir el-Medina* [Leiden: Instituut voor het Nabije Oosten, 2005], 74).
 106. Davies pointed out the wheels in el Kab scene in 1926, 112.
 107. Saqqara tomb of Kaemhesit. Wolfgang Helck, “Rad,” in W. Helck and Eberhard Otto (eds.), *Lexikon der Ägyptologie V.1* (Wiesbaden: Harrassowitz, 1983), 76–78; Yigael Yadin, *Art of Warfare in Biblical Lands in the Light of Archaeological Discovery* (London: Weidenfeld and Nicholson, 1963), 147.
 108. Kenneth A. Kitchen, “An Unusual Stela from Abydos,” *Journal of Egyptian Archaeology* 47 (1961): 10–18.
 109. Kitchen 1961, 13.
 110. M. A. Littauer and J. H. Crouwel, *Wheeled Vehicles and Ridden Animals in the Ancient Near East* (Leiden: E. J. Brill, 1979), 8 and also 35, where the authors propose that wagons developed from sledges on rollers.
 111. For examples, see Cyril Aldred, “An Unusual Fragment of New Kingdom Relief,” *Journal of Near Eastern Studies* 15 (1956): 150–152, pl. XVII; Yadin 1963, 188–189, 210–211.
 112. Donald B. Redford, *The Akhenaten Temple Project Volume 2: Rwd-Mnw, Foreigners, and Inscriptions* (Toronto: Akhenaten Temple Project, 1988), 10, pl. 31.
 113. Robert Mond and Oliver H. Myers, *The Bucheum III: The Plates* (London: Egypt Exploration Society, 1934), pl. CIX.1; Étienne Drioton, *Encyclopédie photographique de l’art: Le Musée du Caire: Photographies inédites d’André Vigneau* (Paris: Éditions “Tel,” 1949), pl. 192, no. 192, 46.
 114. Joseph John Tylor, *Wall Drawings and Monuments of El Kab: The Tomb of Sebeknekht* (London: Egypt Exploration Fund, 1896), 4, pl. II. For the placement of this Sobeknakht in the chronology of the Seventeenth Dynasty, see Chris Bennett, “A Genealogical Chronology of the Seventeenth Dynasty,” *Journal of the American Research Center in Egypt* 39 (2002): 123–155.
 115. Davies 1926, 112; van Walsem 1997, 229.
 116. Tylor 1896, 4; Davies 1926.
 117. Guy Brunton and Reginald Engelbach, *Gurob* (London: Bernard Quaritch, 1927), pl. LII; Angela P. Thomas, *Gurob: A New Kingdom Town* (Warminster: Aris & Philips, 1981), 1:86, no. 747; 2: pl. 56, no. 747; Wachsmann, *The Gurob Ship Model* (College Station: Texas A&M University Press, forthcoming).
 118. Emma Brunner-Traut, “Spielzeug,” in Wolfgang Helck and Eberhard Otto (eds.), *Lexikon der Ägyptologie V.8* (Wiesbaden: Harrassowitz, 1984), 1152–1156; Thomas 1921, 1, 86. See Wachsmann, forthcoming, for a different interpretation.
 119. For a discussion of these representations, see René van Walsem, *The Coffin of Djedmonthuiufankh in the National Museum of Antiquities at Leiden* (Leiden: Nederlands Instituut voor het Nabije Oosten, 1997), 226–231; see also Wachsmann, forthcoming.
 120. Littauer and Crouwel 1979, 112.
 121. Karl Heinrich Dittmann, “Der Segelwagen von Medinet Madi,” *Mitteilungen des Deutschen Archäologischen Instituts, Abteilung Kairo* 10 (1941): 60–78, pl. 16.
 122. Dittmann 1941, 62–64, abb. 2.
 123. For further discussion, see Dittmann 1941, 65.
 124. Friedrich Wilhelm von Bissing, *Ein Thebanischer Grabfund aus dem anfang des neuen reichs. Neudruck der Ausgabe* (Berlin: A. Duncker, 1900), 19–22, Taf. IX.2a–k, X.
 125. For the spokes of chariot wheels and the significance of their number, see James K. Hoffmeier, “Observations on the Evolving Chariot Wheel in the 18th Dynasty,” *Journal of the American Research Center in Egypt* 13 (1976): 43–45.
 126. Mohamed Saleh and Hourig Sourouzian, *The Egyptian Museum, Cairo: Official Catalogue* (Mainz: Verlag Philipp von Zabern, 1987), no. 123.
 127. Doyle 1998, 122.

128. Whether these crewmen are rowing or paddling (among other details of the silver model) is subject to debate; for a summary, see Wachsmann, forthcoming.
129. A list of examples, with discussion, can be found in van Walsem 1997, 225–239; see also Wachsmann, forthcoming.
130. Abdel Moneim Abubakr, “Divine Boats of Ancient Egypt,” *Archaeology* 8 (1955): 93–95; S. Wachsmann, “Sailing into Egypt’s Past: Does a Celebration of Luxor’s Patron Saint Echo Ancient Pharaonic Traditions?” *Archaeology* 55.4 (July/August 2002): 36–39; S. Wachsmann, “The Moulid of Abu el Haggag: A Contemporary Boat Festival in Egypt,” in Harry Tzalas (ed.), *Tropis VII, Proceedings of the 7th International Symposium on Ship Construction in Antiquity* (Athens: Hellenic Institute for the Preservation of Ship Construction in Antiquity), 2:821–835; Wachsmann, forthcoming.
131. Archaizing might also account for the proliferation of disk (rather than spoked) wheels on many funerary vehicles. The Egyptians employed deliberate archaic forms in watercraft, most notably giving wooden hulls the pretense of being rafts by means of papyri-form finials, but also, more elaborately, in rigging; see Noreen Doyle, “The Persistence of the Bipod Mast and the Transience of the Tripod” (paper presented at the Fifty-Seventh Annual Meeting of the American Research Center in Egypt, 2006).
132. N. Cherpion, J.-P. Corteggiani, and J.-Fr. Gaout. *Le tombeau de Pétoisiris à Touna el-Gebel. Relevé photographique* (Cairo: l’Institut français d’archéologie orientale, 2007), 134–135 (scene 92,6).
133. The depiction is vaguely visually reminiscent of a funerary cart appearing in a vignette drawn on linen (BM 10265), in which the cart body appears as a cross-hatched area between the wheels (Kristensen 1919, 272, fig. 6; Göttlicher 1992, 69, abb. 40).
134. Adriaan de Buck, *Egyptian Readingbook: Exercises and Middle Egyptian Texts* (Leyden: Nederlandsch Archaeologisch-Philologisch Instituut Voor Het Nabije Oosten, 1948), 1–2, 58; Donald B. Redford, *The Wars in Syria and Palestine of Thutmose III* (Leiden: Brill, 2003), 106–107; R. O. Faulkner, “The Euphrates Campaign of Thutmose III,” *Journal of Egyptian Archaeology* 32 (1946): 39–42; Georg Steindorf, “Stele Thutmose III. Vom Gebel Barkal,” in Wolfgang Helck (ed.), *Urkunden der 18. Dynastie: historische Inschriften Thutmose III und Amenophis II* (Leipzig: Hinrichs’sche Buchhandlung, 1955), 1227–1368; George Andrew Reisner and Mary B. Reisner, “Inscribed Monuments of Gebel Barkal Part 2. The Granite Stela of Thutmose III,” *Zeitschrift für ägyptische Sprache und Altertumskunde* 69 (1933): 24–39.
135. Jones 1988, 215–216 (VI.39).
136. Jones 1988, 131–132 (II.14, II.15).
137. Faulkner 1946, 40.
138. One example is TT17 (Nebamun); see Richard B. Parkinson, *The Painted Tomb-Chapel of Nebamun* (London: British Museum Press, 2008); Yadin 1963, 210. A second example is a faience fragment (chariot in vineyard); see Yadin 1963, 188.
139. Davies, Gardiner, and Davies 1926, 24, pl. XXIII, XXVII, XXVIII (Nubian).
140. See A. Erman and W. Grapow, *Wörterbuch der ägyptische Sprache* (Berlin: Akademie-Verlag, 1926) 1:334; compare use of the word in O. Cairo 25 543, which makes reference to a “she-ass of the wagon” (Janssen 2005, 74).
141. Walter Wreszinski, *Atlas zur altaegyptischen Kulturgeschichte II* (Leipzig: J. C. Hinrichs’schen, 1935), Taf. 22, 23, 82, 92, 92a, 93, 94, 169, 170; Yadin 1963, 107–109.
142. From TT125, dating to the reign of Hatshepsut; see Cyril Aldred, “An Unusual Fragment of New Kingdom Relief,” *Journal of Near Eastern Studies* 15 (1956): 150–152, pl. XVII.
143. Faulkner 1946, 40. Vinson (1994, 44) suggests that the army brought “prefabricated boats” with them for the river crossing.
144. Yadin 1963, 454.
145. Creasman 2005, tables 1–5 and 7–11.