

# NILOTIC LIVESTOCK TRANSPORT IN ANCIENT EGYPT

A Thesis

by

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## ABSTRACT

Cattle in ancient Egypt were a measure of wealth and prestige, and as such figured prominently in tomb art, inscriptions, and even literature. Elite titles and roles such as “Overseer of Cattle” were granted to high ranking officials or nobility during the New Kingdom, and large numbers of cattle were collected as tribute throughout the Pharaonic period. The movement of these animals along the Nile, whether for secular or sacred reasons, required the development of specialized vessels. The cattle ferries of ancient Egypt provide a unique opportunity to understand facets of the Egyptian maritime community.

A comparison of cattle barges with other Egyptian ship types from these same periods leads to a better understand how these vessels fit into the larger maritime paradigm, and also serves to test the plausibility of aspects such as vessel size and design, composition of crew, and lading strategies. Examples of cargo vessels similar to the cattle barge have been found and excavated, such as ships from Thonis-Heracleion, Ayn Sukhna, Alexandria, and Mersa/Wadi Gawasis. This type of cross analysis allows for the tentative reconstruction of a vessel type which has not been identified previously in the archaeological record.

Elements of hull construction have been identified primarily in tomb art and tribute lists, but are supported by the remains from other types of working vessels recovered from archaeological excavations. Unique to some examples of this type of

vessel are the deck structures used to contain cattle during transport. Proposals for the configuration and specifications of these deck pens also are developed in this thesis.

Cattle boats of the Pharaonic period frequently appear in the reliefs of elite tombs during the Middle and New Kingdom. This vessel's associations with elite status and wealth, despite the fact that it was a working vessel, provide a unique window through which we can gain new insight on the powerful and long-lived Egyptian civilization.

## DEDICATION

To my parents for their fervent support. To my husband Paul for late night coffee &  
helping me when I could no longer type due to a broken bone.

## ACKNOWLEDGEMENTS

I am grateful to my committee chair, Dr. Wachsmann, and my committee members, Dr. Carlson, and Dr. Glowacki, for their guidance and support throughout the course of this research. I would also like to thank my friends and colleagues and the department faculty and staff for making my time at Texas A&M University a great experience.

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## CHAPTER I

### INTRODUCTION AND METHODOLOGY

Cattle in ancient Egypt were a measure of wealth and prestige, and as such figured prominently in tomb art, inscriptions, and even literature. Elite titles and roles such as “overseer of Cattle” were granted to high ranking officials or nobility during the New Kingdom, and large numbers of cattle were collected as tribute throughout the Pharaonic period.<sup>1</sup> The movement of these animals along the Nile, whether for secular or sacred reasons, required the development of specialized vessels. The cattle ferries of ancient Egypt provide a unique opportunity to understand the Egyptian maritime community.

The development of specialized cattle ferries began in the Old Kingdom, and perhaps earlier, with the use of papyrus rafts to ford cattle herds across the Nile. These advancements in nautical technology were spurred by three primary motivations: The need to transport sacred cattle between temples or estates, to collect cattle as tribute, and to convey cattle between grazing grounds. The desire to meet these needs prompted an evolution, however slight in design, of papyrus raft to general cargo vessel, and finally the purpose-built *hn-ih* and other cattle ferries of the New Kingdom. Understanding the motivations for the movement of cattle along the Nile is key to understanding the vessels used to accomplish this task.

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<sup>1</sup> British Museum 1876, 8-15; Dodson 1990, 89; Gardiner 1952, 15.

## The Ideology of Cattle Transportation

For the transportation of sacred cattle, or temple owned livestock, Papyrus Anastasi IV attests to the temple ownership of cattle ferries or transport ships. There a captain associated with the mortuary temple of Sety II in Thebes lists two cattle ferries among the temple's possessions.<sup>2</sup> The captain refers to these vessels as cattle ferries specifically, although in this case they are being used for the conveyance of other goods. This demonstrates that cattle ferries were specialized vessels despite the fact that they were not always used for their designed purpose. Temple ownership of other vessel types is also well attested to in ancient Egypt.<sup>3</sup>

Although documents like the Papyrus Anastasi IV mention that temples often owned their own cattle ferries, small groups or individual animals frequently found themselves being conveyed on non-specialized transport ships. Papyrus Leiden I 350 is a ship's log written during the Ramesside period.<sup>4</sup> This document describes the delivery of a single *wndw*-cow (short-horned) from the herd of the princess Isinofre. The cargo ship used to move this animal also carried waterfowl, bread and milk. In addition to this example, there is also a theological precedent for transporting cattle in general cargo ships along with other goods. Inscriptions in the tomb of the Steward of the Property of Ti in Thebes state that oxen were loaded into both a sacred bark, and more general cargo

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<sup>2</sup> Castle 1992, 243. See Appendix B for a chronology of pharaonic periods described in this text.

<sup>3</sup> Castle 1992, 240.

<sup>4</sup> Janssen 1961, 18-52.

boats along with bread, beer, fowl, vegetables, and “every good and pure thing.”<sup>5</sup> Other, smaller boats, such as fishing boats, could also be commissioned to transport temple goods such as grains, but may also have been used to convey individual animals if necessary.<sup>6</sup>

The circumstances for the transport of the *wndw*-cow from the herd of princess Isinofre, was likely the payment of tribute or taxes. Single animals are often listed as tribute collected by government officials such as in P. BM 104101, where officials gather taxes from temples between Elephantine and Esna.<sup>7</sup> In this document, there are three instances of cattle being transported, two of which were referred to as festival cattle destined for sacrifice. These single individuals were probably transported on general cargo vessels as discussed above. However, it is more probable that herds or larger groups of animals were moved in cattle ferries such as the *hn-ih*-boats, or other large barges, or even driven along the banks of the Nile.

Cattle were not only collected as tribute or taxes from temples. Pharaohs often received large herds as part of *inw*.<sup>8</sup> This type of exchange, rather than being solely an economic transaction, had the more important purpose of solidifying and underscoring the relationship between the pharaoh and the citizens of a particular geographic area. *Inw* was collected from both Egyptians and foreigners.<sup>9</sup> During Hatshepsut’s voyage to

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<sup>5</sup> Davies 1984, 34.

<sup>6</sup> Castle 1992, 249.

<sup>7</sup> Janssen 1991, 79-88.

<sup>8</sup> Bovin & Fuller 2009, 167.

<sup>9</sup> Bleiberg 1984, 158.

Punt, 3,300 head of cattle are listed among the tribute.<sup>10</sup> While Egypt often collected *inw* from groups after Egyptian conquest, it was not a type of plunder or booty, but rather symbolized the new unity between Egypt and its newly-acquired subjects.<sup>11</sup> For example, the Cenotaph of Viceroy of Nubia Usersatet Ibrim lists both long and short-horned cattle as Nubian tribute.<sup>12</sup>

Similar to the collection of *inw* was *b3kw*. This was collected yearly but was much less symbolic, being closer to a purely economic transaction or tax. Cattle were a key element of *b3kw*, along with other agricultural goods such as grains and slaves.<sup>13</sup> *B3kw* further differs from *inw*, in that items collected for this purpose were destined for temples or gods, rather than the pharaoh personally. The Annals of Thutmosis III lists many breeds and varieties of cattle as *b3kw* from Syria.<sup>14</sup> In a similar type of transaction, although more local, nomarchs levied taxes on their provinces, and these were also often collected in the form of cattle, as in the case recorded at el-Kab dating to the early 18<sup>th</sup> Dynasty, where the nomarch levied 122 cattle, along with other types of livestock.<sup>15</sup>

In the collection of *inw*, temple or privately-owned ships, rather than state-owned vessels, were often used to transport goods and animals.<sup>16</sup> Papyri occasionally describe

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<sup>10</sup> Casson 1991, 13.

<sup>11</sup> Boivin & Fuller 2009, 160.

<sup>12</sup> Cumming 1984, 37.

<sup>13</sup> Spalinger 1996, 366.

<sup>14</sup> Bleiberg 1988, 157.

<sup>15</sup> Hassan 1997a, 56.

<sup>16</sup> Spalinger 1996, 360.

the prosperous man as one who owned his own cattle transport ships.<sup>17</sup> Thus vessels like these could be co-opted from individuals by the pharaoh for the collection of *inw* paid in cattle. The collection of *b3kw*, however, was probably carried out on general cargo ships. When collecting *b3kw* for the god Amun, Rameses II states that he brings the god barges from the sea in order to convey the tribute from foreign lands to Egypt.<sup>18</sup> The transport over open waters excludes the use of cattle ferries in this case as they consistently appear only in riverine environments in iconography. This passage further suggests foreign tribute was commonly brought by sea rather than overland, making it possible that seagoing vessels such as these were used to convey cattle from places like Syria.

In addition to the initial collection of animals as payment or tribute, ships were also used to transport herds to and from grazing grounds. During the Old Kingdom, cattle were mostly kept in Lower Egypt in the Delta area.<sup>19</sup> The prevalence and importance of cattle herding in the north led to a high concentration of cattle cults in this part of Egypt.<sup>20</sup> The floodplains of the Delta which were used to cultivate wheat and barley were well suited to livestock keeping, as the animals would graze in fields after harvest. As these areas were used to grow grains cattle were not kept there continually, but rather brought in on cattle ferries after the harvest.<sup>21</sup> This practice is clearly referenced in the Papyrus Harris I, which states that "...[the black cattle] were

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<sup>17</sup> Marx 1946, 22.

<sup>18</sup> Bleiberg 1988, 158 (Ramesses II, KRI II 38:11).

<sup>19</sup> Moens & Wetterstrom 1988, 159.

<sup>20</sup> Moens & Wetterstrom 1988, 159.

<sup>21</sup> Hassan 1997a, 56.

transported to their other places for their grazing grounds...”<sup>22</sup> Fording cattle to grazing grounds with the aid of papyrus rafts is also a practice prevalent throughout Egyptian art. Numerous examples of this motif span the Old to New Kingdom.<sup>23</sup> A prime example of this is from the 6th Dynasty Mastaba of ‘Ankhm ‘ahor at Saqqara, where two papyrus rafts are used to ford a herd of 32 head across the Nile.<sup>24</sup>

The practice of raising cattle in one location and then shipping them out to other parts of Egypt goes back to at least the Old Kingdom. The Delta cattle estate of Kom el-Hisn was investigated in the 1980s by Robert Wenke.<sup>25</sup> During his excavations he found large amounts of cattle dung, but a scarcity of bovine bones. This seems to indicate that the animals were raised, or at least kept, in the Delta for a period and then shipped south.<sup>26</sup>

## **Methodology**

Now that the primary motivations for *why* cattle were put on ships on the Nile has been identified it is possible to address the question of *how*. This study surveyed a total of 38 tomb reliefs associated with cattle transportation or cargo ships, reproduced in Appendix A. I have divided the reliefs into five categories: Papyrus rafts, Vessels with animal enclosures, Vessels transporting cattle on deck, *Comparanda*, and Miscellany/outliers.

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<sup>22</sup> British Museum 1876, 20 (Pl. 44 ln. 49).

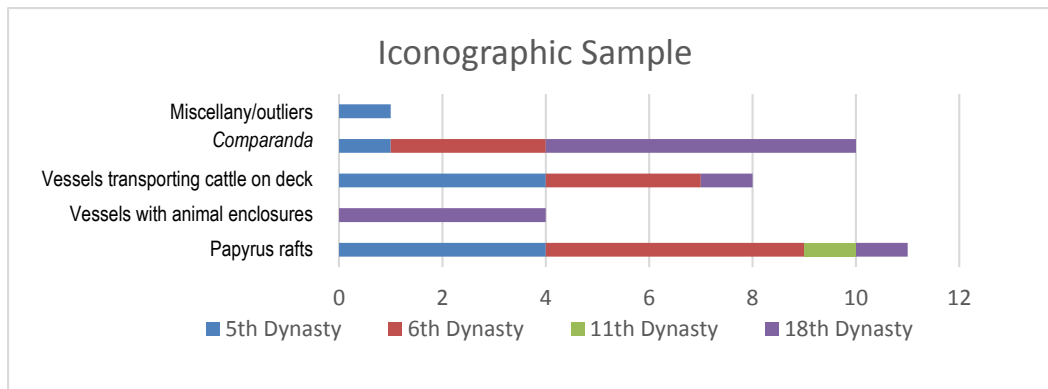
<sup>23</sup> Vandier compiled a sizeable collection of these scenes in *Manuel d'archeologie egyptienne*, 1952.

<sup>24</sup> See Appendix A, A.4.

<sup>25</sup> Bard 2013, 147.

<sup>26</sup> Bard 2013, 147.





**Table 1.1.** Iconographic sample of watercraft associated with cattle transportation.

The bulk of these examples were drawn from the Old and New Kingdoms, with the earliest relief coming from the 5<sup>th</sup> Dynasty and the latest belonging to the 18<sup>th</sup> Dynasty. Trends in representation bias were very apparent and are described in Table 1.1. Fording cattle scenes were a popular mortuary motif during the Old Kingdom, but appear to have fallen into less favor by the Middle Kingdom period, so while this category in the iconographic survey contains the most examples, it is extremely skewed to the 5<sup>th</sup> and 6<sup>th</sup> Dynasties. In the same light, examples of cattle ferries and freight ships with animal enclosures were very prevalent during the 18<sup>th</sup> Dynasty, but this particular vessel type does not appear prior to the New Kingdom. These patterns in mortuary motif popularity and trends must be taken into consideration for the discussion of the development of the cattle ferry. I then analyzed the reliefs to identify elements of hull design, vessel operation practices and lading/containment strategies for livestock. In the following chapters, these findings are compared and contrasted to archaeological evidence from both ceremonial and everyday contexts. References to items in this

catalog will be given in the form of a lettered and numbered code where the letter denotes the scene type and the number refers to its location within that group. Therefore when referring to the Mastaba of Ptahhotep, which includes a 5<sup>th</sup> Dynasty cattle fording scene the reference would be A.1.

In addition to the collection of a corpus of iconographic examples, I also collected literary evidence. Table 2.1 contains terms for boat types associated with the transportation of cattle, along with their contexts. Comparing these terms to their iconographic counterparts supplies a more complete picture of the cattle ferry in the ancient Egyptian maritime community.

In later chapters, I compare and contrast cattle ferries with other Egyptian ship types from these same time periods to better understand how these vessels fit into the larger maritime paradigm; this also serves to test the plausibility of reconstructed vessel size, design, and crew composition. Examples of cargo vessels similar in function to the cattle ferry have been found and excavated from sites such as Thonis-Heracleion, Ayn Sukhna and Mersa/Wadi Gawasis.<sup>27</sup>

### **Interpreting Iconographic Evidence**

While iconographic evidence can provide a wealth of information, it also comes with a myriad of problems in its interpretation. Biases are very strong when dealing with art; craftsmen are influenced by patrons, the purpose of the artwork, the craftsman's skill level, and their own life experiences. All of these components cause both small and

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<sup>27</sup> Fabre & Belov 2009, 107-118; Pomey 2009, 7-15; Ward & Zazzaro 2010, 26-43; Zazzaro 2006, 3-8.

large deviations from reality. This does not undermine the value of iconography as a source of information for understanding the past, but care must be taken to attempt to gain an understanding of these biases and how they affect the iconographic record.

### *Patterns, Conventions, and Mistakes*

In the interpretation of iconography, identifying what elements can inform on reality and which ones are merely the product of mistakes, artistic convention, or contemporary aesthetics has always been a difficult task. One of the attempts to address this problem was highlighted by Brindley's efforts in 1920 to analyze rigging elements on seals from the 12<sup>th</sup> to mid-16<sup>th</sup> centuries A.D. Brindley endeavored to compensate for bias in representation by creating a systematic study of a large volume of works. Compiling a large corpus of examples allowed Brindley to identify patterns in representations, and the more prolific a pattern, the more likely it was to be based in reality.<sup>28</sup> However, this approach is more difficult to apply to ship types, such as the cattle ferry, which are represented more infrequently in art. With only a few dozen examples from a fairly uniform context, it is entirely possible that any patterns may be the result of the inclusion of particular elements due to the art's purpose (such as funerary art), rather than being based in reality.

Patterns in ancient Egyptian art can also be attributed to the use of pattern books or the practice of copying popular motifs for multiple patrons, rather than the artist's experience with the subject matter of his image. Wachsmann proposes the existence of

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<sup>28</sup> Friel 2011, 86-8.

pattern books in his analysis of Egyptian tomb art, where the repetition of common elements was used to identify this type of artistic aid.<sup>29</sup> The existence of pattern books is more probable than the direct copying of the tomb art of a master craftsman by other artists, as it was less likely that other artists would have had access to the original work.<sup>30</sup>

Similarly, attempts to determine the validity of the details in iconography can be further aided by understanding other aspects of the craftsman's methods. Some "mistakes" or supposed inaccuracies may be due to the nature of ancient Egyptian art itself. Particularly in ancient Egypt, the artist was generally more concerned with representing all of the basic attributes of an object than with reproducing it as the observer would see it in real life.<sup>31</sup> Often Egyptian artists compiled the most recognizable or most important characteristics into a two-dimensional representation without regard to perspective. Objects that would ordinarily lie flat are often represented turned on end so that all the most representative attributes are visible, as rendering an object in a three-dimensional way with shading was a foreign concept to Egyptian artists.<sup>32</sup> A prime example of this technique is demonstrated in the depiction of pack mules and their burdens. One such painting appears in the First Intermediate Period tomb of Iti (Figure 1.1).<sup>33</sup> In this painting, the baskets loaded onto the donkey appear

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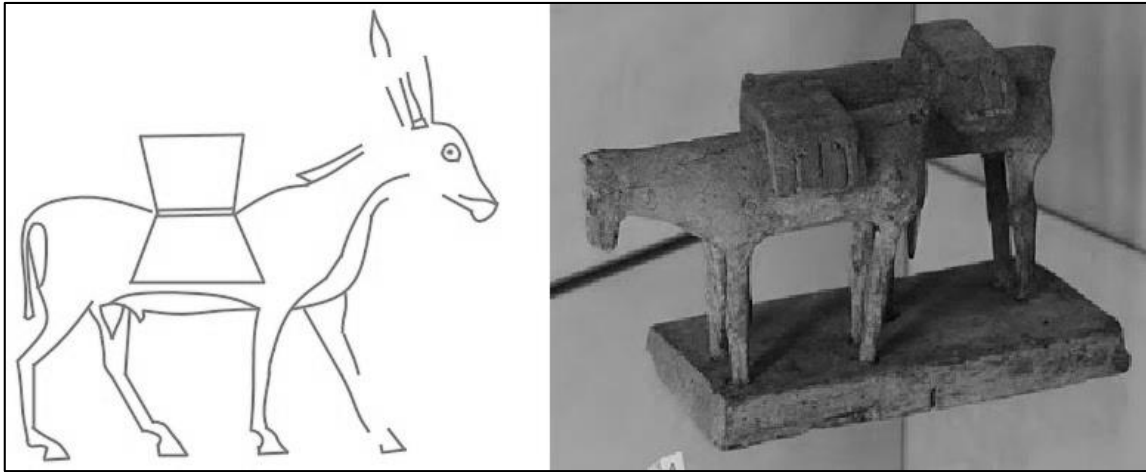
<sup>29</sup> Wachsmann 1987, 23.

<sup>30</sup> Doyle 1998, 31-33.

<sup>31</sup> Schäfer 1974, 95-98.

<sup>32</sup> Doyle 1998, 37.

<sup>33</sup> Fragment of a grain transport scene from Gebelein, 2190-1976 BCE at the Fondazione Museo delle Antichità Egizie at Turin, Italy, Inv. S. 14354/15.



**Figure 1.1** Loaded mules: Gebelein & Assiyut. Left: Pack Mule, Tomb of Iti (drawing adapted from SCALA photo of a Fragment of a grain transport scene from Gebelein, 2190-1976 BCE at the Fondazione Museo delle Antichità Egizie at Turin, Italy, Inv. S. 14354/15); Right: Two donkeys with loads Assiyut, 12th Dynasty, Middle Kingdom, Museum of Beaux Arts, Lyon 1969-399 (Photo by Andrea Byrnes, reproduced with permission).



**Figure 1.2** Painted wooden model boat from the 12<sup>th</sup> Dynasty ( © The Trustees of the British Museum, reprinted with permission 2015).

stacked, with one hanging off of its side, while the other rests on its back. However when compared to the 12<sup>th</sup> Dynasty model, it can be seen that the baskets would have both hung down behind the withers. The artist of the tomb of Iti painting simply wanted to convey that the donkey was carrying two packs, rather than just one, and so the second basket was shown flipped upwards.

Scale was also implemented to denote information other than what the observer would see in reality. Hierarchy of scale can be fairly uniformly applied to Egyptian art, with the largest figures in a scene being the most important or prestigious, and the smallest being the least significant. Tomb owners for instance, appear considerably larger than anyone else in the artwork adorning their tomb walls. When applied to the maritime community, it has been found that after the tomb owner and his attendant, pilots and helmsmen appear the largest, followed by men handling rigging or sailors relaying orders, while paddlers are the smallest individuals in the scenes. This sizing has been directly related to their social ranking or hierarchy in reality.<sup>34</sup> For example, the captain and helmsman of the model represented in Figure 1.2 are not leading a group of children paddlers. Instead, because they are less important than the captain or helmsmen, the paddlers are made in a smaller scale.

#### *Craftsman Practices & Techniques*

The techniques used to create the artwork itself can also have an impact on the details of iconography. Methods such as surface preparation, tool types, and order of

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<sup>34</sup> Doyle 1998, 56.

operations all affect the finished product and what details are chosen to/can be represented. Ancient Egyptian artists were fairly consistent in their method, which allows the scholar to construct a better understanding of how these elements should affect iconography interpretation.

For the painted relief, surfaces were first smoothed by plastering over gaps between stones. After this step, the artist prepared the area for the chosen scene by marking out a grid. The sculptor then rough-worked the design with a chisel and painters would later add color and additional details.<sup>35</sup> Rather than conveying features such as textures by using a chisel, coarse dark lines were employed to convey these sensory elements for the majority of painted reliefs. In this manner the artist was able to break up the surface of a flat image and use brushwork to relate animal hair, carpet fibers, or feathers.<sup>36</sup> Because details were often painted, and not carved, often the paint has faded or the plaster has crumbled, erasing them from the archaeological record. Therefore, when interpreting iconography one must always keep in mind that elements may be missing from the image which were actually present at the time the work was created.

### **Biases of the Literary Record**

Textual evidence, no matter how cut and dried it may appear, is always fraught with biases that have affected the content. It is important to attempt to understand these biases to gain a more complete picture of the reality they represent. Biases in text are similar to those found in the iconographic record. The purpose for which the text was

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<sup>35</sup> Doyle 1998, 34.

<sup>36</sup> Smith 1998, 2.

written, for whom it was written, culture, and the author's own background and place in society all hold great influence over the words which are chosen.

The earliest Egyptian writing appears in the 1<sup>st</sup> Dynasty, no later than 3000 B.C.E.<sup>37</sup> By 2600 B.C.E. continuous text appears, and in the Middle Kingdom there is an explosion of literary texts.<sup>38</sup> The ancient Egyptians believed that writing came from the gods and, as such, carried heavy religious connotations throughout Egyptian history. The first application of the written word was in the form of offering lists and lists of officials' rank.<sup>39</sup> The primary driving force for changes and developments in genres and literary styles seems to be the use of writing in tombs.<sup>40</sup>

When interpreting text it is important to consider that, although there were eventually secular texts, ancient Egyptian writing still had strong associations with the religious because of the manner of its development.<sup>41</sup> This relationship with the religious is also multilayered when considering texts referring to cattle ferries. The source for a considerable amount of information on these vessels is mortuary and these texts were often written by scribally-trained priests, rather than professional scribes.<sup>42</sup>

Other types of writing emerged in ancient Egypt, and scribes held a high status. Elite titles such as "Scribe" and "Administrator of Scribes" are bestowed on elites, and the entire social paradigm was organized around literate officials who stood directly

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<sup>37</sup> Gardiner 1957, 1.

<sup>38</sup> Baines 1983, 572.

<sup>39</sup> Lichtheim 1975, 3-7.

<sup>40</sup> Lichtheim 1975, 3-4.




<sup>41</sup> Gardiner 1957, 10.




<sup>42</sup> Bard 2013, 32.



below the king. These were the individuals who organized expeditions, offerings, and managed treasuries. Actual writing, however, was performed by subordinate scribes. These subordinate scribes were trained in special scribal schools, and were employed to create the administrative documents that powered the Egyptian bureaucracy.<sup>43</sup>

Scribal practices also influence the words chosen for a given text and how those words were written. Aesthetics played a major role in the creation of a text, as there was a high regard for it as an art form in itself.<sup>44</sup> This influenced elements such as the direction in which the text was meant to be read, the word choice, and how those words were represented. Scribes would routinely rearrange signs to create balanced rectangles out of their words, and even the order of signs may be reversed to achieve this goal.<sup>45</sup>

Thus the ancient Egyptian word for boat, *dpt*, is not written as [    ], but rather

as [    ].<sup>46</sup> Furthermore, it is very common for texts to be written in a type of meter, which would also have a direct influence on word choice.

## Conclusions


The study of *hn-ih*-boats and other vessels associated with the conveyance of cattle requires an understanding of not only the motivations for livestock transport, but also a grasp of the nature of Egyptian art and literature themselves, which are the primary sources of information concerning these animal carriers. I critically examined

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<sup>43</sup> Bard 2013, 32.

<sup>44</sup> Lichtheim 1975, 10.

<sup>45</sup> Zauzich & Roth 1992, 4.

<sup>46</sup>  is simply a determinative, which signifies that the preceding word means “boat.”

the sources of information on these watercrafts, taking into account the potential for bias in the literary and iconographic record as described above. This evidence is then compared to other vessel types found in the archaeological record in order to better reconstruct the reality of cattle carrying boats in ancient Egypt.


## CHAPTER II

### THE ETYMOLOGY OF THE CATTLE BOAT





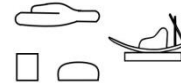
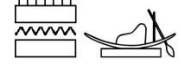

Many records found on stelae, tomb walls, and preserved on papyri mention large transport ships specifically for the conveyance of cattle. Even fictional literature such as the *Herdsman's Tale*, written in the Middle Kingdom, describes vessels used to move bulls across the Nile. These cattle ferries or barges were referred to under a variety of names. This chapter will focus on identifying groups of terms used to describe cattle carrying vessels and examine their varying characteristics as revealed through text (Table 2.1).

#### **Hn-ih: The New Cattle Transport**


Perhaps one of the most commonly-used terms for the cattle barge is hn-ih, and it is a word that has maintained a significant longevity, seeing extensive use in the Middle and New Kingdom periods. Not only does this vessel type find itself listed in a variety of texts, it is also the livestock carrier for which we have the best iconographic evidence. The hn-ih is depicted in detail on the walls of the tomb of Huy, an 18th Dynasty viceroy. Representations like these, along literary references, reveal unique features of this animal transport.





Hn-ih-boats are represented in text with slight variations, however each one is accompanied by the cattle determinative [  ]. In the Papyrus Lansing hn-ih is given





as [  ].

Hieroglyphs	Transliteration	Description	Example Contexts
	<i>Hn-ih</i> -boat	Cattle ferry	Wb VI, 933; WB III, 376, 7; P. Koller 3,6; P. Lansing 12,4; P. Anastasi IV 7,1; P. Harris I 69, 13; P. Harris 12b, 11; P. Anastasi VIII 2, 17
	<i>wsh</i> -ship	Large cargo boat, flat bottomed	P. Koller 3, 6; Silsileh inscriptions; P. Harris
	<i>Karu</i> -boat	Boat/skiff	Amen. 10, 11, P. Koller 3,7
	<i>Trt</i> -boat	Boat, skiff, ship	P.Harris
	<i>Dpt</i>	Boat (general)	Amen. 25, 15, Peasant 221, Palermo Stele; P. Hermitage 1115
	<i>Mns</i>	Seagoing cargo ship	A.Z. 1906, 15
	<i>Smh</i>	Small reed raft or boat	Pyramid texts, P.421, M. 603, N.1208

**Table 2.1.** Possible cattle carrying vessels and their contexts. Many of these terms can be represented in hieroglyphs multiple ways, only one example for each is given here.

hieroglyphs [  ] simply mean “new” while the preceding one is the determinative which shows the vessel described was a cattle transport. The man striking two-handed with a staff is also a determinative; often it denotes violence or action.<sup>47</sup> Here it more likely carries connotations of effort, alluding to the effort of the ferry in transportation of goods, or in this case, livestock.

The beginning of the word, [  ] or *hn*, is a double consonant glyph laden with different subtexts. At its most basic, it means to paddle, or row a boat, but more importantly, it is often used in the terms applied to vessels used to transport cargo.<sup>48</sup> This glyph is a fairly common double-consonant glyph used in inscriptions. Here again is an example of the artistic nature of the written word for ancient Egyptians.<sup>49</sup> The use of [  ] creates a more visually distinctive inscription than the use of two 1-consonant signs, in this case [  ], and makes the word easier to read. The appearance of the quail chick, or [  ], is often interpreted as a “w” or “u” sound. However its use in this case is to demonstrate the plural so that the passage reads, “Ships, ferry-boats, and new cattle transports are moored to its quay.”<sup>50</sup>

The term *hn-ih* also appears in the form [    ]. Again, the determinative for cattle is employed, however [  ] has been substituted for the striking man. The interchangeable nature of these two signs is a fairly common feature of Egyptian


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<sup>47</sup> Collier & Manley 1998, 132.

<sup>48</sup> Budge 1978, cvii.

<sup>49</sup> Collier & Manley 1998, 15-17.

<sup>50</sup> Blockman & Peet 1921, 294.

inscriptions.<sup>51</sup> The signs chosen in this form allow the glyphs to be arranged in a tighter rectangle, making it easier to write in areas with limited space. Shortening the word makes it necessary to clarify its meaning in other ways. To show that this shortened version of the word is indeed referring to a cattle ferry, the determinative [] is used.

Payprus Koller also mentions *hn-ih*-boats. The document is a letter concerning Nubian tribute written by Paser, Overseer of the Land of Kush in the later New Kingdom. In it the author states:

When my letter reaches thee thou shalt cause the tribute to be made ready in all its items, in *hw3*-bulls, young *g3*-bulls, *wndw*-bulls, gazelles, oryxes, ibexes, ostriches; their broad-boats, *hn-ih*-boats and [ordinary] boats being ready to hand, their skippers and their crews prepared for starting...<sup>52</sup>

This passage indicates two key elements of *hn-ih*-boats. First it is clear that these cattle ferries of the New Kingdom were specialized vessels for livestock transport rather than being general cargo boats adapted to move cattle. This is evident by the fact that they are requested in addition to both broad boats and more general cargo vessels. Secondly, although the last phrase is applied to all three vessel types, the passage does imply that cattle-boats would have been directed by a skipper, or captain, likely an *nf* or steersman. This implication is supported by the Papyrus Anastasi VIII which does list an *nf* as the individual in control of the cattle ferry mentioned therein.<sup>53</sup>

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<sup>51</sup> Collier & Manley 1998, 133.

<sup>52</sup> Gardiner 1911, 39-40.

<sup>53</sup> Vinson 1996, 21, 42.

Other texts, such as the Papyrus Harris I reveal additional aspects, such as construction materials used for the construction for *hn-ih*-boats. In this text, *hn-ih*-boats are found in a list of vessels constructed as tribute for the pharaoh's father, which is concluded with “total of cedar and acacia boats 82.”<sup>54</sup> Out of these two material options, acacia must be the wood which was used to construct these cattle ferries. Cedar was an expensive, imported wood which was used mostly in ceremonial vessels and prized for its ability to be cut into long straight timbers. Acacia, conversely, was a relatively hard local wood which comes from a small tree with curving branches. Planks or timbers cut from these crooked trees would have been very short, although Greek writer Theophrastus reports they could generate timbers up to six meters.<sup>55</sup> The *hn-ih*-boats depicted in the tomb of Huy have short, joggled hull planks, making it likely that they were made from acacia. Papyrus Harris I may also suggest that these cattle ferries were fairly large. Along with the commissioned vessels, the document provides lists of large herds which were also being collected.<sup>56</sup> Unfortunately, whether these herds were in actuality transported on the *hn-ih*-boats mentioned is unclear. Other acacia barges with similar functions mentioned in Old Kingdom texts are given as being 60 to 100 cubits, or 32-52 meters in length, and were used to move goods on the Nile throughout Egypt.<sup>57</sup>

Other elements, such as who actually owned this type of vessel are also alluded to in text. It seems that individuals or the state could own *hn-ih*-boats. Papyrus Koller

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<sup>54</sup> British Museum 1855, 8.

<sup>55</sup> Ward 2000, 15-6. See also BAR I: § 323.

<sup>56</sup> British Museum 1876, 15.

<sup>57</sup> Ward 2000, 15-6. See also BAR I: § 323.

explicitly reveals that *hn-ih*-boats were being commissioned on behalf of the state to collect tribute.<sup>58</sup> On the other hand, the Papyrus Lansing includes this type of vessel in the list of chattels Ra'ia places in his newly constructed mansion.<sup>59</sup>

An interesting aspect of the *hn-ih*-boat's use is illuminated in Papyrus Anastasi VIII, where a steward is being chastised for his mismanagement of a cattle ferry:

A further matter: You have salved yourself bald(?); you have salved yourself well. Is it true that you sent the cattle ferry which used to carry the wool with the sailor Seti in it, so that it was kept empty as far as Heliopolis while the six men were in it as crew? Is it true? You are a sensible person now. Is it proper to keep silent to you about this neglectfulness that you displayed? Are there no rushes in the papyrus swamp? Is there no output? Take heed from me if you fail to load this boat lest it should be sent empty.<sup>60</sup>

So, while the *hn-ih*-boat was a purpose built vessel for the conveyance of cattle, this passage demonstrates that was common practice to use these vessels to carry other cargos. These boats would have been used in such a manner since the movement of cattle to grazing grounds was seasonal in nature. This means that, excluding special circumstances such as tribute collection, the majority of cattle ferries would fall into disuse for most of the year. It appears that good stewards maximized the economic potential of these vessels by transporting varying cargos year round.

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<sup>58</sup> Gardiner 1911, 39-40.


<sup>59</sup> "Its granaries are supplied with grain, overcharged with corn. The fowl-yard and fowl-house contain rogeese; the stalls are full of oxen; the breeding pool contains sr-duck; horses are in the stables. Ships, ferry-boats, and a new cattle-transport (*hn-ih*-boat) are moored to its quay." Blackman 1925, 294.

<sup>60</sup> Wente 1990, 120-1.



### ***Wsh, Dw'-twy, Dpt and Its Derivatives: Large Egyptian Freighters***

Larger freighter-like vessels were also used on the Nile alongside the smaller barges or ferries throughout Egyptian history to transport cattle and other heavy cargo. Commonly mentioned ship types for this vessel category include *wsh*, *dw'-twy*, and derivatives of *dpt*. While all of these types complete the same overall function, they do exhibit noteworthy variances within this group. However, all of these ships seem to carry general cargo, rather than being purpose built for any single type of commodity or livestock.

The *wsh*-ship, or [, was a large transport ship mentioned in the Silsileh inscriptions and Papyrus Harris.<sup>61</sup> *Wsh* was a common term in the New Kingdom which was used to denote a broad vessel with unspecific cargo.<sup>62</sup> These freighters generally moved foodstuffs and were often owned privately, or by temples.<sup>63</sup> This was the type of cargo ship sent on an expedition to construct monuments in Thebes during the 20<sup>th</sup> Dynasty.<sup>64</sup> The Silsileh inscription implies that these vessels were either state owned, or privately owned but state commissioned, as the passage states that the ships were under the pharaoh's command. These ships were frequently sent to Nubia by the Egyptian pharaoh to collect *inw*, a commission illustrated in the market scene in the tomb of Khaemhat (TT57), who served as Overseer of the Granaries under Amenhotep III.<sup>65</sup>

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<sup>61</sup> BAR 1962 IV: §19; Grandet 1999, 42.

<sup>62</sup> Vinson 2013, 3.

<sup>63</sup> Pino 2005, 101-2.

<sup>64</sup> The Silsileh Inscriptions of Medinet Habu list the *wsh*-ship as the large transport vessels sent by the pharaoh to carry building materials for monuments at Thebes; BAR IV: §19.

<sup>65</sup> Pino 2005, 101-2.

While this scene does not specifically depict cattle as a consignment retrieved on that particular commission, as previously mentioned cattle do appear among *inw* tribute lists.<sup>66</sup> As a vessel type that regularly carried this type of tribute it is probable that cattle were at times among their cargo. It is also important to note that *wsḥ*-ships differ from the smaller cargo ships mentioned above not only in size, but also in use. Vessels such as *hn-ih*-boats seem to have been purposed for more local use, *wsḥ*-ships could be sent out of Egypt to Nubia to retrieve goods.

Other contemporary large freighters included the *dw'-twy*-ships. The name of this ship type has a significant longevity, appearing first in the early Dynastic Period. However, at its initial development the *dw'-twy*-ship was a large ceremonial vessel, rather than ship for everyday use.<sup>67</sup> Despite this ceremonial aspect, both the sheer size of these ships and the contexts in which they are mentioned seem to imply that they may have carried cattle. The Palermo Stone seems to indicate this, listing the construction of *meru* wood *dw'-twy*-ships alongside sixteen-barges of the king. In the same section, the text mentions the collection of 200,000 cattle from Nubia.<sup>68</sup> Although it is not directly stated that these ships were used for the transport of these cattle it seems probable. It is also possible that *dw'-twy*-ships were employed for cattle only when collecting them as tribute, thus maintaining a ceremonial function, and were not used for everyday commerce.


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<sup>66</sup> Casson 1991, 13.

<sup>67</sup> Vinson 2013, 2.

<sup>68</sup> BAR 1962, vol. 4 § 65.

The Palermo Stone shows that *dw'-twy*-ships were made of *mrw* wood. There is some debate as to the exact species of timber referred to here. *Mrw* has been identified by some Egyptologists as cedar, while others maintain it refers to cypress or juniper.<sup>69</sup> As both these species are imported lumber, and juniper and cedar grow together, it is entirely possible that stating one built a ship “of *mrw*-wood” simply meant that the timber was imported.<sup>70</sup> Whether it was cedar, cypress or juniper, the benefit of using these types of wood was that these trees easily produced long planks, unlike the crooked, native acacia.<sup>71</sup> This quality made these genera valuable for the construction of larger ships. The additional fact that *dw'-twy*-ships held ceremonial importance further suggests the use of cedar in their construction as cedar held more prestige than local woods. While *dw'-twy*-ships are described as being large transport vessels, it is possible that their ceremonial function would garner them a length to beam ratio closer to other ceremonial vessels, which average 4-8:1, rather than the broader 3:1 of working class Egyptian boats.<sup>72</sup>

While both *dw'-twy* and *wsḥ* appear frequently throughout the Egyptian literary record, by far the most common ship name is *dpt ntr*.<sup>73</sup> The root word of this term, *dpt* ], eventually came to generically mean “boat” rather than defining a specific vessel type.<sup>74</sup> It even seems to have enjoyed a longer life than the term *dw'-twy*, first

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<sup>69</sup> Kuniholm 1997, 347.

<sup>70</sup> Kuniholm 1997, 347.

<sup>71</sup> Ward 2000, 20-3.

<sup>72</sup> Hocker and Ward 2004, 14.

<sup>73</sup> Miosi 1975, 93.

<sup>74</sup> Vinson 1994, 25.

appearing in Pyramid Texts and on the Old Kingdom Palermo Stone.<sup>75</sup> Similar to most previous examples, the determinative [  ] is employed.

*Dpt* makes frequent appearances across ancient Egyptian Literature. For example, it appears in the Tale of the Shipwrecked Sailor, a literary piece from the Middle Kingdom on palimpsest P. Hermitage 1115.<sup>76</sup> In this story, *dpt* refers to a seagoing vessel 120 cubits long with a beam of 40 cubits and a crew of 120 Egyptians.<sup>77</sup> Also belonging to the Middle Kingdom, the Eloquent Peasant is one of the longest pieces of surviving ancient Egyptian literature totaling 420 lines which have been compiled from different papyri. This text's use of *dpt* is rather more metaphorical, although it is implied that this vessel was a cargo carrier.<sup>78</sup>

This type of large freighter was used to transport a myriad of items from a pygmy for Pepi II, to obelisks in the New Kingdom, but is also specified as a freighter used to transport cattle.<sup>79</sup> This diversity of cargos seems to agree with the suggestion that *dpt* served as a generic term for boat, however there are several consistencies. This term appears to refer to large boats used to convey large cargos, and these were mostly seagoing ships, rather than the smaller cargo boats used on the Nile. Stone seems to be a frequent cargo of *dpt*-ships, as mentioned in the Shipwrecked Sailor the narrator was on his way to a turquoise mining region on an expedition for the pharaoh, and as mentioned

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<sup>75</sup> Miosi 1975, 93; Vinson 2013, 2.

<sup>76</sup> Baines 1990, 58; Rendsburg 2000, 15; Simpson 1958, 50.

<sup>77</sup> Simpson 2003, 48.

<sup>78</sup> Perry 1986, 2, 451.

<sup>79</sup> Miosi, 1975, 93.

above *dpt*-ships were those named as some obelisk carriers.<sup>80</sup> It is possible these ships, which were around 120 cubits long, were the ones used to transfer the large herds of cattle mentioned in the Papyrus Harris.

### ***Smḥ*, *Shn*, and *Šht*: Small Reed Rafts**

Throughout the entirety of Egyptian history, the term *smḥ* has been used to refer to small reed-bundle rafts employed in the pastime of fishing and fowling along the Nile.<sup>81</sup> In rare instances, it has been argued that *smḥ* could also be used to refer to large wooden boats for the transportation of cattle.<sup>82</sup> However, the stronger association of *smḥ* with reed rafts and the proliferation of these rafts in both literature and iconography, make that interpretation less likely.

The tomb of Nefer-Hotep, an 18th Dynasty official, shows the transportation of a calf during the harvesting of papyrus (See Appendix A, A.11).<sup>83</sup> This raft appears to have had a very shallow draft, with a bound stem and stern that rose high above the water. These craft were constructed by lashing together bundles of papyrus. Lashing is not depicted in the Nefer-Hotep relief, although details such as this would likely have been painted rather than carved, and thus not preserved.

Lashing details have survived on other reliefs such as those from the tomb of Khounes of the 6th Dynasty, and the 6<sup>th</sup> Dynasty Mastaba of Ti (See Appendix A, A.2). These reliefs demonstrate a transverse lashing of papyrus bundles across the raft. While

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<sup>80</sup> Simpson 2003, 47,

<sup>81</sup> Miosi 1975, 86.


<sup>82</sup> Jones 1998, 144.

<sup>83</sup> Vandier 1969, vol. 5 303.

most of these rafts end in a blunted stem and stern, some are more decorative and end in a flared frond such as the raft from the tomb of Nefer-Hotep. In these scenes, all of the vessels are propelled by a pole, although many appear to be steered by use of an oar.

*Smḥ* are always operated by a three-man crew when fording cattle. Two of the crewmembers (if they can be called such), are occupied with managing the raft, either in its steering or its propulsion. The third figure is in charge of managing the cattle, either by holding a rope tethered to a towed calf, or managing a tethered calf on the raft itself. While this figure in some instances assists in the operation of the craft, his focus is always on monitoring the herd as it fords the river, which is his primary purpose. As mentioned above, these craft were multifunctional, also seeing use in fishing and fowling. While fording cattle was one of the more significant functions of these rafts, its non-specialized nature is further highlighted in the Nefer-Hotep relief where it is simultaneously being used to harvest Papyrus while transporting a small calf.<sup>84</sup>

The Herdsman's Tale verifies the use of *smḥ* to ford cattle by naming it as "our boat for taking bulls across."<sup>85</sup> While this statement makes it seem as if adult cattle were ferried across the river in reed bundle rafts, it is far more likely that the author here is referring to the practice described above, where the craft would be maneuvered alongside a swimming herd, as adult cattle do not appear onboard such rafts in


iconography. In text, the hieroglyphs for this type of craft are [].<sup>86</sup> This

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<sup>84</sup> See Appendix A, A.11.-

<sup>85</sup> Miosi 1975, 85-6.

<sup>86</sup> Budge 1978, 671.

term includes a determinative commonly found in other boat names associated with vessels that transport cattle [, as well as other transport boats.<sup>87</sup>

*Smḥ* rafts could also be widened to accommodate greater loads, but were still used in much the same way. These wider versions were termed *šht*, and similar vessels were used in Egypt into the 20th century AD. Another variant, *šhn* was used in a similar fashion to ferry between riverbanks.<sup>88</sup> Since the functions and forms of *šhn* and *smḥ* so closely align it is unlikely they were different types of craft, but rather synonymous terms which diverged only slightly to define their functions.

## Conclusions

The ancient Egyptians used several types of vessels to move cattle both from foreign lands to Egypt, and more locally along the Nile. While *hn-ih*-boats were specifically designed for the transport of cattle, a high degree of flexibility in use was a key requirement for these ferries. The multifunctional nature of the *hn-ih* is emphasized in a rebuke recorded in the P. Anastasi VIII. The text also suggests that these cattle ferries were primarily used to transport animals locally, to and from grazing grounds, and this practice allowed the vessel to be available for other cargos for the majority of the year.

Cattle were also moved short distances locally by fording herds across the Nile. To manage the animals, Egyptians used payrus rafts such as *smḥ*, *šhn*, and *šht*. Three-man crews were employed, one of which led the herd. This was accomplished often by

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<sup>87</sup> See Budge 1978, 576.

<sup>88</sup> BAR 1962, vol. 4 § 175.

towing a small calf which the other animals would follow. Again, these rafts were often also multifunctional; they could be used to harvest papyrus and fish as frequently as they were employed to move cattle.

Despite the fact that a purpose specific cattle transport did exist, ancient Egyptians did use other cargo ships to move livestock. *Hn-ih*-boats were used primarily for local transport, but for the importation of cattle in the form of tribute, the Egyptians used large freighters. These included the *wsh*-boats, which were used to collect *inw* from Nubia, and which may have included cattle in these consignments. *Dw-tw*y vessels, a type of large freighter with ceremonial connotations may also have been involved in the movement of cattle collected as tribute. While these vessels might have transported cattle, they were often part of a larger, general cargo.



### CHAPTER III

#### RECONSTRUCTION OF CATTLE MOVERS

To better understand how *hn-ih*-boats and other cattle moving vessels operated in ancient Egypt, it is important to at least attempt a reconstruction of the vessel itself. While no cattle ferries have been identified in the archaeological record, textual, iconographic, and archaeological parallels can be combined to isolate elements of vessel design and inform on their use. Examples of other types of working boats such as the Lisht timbers, are preserved and methods of construction, materials, and hull design in these boats would have been similar to what would have been implemented in the production of *hn-ih*-boats.

#### **Hull Construction**

Hull design in general remained fairly consistent throughout the history of ancient Egypt; however iconography does seem to indicate modest changes in form. Function played a large role in the determination of hull shapes and several attempts have been made to create classification systems based on these shapes found in iconography and text. Most notable are the typologies developed by Grasser, Reisner, Boreux, Tooley, and Merriman.<sup>89</sup> In 2012 Michael Stephens synthesized these systems

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<sup>89</sup> Boreux, C. 1925. *Etudes de Nautique Egyptienne*. Cairo : Impr. de l'Institut français d'archéologie orientale; Grasser. 1869. "Resultate de Dumicken," In *Das Seewesen der alten Aegypten*. Berlin; Merriman, A. 1911. *Egyptian Watercraft Models from the Predynastic to Third Intermediate Periods*. BAR International Series 2263; Reisner, G. 1913. "Models of Ships and Boats." *Catalogue general, des antiquités égyptiennes du Musée du Caire*; Tooley, A. 1995. *Egyptian Models and Scenes*. Buckinghamshire: Princes Risborough.

into a more cohesive typology which included not only a dating sequence for hull shape types, but also considered vessel function when constructing his categories.

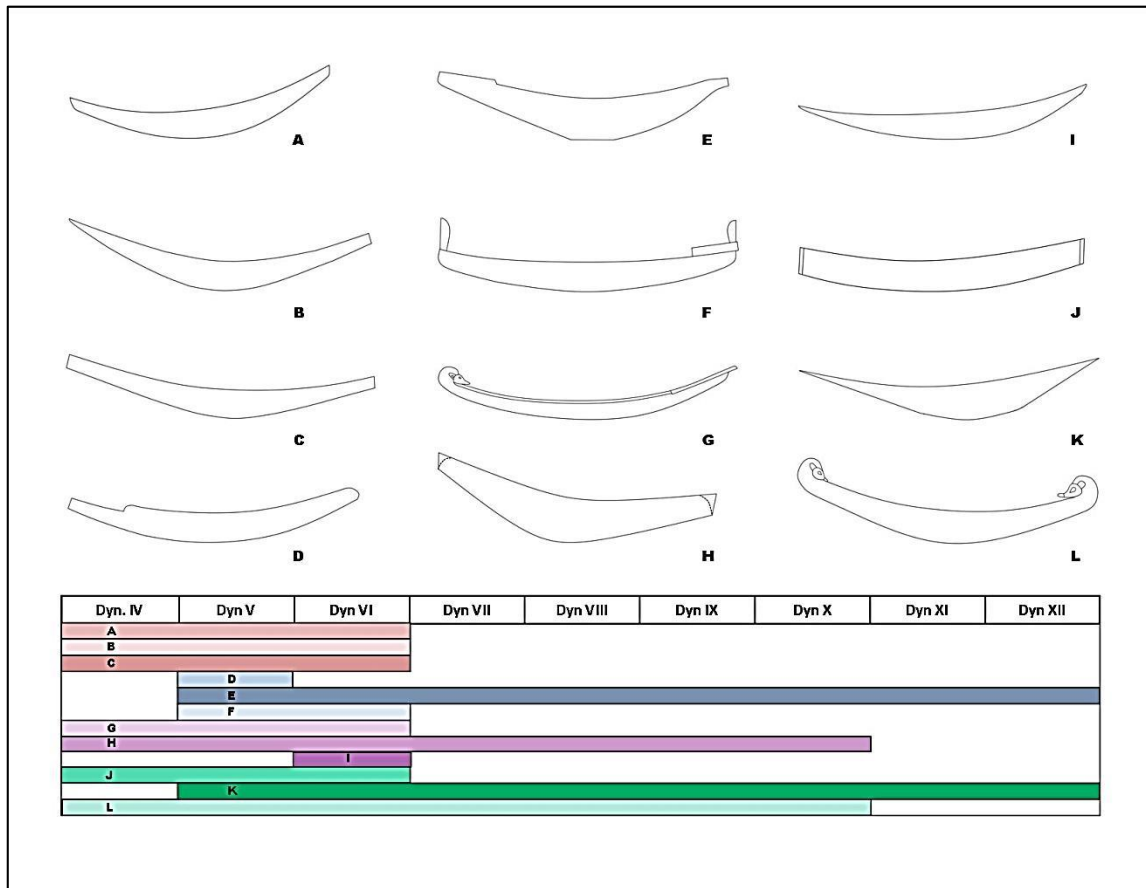
Stephens' findings, which focused on the Old and Middle Kingdoms, are represented in figure 3.1. Cargo carrying or transport vessels are represented by hull types H and J, both of which had a lower hull with most often a square bow and stern (although rounded extremities were not rare). Hull type H was smaller and less symmetrical than type J, and was always fitted with a bipod mast. However, often in Nile scenes, these vessels have their masts un-stepped and are being propelled by punting poles.<sup>90</sup>

The Old Kingdom examples of cattle-carrying ships in iconography are never specialized cattle carriers, but rather small, general cargo transports. However, their hull shape varies between the 5<sup>th</sup> and 6<sup>th</sup> dynasties. At first, the majority of these small cargo vessels had a bow and stern which only rose moderately above the water line, and in some cases, had an out-curving bow. During the 6<sup>th</sup> Dynasty, these ships acquired a much deeper hull and more closely aligned with Stephens' H type. Almost universally, the hulls of 6<sup>th</sup> Dynasty cargo carriers had a stern which rose high above the bow, although both extremities were angled high above the waterline. The extremities were also in general truncated; however in some cases the stern and bow might be slightly rounded. Figure 3.2 illustrates examples of these differences in hull shape.

Despite this seeming evolution, there are too many similarities between the

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<sup>90</sup> Stephens 2012, 40.



**Figure 3.1.** Egyptian hull shapes IV-XII Dynasty (Drawing by author). The hull shapes above are based on Michael Stephens description of hull types which he identified in his 2012 work “A Categorization and Examination of Egyptian Ships and Boats from the Rise of the Old to the End of the Middle Kingdoms.” *BAR International Series 2358*. Oxford: Archaeopress. The graph below the hull shapes shows when each form appeared in the iconographic record.

representations of the 5<sup>th</sup> and 6<sup>th</sup> dynasties to suggest that the physical hull design did in fact change so greatly. Deck structures remained similar in their representation, as did the types of goods represented as cargo. The most likely explanation is that artistic conventions were being shifted slightly, rather than any revolutions in shipbuilding. However, during the New Kingdom, Nilotic ships appear in art which seem to have carried cattle exclusively rather than general cargo, and must have been the vessels which texts such as Papyrus Harris referred to as the cattle transport ship.

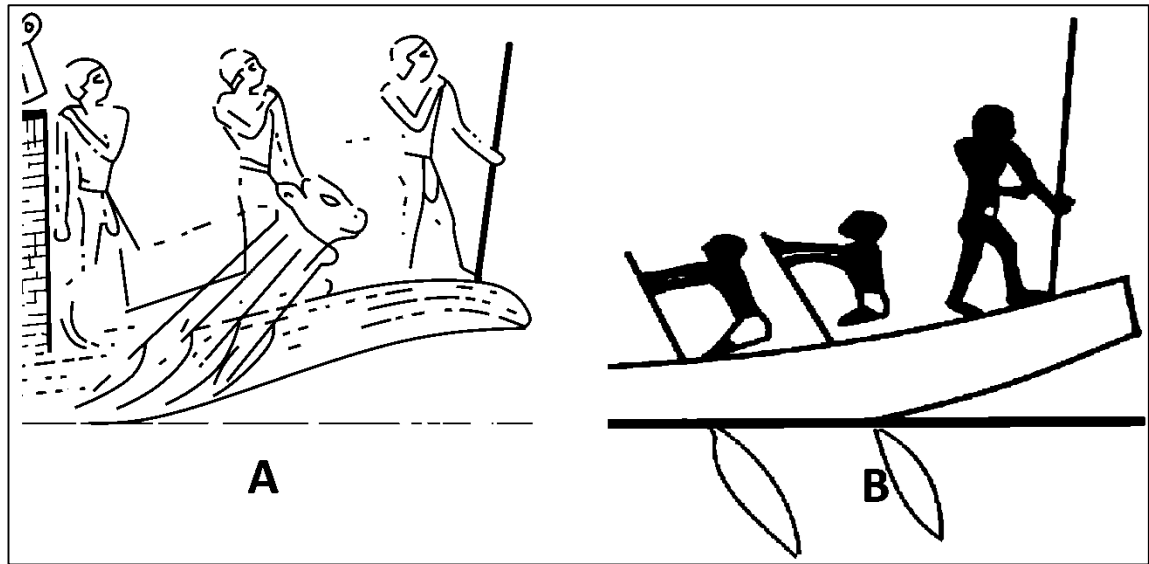
The best example of the cattle transport ship comes from the tomb of Hui at Thebes dating to the 18<sup>th</sup> Dynasty (Figure 3.3). The hull shape is very similar to those of the Old Kingdom, having a truncated or square bow and the extremities are angled high above the waterline with the stern being the highest point on the vessel. While the general hull shape has remained fairly unchanged from the Old Kingdom to the New Kingdom, there is a very important development. During the Old Kingdom, it appears that cattle-carrying cargo ships were steered using a large steering oar which was set out against one side of the ship or the other.<sup>91</sup> The configuration of two steering oars in an axial rudder system is also frequently seen for Egyptian freighters.<sup>92</sup> In a few cases the steering oar is rested against an upright, curved stern stanchion or appears to be fastened to the outside of the hull.<sup>93</sup> During the New Kingdom, cattle transport ships start to be shown with a notched or very pronounced cleft at the stern. A single rudder, supported

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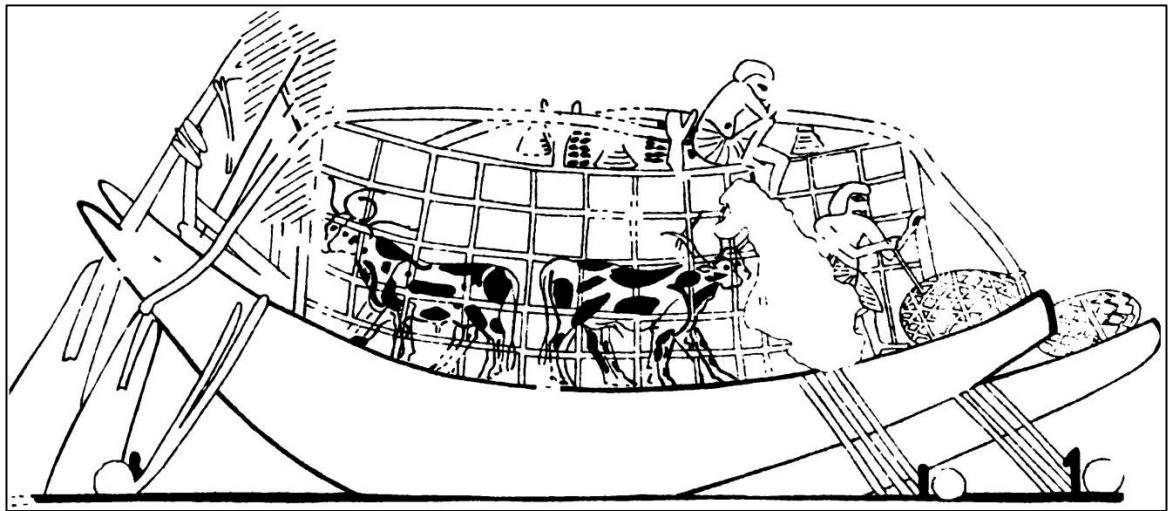
<sup>91</sup> For examples see Appendix A, C.1, C.2, C.3, D.1, D.3, D.4a, D.6

<sup>92</sup> This is shown in many reliefs from Saqqara. Belov 2014, 4.

<sup>93</sup> See Appendix A, D.4a and C.4 for examples.



**Figure 3.2.** Rounded versus truncated bow: Old Kingdom cargo boats. (A) Relief from the tomb of Ptahhotep, 5<sup>th</sup> Dynasty showing a transport ship with livestock, this vessel has a rounded bow and stern. (B) Painted relief from tomb of Kaïemânkh, 6<sup>th</sup> Dynasty, showing a transport ship with livestock and a truncated bow, the vessel has been flipped horizontally so both ships have the same orientation to allow better comparison (Adapted from Vandier 1969, v.5 fig.298 and Davies 1936, pl.3).



**Figure 3.3.** Tomb of Huy—cattle transport boats, 18th Dynasty. From the west wall of the Tomb of Huy at Thebes. From the top register of a three-register scene of cattle transport ships moored on the Nile banks. Adapted from Davies 1926, pl.32

by a stanchion and operated by a loom, rests in the cleft (Figure 3.4). While the stern cleft may have existed prior to this in the Old Kingdom, as suggested by the Mastaba of Kaïemânkh relief, it became much more pronounced by the New Kingdom.<sup>94</sup> Additionally, cargo was kept clear of this steering assembly, while on Old Kingdom cargo ships and even other types of freighters in the New Kingdom, such as grain ships, all available space was filled with cargo. Often in iconography this appears as a curved storage structure on which the helmsman sits. However, in the New Kingdom, this becomes a screened-off rectangular structure.<sup>95</sup>

Because cattle ferries in ancient Egypt were meant for riverine environments the body shape of these vessels could be made more boxlike, with a sharp turn of the bilge and relatively flat bottom. Other types of boats from ancient Egypt have been recovered from archaeological excavation and their hull design lends insight into the reconstruction of the cattle transport ship. Six boats dating to ca. 1850 BCE were recovered by Jean-Jacques de Morgan in 1894 at Dashur.<sup>96</sup> All six of these watercraft had broad mid-sections which were relatively shallow that tapered to relatively thin extremities (Figure 3.5).<sup>97</sup> On average, the distance between the bottom plank to the sheer line of the Dashur boats is 1 meter, so their stern and stem would not have risen as high out of the water as those of the cattle ferry as seen in art.<sup>98</sup> However, it must be taken into

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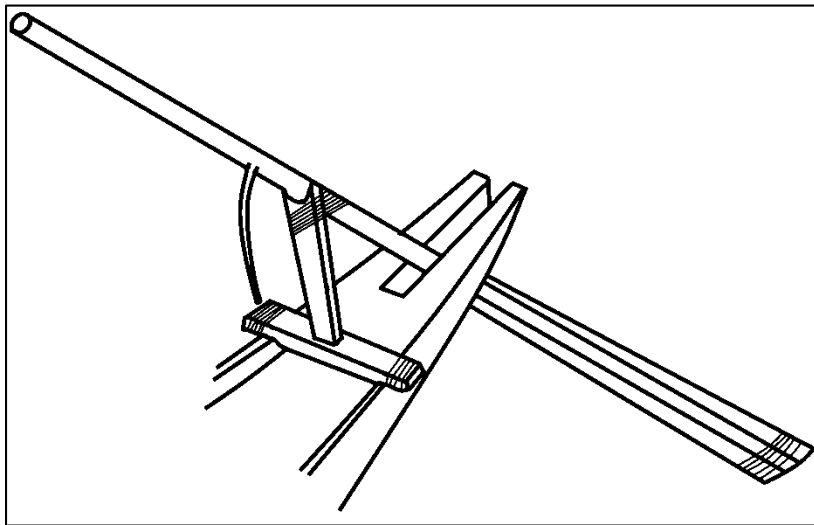
<sup>94</sup> See D.3 for the Mastaba of Kaïemânkh relief.

<sup>95</sup> See Landström 1970, 60 for Old Kingdom cargo ships; See Naville, Lewis, Tylor and Griffith 1984, pl.3 for an example of a grain ship with a rear rectangular enclosure.

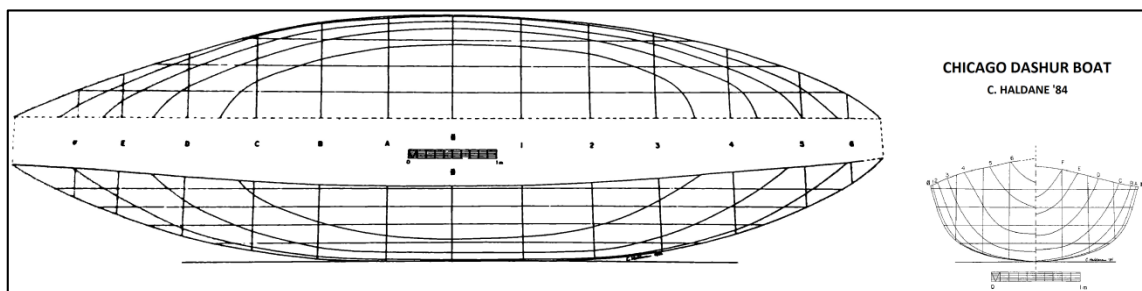
<sup>96</sup> Steffy 1994, 33.

<sup>97</sup> Haldane 1984, 389.

<sup>98</sup> Vinson 1994, 27.



**Figure 3.4.** Steering oar assembly of a model boat, object no. 334 (Adapted from Jones 1990, pl. 31).



**Figure 3.5.** Lines of the Chicago Dashur Boat. Sheer and half-breadth plan left; body plan right From Steffy, J. 1994. *Wooden Ship Building and the Interpretation of Shipwrecks*. College Station: Texas A&M University Press, figure 3-10a & 3-10b. (Reproduced with permission from Texas A&M University Press).

consideration that these were ceremonial, and not working class vessels.<sup>99</sup>

Excavations of the area surrounding the pyramid of Senwosret I (12<sup>th</sup> Dynasty) uncovered timbers of working watercraft in the roadway and ramp foundations.<sup>100</sup> Some of these timbers recovered from the Lisht excavations were frame timbers which allow for an estimate of the vessel's original hull shape to be drawn. The heavy frames suggest the original vessel had a shallow draft and a more rounded bottom without a significant chine, unlike the ceremonial barge of Khufu. The boat reconstructed from the Lisht timbers was a cargo vessel probably reserved to carry blocks of stone necessary to build Senwosret I's pyramid.<sup>101</sup>

#### *The Size and Dimensions of the Cattle Transport*

Several lines of evidence are available to help determine the reconstructed size of a generic cattle transport ship of the New Kingdom. The cattle boats of the tomb of Huy are most definitely Nilotic vessels and not seagoing vessels, so despite the fact that textual evidence alludes to the movement of large herds of cattle, the *hn-ih*-boats were not comparable to the great Nile boats of Ramses III or the large seagoing cargo carrier in the Tale of the Shipwrecked Sailor that were over 54 meters long.<sup>102</sup> More closely related in size to the cattle transport ship, the autobiography of Uni from the 6<sup>th</sup> Dynasty mentions two types of cargo vessels. An eight-framed *satch* boat is given in the text. In comparison to the Khufu barge that had twice as many frames; it is likely this cargo ship

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<sup>99</sup> The Dashur boats were excavated from the pyramid complex of Senwosret III at Dashur, and were buried to express the prestige of the deceased. Ward 2000, 102.

<sup>100</sup> Ward 2000, 107.

<sup>101</sup> Ward 2000, 103-128.

<sup>102</sup> Edgerton 1930, 140; Lichtheim 1973, 212.



type was ca. 21 meters long. This extrapolation, however, is problematic as it must be kept in mind that a direct comparison between a ceremonial vessel such as the Khufu barge and a working one is problematic as these two ship types had drastically different functions as well as length-to-beam ratios. A larger cargo ship, a *sekhet*-boat is also named, but was a large stone carrier of about 32 meters.<sup>103</sup>

Nilotic working boats like these generally had a length-to-beam ratio of 3:1, being significantly bulkier than the slim ceremonial vessels which had length-to-beam ratios of 4-8:1.<sup>104</sup> The Lisht timbers were tamarisk and acacia, which is not unexpected for utilitarian vessels, and the timbers range in size from 1.01 to 2.6 meters with a majority of the planks being 16 to 20 centimeters in width. Some of the frame timbers survive and suggest that the vessel had a length to beam ratio of 3:1, and was close to 24 meters long at minimum.<sup>105</sup>

In the 1930s, William Edgerton surveyed ancient Egyptian papyri and inscriptions to compile a list of boat dimensions (Table 3.1). The majority of these vessels follow the length to beam ratio of 2-3:1 which is expected of working vessels. As discussed earlier, *dpt* was a term for a general Egyptian freighter for which Edgerton has gleaned widths of 13.7 and 18.3 meters. The recovery of burnt Old Kingdom ship timbers from the site of Ayn Sukhna on the Red Sea also lends insight into the size of possible cargo ships. The 13.5 to 15 meter vessels found in the galleries here likely

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<sup>103</sup> Vinson 1994, 25.

<sup>104</sup> Hocker & Ward 2004, 13.

<sup>105</sup> Ward 2000, 103-26.

Ship Type	Length (cubits)	Width (cubits)
<i>dw3-t3wj</i> -ship	100*	--
<i>wšḥ-t m šnd</i>	60	30
<i>dpt</i>	--	30*
<i>dpt špśjt</i>	120	40
<i>wšr ḥ3t (imn), ḥr tp itrw</i>	130*	--
<i>wi3 špśj</i> of Ptah	130*	--
<i>wšḥt</i> of King Piankhi	43	--
<i>wšḥt</i> of Harem of Amun	45	15

**Table 3.1.** Ships and their lengths. Adapted from Edgerton 1930, “Dimensions of Ancient Egyptian Ships,” *JEA*, 46:145-9. Table 1. Entries with an (\*) indicate that it is unclear if it is length or width.

crossed the Gulf of the Suez carrying several tons of ore cargo.<sup>106</sup> Similarly, excavations at Marsa/Wadi Gawasis have revealed steering oar fragments, which probably belonged to a seagoing vessel 14 to 18 meters long.<sup>107</sup> Ships like these may likely have carried cattle coming to Egypt as tribute.

Another approach to identifying the dimensions of *hn-iḥw* or other cattle ferries is to consider the size of their cargo. Allan Gilbert in his article, *Zooarchaeological Observations on the Slaughterhouse of Meketre*, suggests cattle sizes based on the Meketre slaughterhouse model.<sup>108</sup> By relating the scale of the human figures, Gilbert proposed that the cattle in these scenes were approximately 39 inches at the withers for young animals, and 53 inches on average for fattened cattle. He further proposes that the young, recently weaned cattle in these models would have weighed roughly 100

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<sup>106</sup> Pomey 2009, 7, 13.

<sup>107</sup> Zazzaro 2006, 7.

<sup>108</sup> These models were also examined by Winlock in Winlock, H. 1955. *Models of Daily Life in Ancient Egypt: From the Tomb of Meket-Rē' at Thebes*. Cambridge: Harvard University Press.

kilograms.<sup>109</sup> Old Kingdom reliefs of cattle being transported on ships in general only depict them carrying two to three animals. In the relief from the tomb of Huy, only four head of cattle are being transported on the cattle ferry, although they are not packed tightly. The depiction of relatively few animals onboard these vessels is best understood as artistic convention, the artist wanted to show the viewer that cattle were cargo during these events, but the actual number of animals was unimportant to the artist. Nonetheless, it would be appropriate to propose that these cattle transport ships had to at least be able to carry four head of cattle, and based on the animal size described above suggests that these boats should be at the very least able to carry 1200 kg of cargo.<sup>110</sup>

### *Hogging Truss*

Ancient Egyptian ships lacked a keel, but used another method to contribute strength to a ship's hull. Many large cargo and seagoing ships from ancient Egyptian iconography such as the Hatshepsut obelisk barges, used a hogging truss to provide longitudinal strength to vessels whose length-to-beam ratio would in conjunction with heavy loads cause the ship to hog and sag during use. The hogging truss is a strong cable that was passed along forked posts or "crutches" which were located at the extremities of the hull and were then tied around the stern and stem.<sup>111</sup> A tension lever would be fixed to the crutch amidships which could be twisted until the desired tautness

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<sup>109</sup> Gilbert 1988, 71-7.

<sup>110</sup> 1200 kg of cargo takes into consideration the roughly estimated weight of four fattened cattle with an average wither height of 53 inches.

<sup>111</sup> Steffy 1994, 273.

was achieved to keep the hull from buckling.<sup>112</sup> These devices are clearly illustrated in the Hatshepsut voyage to punt relief from Deir el Bahri (Figure 3.6).

Cattle ferries may well have also been strengthened using a hogging truss. In the tomb of Huy what appears to be a hogging truss cable is run around the stern of the vessel. It is then passed over the cattle pen on deck above which can be seen a Y-shaped stanchion, or crutch amidships. The hogging truss cable is run over this support and then attaches to the bow of the ship (Figure 3.3). It is possible the thick, twisted cable was attached to through beams inside the vessel, but it is unclear. Although the hogging truss was a necessary feature of Egyptian seagoing vessels, its presence on cattle-ferries does not automatically indicate that they were used in unsheltered waters.<sup>113</sup> Cattle are a heavy, not to mention mobile, cargo; the hogging truss may have simply served to provide tension, supporting the hull as a countermeasure against the shifting of weight that is inevitable with live cargo and to allow the boats to carry heavier loads.

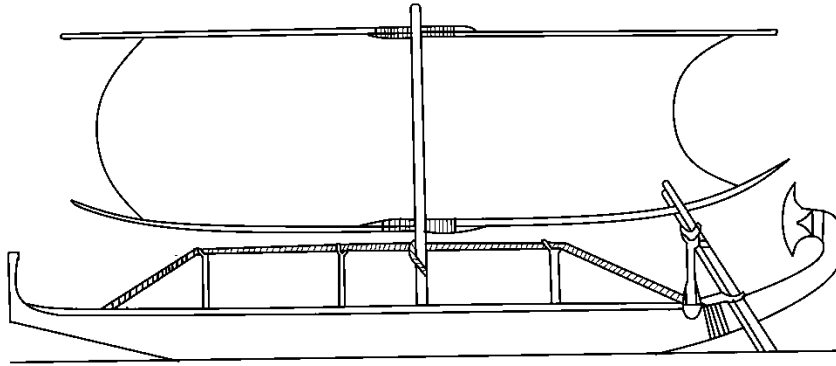
Joggling is a plank joining technique, which, like the hogging truss, provides longitudinal strength for a hull. Notches, or joggles, are cut into timber edges and these irregularities interlock with adjacent timbers to resist hogging and sagging by reducing the amount of movement normally caused by planks sliding against each other during use.<sup>114</sup> Not only does this technique allow vessels to withstand stresses related to waves in the open sea, it also adds additional strength to allow rivercraft to carry heavy cargo

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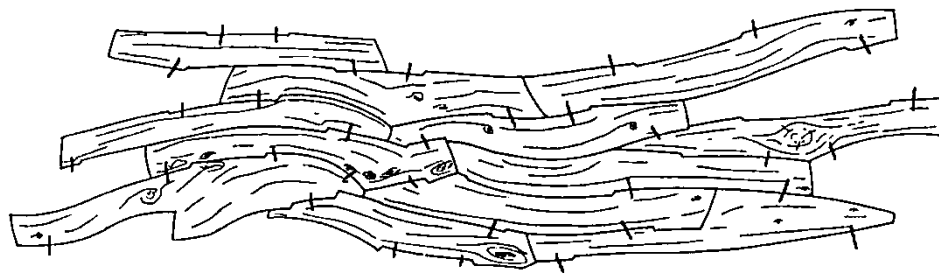
<sup>112</sup> Faulkner 1941, 4-5.

<sup>113</sup> Wachsmann 1998, 25.

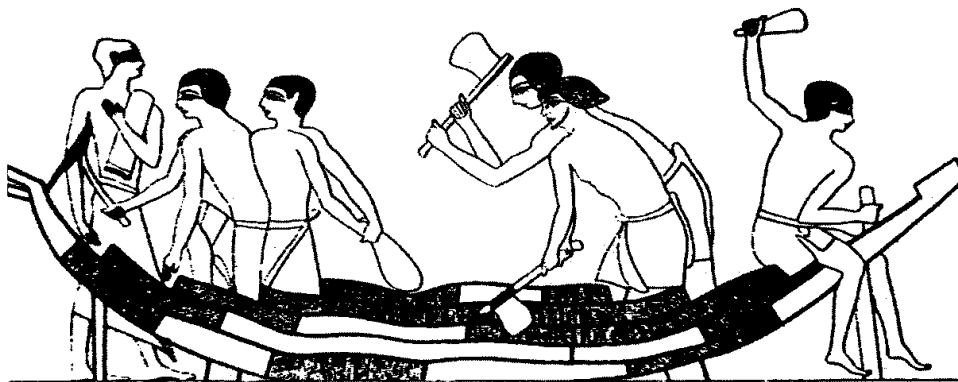
<sup>114</sup> Steffy 1994, 273.



**Figure 3.6.** Schematic example of a barge from the Deir el-Bahari reliefs showing the hogging truss. Adapted from Erman 1894, 489.



**Figure 3.7.** Joggled edges and ligature locations (vertical lines) of Lisht Timbers in a reconstruction planking plan. From Ward, C. 2006. "Boat-building and its social context in early Egypt: interpretations from the First Dynasty boat-grave cemetery at Abydos." *Antiquity* 80:124 (Reproduced with permission from the Cambridge University Press).



**Figure 3.8.** Joggling on 18th Dynasty ship. Tomb no. 3, Khnumhotep II at Beni Hassan. Adapted from Bormann et al 2013, Figure 14.

such as stone, or perhaps cattle. Jogging was implemented in the construction of the Khufu Barge, a ceremonial vessel, but was also found in planks from the Lisht timbers and the Dashur boats.<sup>115</sup> Iconography also demonstrates the use of jogged planks in a variety of ship types. In the Middle Kingdom tomb of Khnumhotep II at Beni Hassan, reliefs show the use of short, wavy planks which appear to interlock (Figure 3.8).<sup>116</sup>

### *Methods of Construction*

As determined in Chapter II, cattle ferries were most likely made from local woods such as acacia and tamarisk. However, the short, curved trees of these types made it necessary to use short planks in the construction of Egyptian hulls. Often in reliefs, the use of short planks is apparent and seems to corroborate textual evidence such as the description of Egyptian shipbuilding made by Herodotus:

Their boats with which they carry cargoes are made of the thorny acacia...From this tree they cut pieces of wood about two cubits in length and arrange them like bricks, fastening the boat together by running a great number of long bolts through the two-cubits pieces; and when they have thus fastened the boat together, they lay cross-pieces over the top, using no ribs for the sides; and within they caulk the seams with papyrus. ...These boats they have in great numbers and some of them carry many thousands of talents' burden.<sup>117</sup>

The use of short planks is clearly evident in the tomb of Huy reliefs (See Appendix A,

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<sup>115</sup> Ward 2000, 48.

<sup>116</sup> Bormann, Bruer, Haase, Hildebrant, Mählizt-Galler, Rügler & Stürmer 2013, 18-9.

<sup>117</sup> Hdt., *Histories* 2.96.

B.3). Archaeological evidence for working-class boats also demonstrates the use of short planks in Egyptian shipbuilding. For example, the planks of the Dashur boats vary in length from 1 to only 4.5 meters.<sup>118</sup> The hulls of working class boats also tend to be less consistent and thinner in general, than ceremonial class working vessels.

Archaeological remains of planking from working boats range from 7 to 18 cm while ceremonial boats have planking around 10 to 15 cm.<sup>119</sup>

Unlike later wooden ships, Egyptian vessels did not have a keel. Instead, these watercraft were built shell-first, meaning the hull planking was built up from a central plank and if internal frames were to be used they were installed after the hull's completion.<sup>120</sup> For example, the early Dynastic boat excavated in Abydos had five bottom strakes before the hull rose in a sharp turn of the bilge, or angular chine.<sup>121</sup> Similarly, the Dashur boats were also built up from a central strake. The de Morgan Cairo Dashur boat had a central strake which was made up of three planks whose widths were 11 to 13 cm at stem and stern, although they swell amidships. This central strake is the thickest one in the hull, being about 8 to 9.5 cm thick.<sup>122</sup>

The planking of working vessels of ancient Egypt, such as cattle ferries, was held together by lashing the planks transversely across the hull through notches cut into the planks. In the Lisht timbers, cordage was passed through L-shaped and angled channels,

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<sup>118</sup> Steffy 1994, 33.

<sup>119</sup> Lisht hull planks averaged in thickness from 8.5 cm to 18 cm in thickness, Dashur boats had planking 7 to 13.5 cm thick, while Abydos boats were 10-12 cm and the Khufu barge had planks 12-15 cm thick. Ward-Haldane 1993, 65.

<sup>120</sup> Partridge 1996, 36.

<sup>121</sup> Ward 2004, 20.

<sup>122</sup> Creasman 2005, 37.

and in 1st Dynasty fragments from the cemetery at Tarkhan, V-shaped lashing channels are present as well.<sup>123</sup> The remains of lashing are even present in some of the Lisht timbers, showing the cordage used to be a broad, plaited strap.<sup>124</sup> The vessels from the early Dynastic boat graves at Abydos used broad cordage as well, whose preserved width was 7.5 cm, although their function was purely ceremonial.<sup>125</sup> The notches or channels in Egyptian ships through which this cordage was passed never pierced the hull.<sup>126</sup> In addition to lashing, the hull planks of Egyptian ships were held together with mortise-and-tenon joinery. The Dashur boats had deep mortise-and-tenon joints and had large tenons which served to internally strengthen the hull.<sup>127</sup> The prevalence of these construction methods throughout all of Egyptian history in both ceremonial and working vessels makes its probable use in the construction of cattle ferries almost certain.

Due to the stresses of heavy cargo, cattle transport ships required additional measures to strengthen the hull. Like the Dashur boats, cattle ferries were constructed with throughbeams. This can be seen in the transport ship represented in a fragment of a Nile shipping scene from the 18<sup>th</sup> Dynasty.<sup>128</sup> The fragment probably comes from the tomb of Meryneith at Saqqara and depicts two cargo ships, both with tethered cattle. Throughbeams appear just below the first strake under the gunwale appear throughbeams. The Cairo de Morgan Dashur boat was constructed with 11

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<sup>123</sup> Vinson 1994, 18; Ward 2006, 119, 124.

<sup>124</sup> Ward & Zazzaro 2010, 31.

<sup>125</sup> Ward 2004, 20.

<sup>126</sup> Jones 1995, 77.

<sup>127</sup> Steffy 1994, 33.

<sup>128</sup> See Appendix A, D.7



throughbeams spaced evenly 70 cm apart, and were rectangular in cross section.<sup>129</sup> The remains of throughbeams from working vessels has been recovered from Mersa/Wadi Gawasis.<sup>130</sup> These beams had ledges to receive deck planking and were rounded on their interior surface perhaps to protect cargo stored below.<sup>131</sup> Throughbeams may also be evident on a Dynastic graffito (30 M 365a) from the road between Armant and Nag' al-Ḥamâdi, whose rectangular deck enclosures and lack of cargo near the steering assembly may suggest that it is a cattle ferry.<sup>132</sup>

Throughbeams would have supported deck planking required for the transportation of cattle in addition to contributing to hull strength. As the deck structures required for penning cattle would have been a permanent feature onboard the ship, it is likely that only the deck near the extremities of cattle ferries was removable, like that of the Khufu barge. Furthermore, it is also likely that the rooms below the deck would have been used for the storage of more cargo and/or fodder for the transported animals. The taking on of fodder for animal cargo is attested to in the ancient ships logs of the Papyrus Leiden I 350 Verso.<sup>133</sup> Here, fodder or *wnmt* is taken on for the *ḥtr*, which was a team of either horses or oxen. In some cases iconography shows what appear to be bundles of fodder in net sacks are stored on deck.<sup>134</sup> The artists may have been showing what was in the hold rather than conveying how the fodder was actually transported.

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<sup>129</sup> Creasman 2005, 55.

<sup>130</sup> Ward & Zazzaro 2010, 31.

<sup>131</sup> Ward & Zazzaro 2010, 31.

<sup>132</sup> Winkler 1939, v.1. pl.9; See also Appendix A, C.12.

<sup>133</sup> Janssen 1961, 27-31.

<sup>134</sup> Refer to Appendix A, B.4 for a representation of fodder kept on the deck of *ḥn-ih*-boats.

Other working vessels which also carried heavy cargo are represented by the previously discussed Lisht timbers. Rather than throughbeams, these stone freighters used a heavy frame system and a large keelson-like timber to allow the vessel to support cut stone. The Lisht frame consisted of a large floor timber that supported the keelson-like component.<sup>135</sup> The inboard ends of the upper timbers of the frame are spaced 50 cm apart, which may suggest the size of the keelson-like element. The floor timber is notched and is 12 cm moulded and 22 cm sided.<sup>136</sup>

### *Decoration*

Although not as ornate as ceremonial vessels, cattle ferries were given some decoration. Hulls of cattle boats may have been painted vibrant colors. In the tomb of Huy, the hulls of the cattle boats have been painted either red or green.<sup>137</sup> Additional ornamental elements are shown on other cattle transport ships. In the 5<sup>th</sup> Dynasty tomb of Ptahshepses, a ship transporting cattle is depicted with a zigzag pattern painted on the strake below what could be considered the gunwale. Likewise, in a scene from the 6<sup>th</sup> Dynasty tomb of Kagemni, a livestock transport boat is also decorated in a similar manner and motif (Figure 3.9).<sup>138</sup> It is possible that these diagonal or zigzag pattern were painted on the vessels to mimic the lashing cordage of papyrus rafts. Papyrus rafts are not only firmly associated with the movement of cattle, but also are associated with theological ideas of the sacred and invoke divine aid and protection from Nile

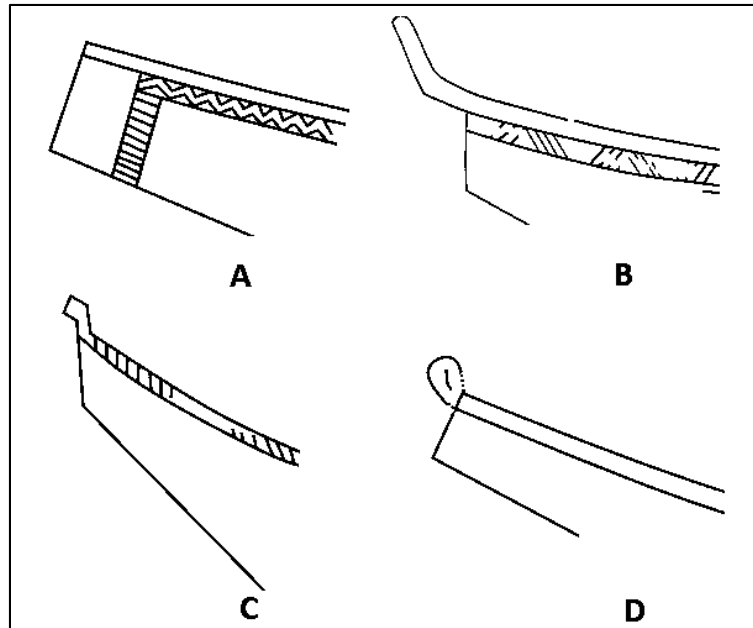
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<sup>135</sup> Ward 2000, 126.

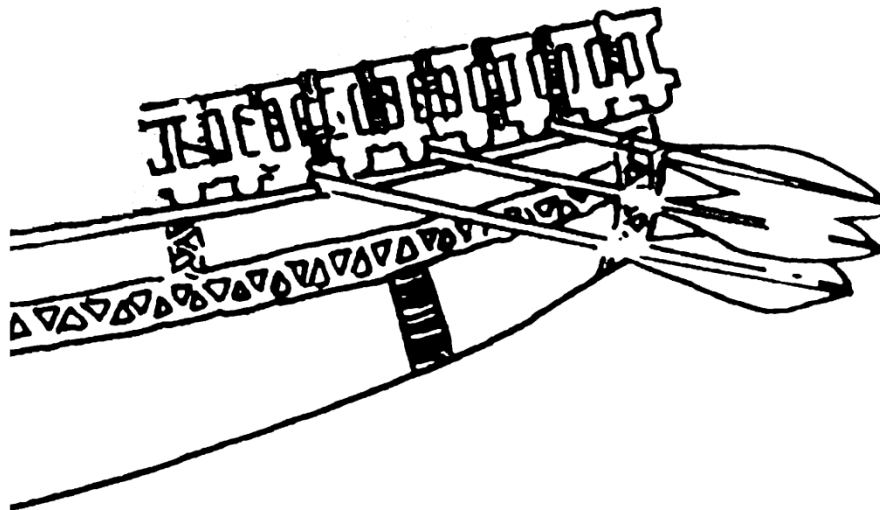
<sup>136</sup> Ward Haldane 1988, 146-8.

<sup>137</sup> Davies 1926, 19.

<sup>138</sup> See D.2b.



**Figure 3.9.** Hull decorations on the stern of cargo ships and cattle ferries. A: Tomb of Ptahshepses, cargo ship with livestock after McFarlane & Mourad 2012, figure 9.8; B. Mastaba of Kagemni, livestock & grain transport after Firth & Gun 1926, pl.53; C. Old Kingdom cargo ship, 6<sup>th</sup> Dynasty after Landström 1970, 60; D. Tomb of Mehu, small transport with three head of cattle, Adapted from McFarlane & Mourad 2012, pl.107.



**Figure 3.10.** Hull decoration from a seagoing ship. From the relief in the temple of Sahure, 5<sup>th</sup> Dynasty, Adapted from Fabre & Belov 2009, p.92.

hazards.<sup>139</sup> Often, scenes of cattle fording include inscriptions of magic spells to help ward off crocodiles.<sup>140</sup> Perhaps, then, by mimicking attributes of papyrus rafts on wooden vessels, the shipwrights could impart similar divine or magical protection for livestock transportation endeavors. If this was the case, it was perhaps intended for general protection, and not specifically to ward off dangerous riverine animals. Whether or not lines or zigzags are present, this strake below the gunwale is differentiated from the rest of the hull on the majority of cargo ships and cattle ferries.

Alternatively, it could also be the case that these zigzag or diagonal patterns represented sewn planking. Other vessel types, such as the seagoing vessel from a relief in the temple of Sahure, also exhibit a similar pattern below the gunwale (Figure 3.10).<sup>141</sup> Lashing as a construction method is well attested to in Egyptian naval architecture. The timbers from Lisht and those from the Abydos boats have lashing channels which are an average of 7.5 cm long and 1.9 cm thick.<sup>142</sup> Furthermore, timbers at Mersa/Wadi Gawasis also have ligature channels 1-1.5 cm thick which are paired across plank seams.<sup>143</sup> As mentioned earlier, Egyptian artists depicted an object in its most representative state, and the fact that the planking of these ships were lashed together may have been important enough to represent in this manner.

### *Propulsion*

During the Old Kingdom, general cargo ships that carried cattle had bipod masts,

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<sup>139</sup> Miosi 1975, 86-8.

<sup>140</sup> McFarlane & Mourad 2012, 101.

<sup>141</sup> Fabre 2005, 92.

<sup>142</sup> Ward 2006, 124.

<sup>143</sup> Ward 2010, 32.

which were lowered when not in use. When the mast was stowed, oars in some cases were employed to assist in travel downstream. Even when the mast is not visible, the crutches which would have supported it when lowered are represented in iconography.<sup>144</sup> In the relief of a small cattle transport in the tomb of Mehu, one man is depicted manipulating the sails with two lines, or sheets, attached to the yard.<sup>145</sup>

New Kingdom examples of *hn-ih*-boats embraced the development of the single pole mast. When not in use, the yards of *hn-ih*-boats were lowered to the boom, a practice that can be seen on the cattle transport represented on the fragments from the tomb of Meryneith (Figure 3.11). In the tomb of Huy *hn-ih*-boats, no mast is visible, lowered or otherwise; however it is unlikely these vessels were propelled with oars. This suggests that cattle-ferry masts even in the New Kingdom could be lowered or raised as well.

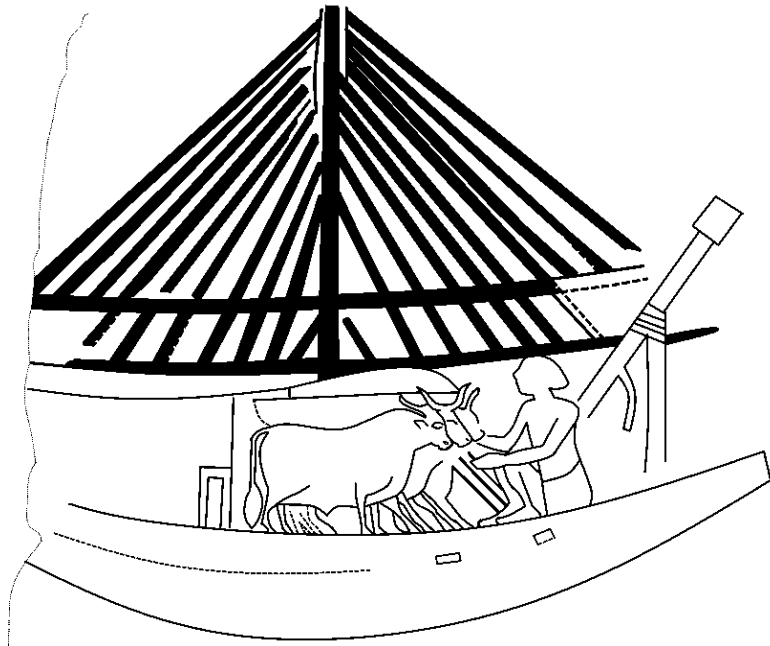
### **Rafts: Fording the River**

The cattle fording scene gained popularity as a motif during the Old Kingdom, and remained popular throughout Egyptian history. While this scene type is very prolific in funerary art, many of the best examples come from the 5<sup>th</sup> and 6<sup>th</sup> Dynasties. The papyrus rafts in these reliefs played an important role in the movement of cattle along the Nile. Not only is the raft's use depicted in tombs, but the methods of their

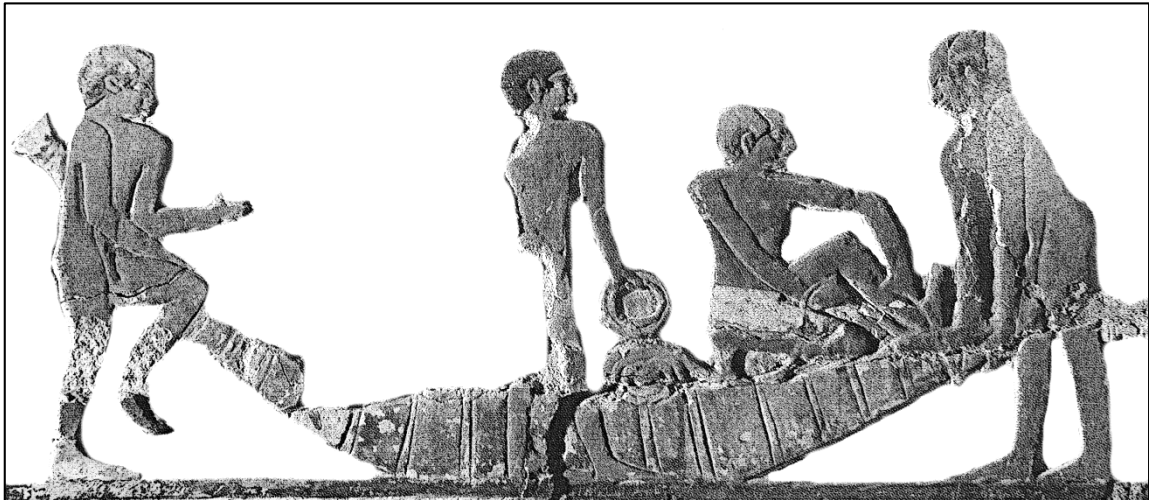
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<sup>144</sup> For examples of Old Kingdom livestock transports with bipod masts see Davies 1936, pl.3; Firth & Gun 1926, pl.53; Landström 1970, p.60

<sup>145</sup> Mcfarlane & Mourad 2012, pl.107; See Appendix A, D.6.



**Figure 3.11.** Tomb of Meryneith, Nile shipping scene, 18<sup>th</sup> Dynasty. Adapted from Bormann et al 2013, Figure 40.



**Figure 3.12.** Constructing a papyrus raft. Tomb of Nefer & Kahay, 5<sup>th</sup> Dynasty, adapted from McFarlane & Mourad 2010, pl. 101.

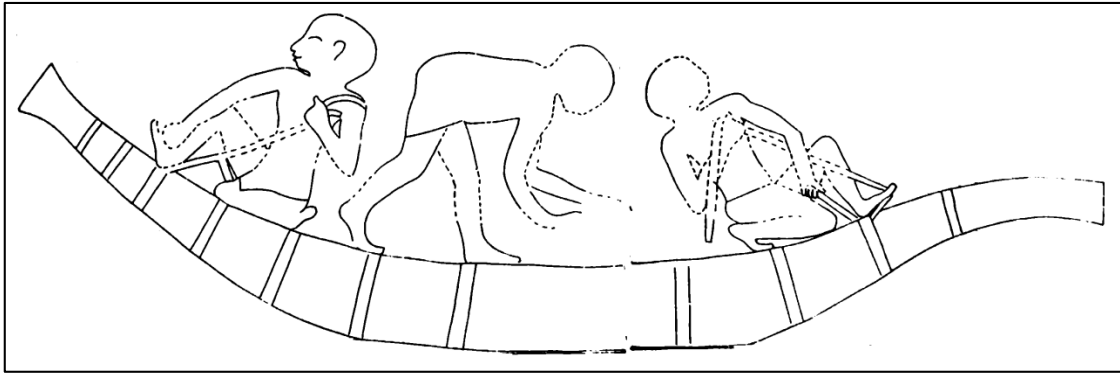
construction are as well. This coupled with literary evidence allows for a fairly accurate reconstruction of this type of watercraft as it was used in ancient Egypt.

As previously mentioned, the *smḥ*, *shn*, and *šht* were papyrus rafts used in several different types of activities such as fishing and fowling, harvesting papyrus, and fording herds of cattle. They first appeared in iconography during the fifth millennium BCE.<sup>146</sup> These craft were not very large, in art papyrus rafts are almost always shown with no more than three crewmembers and these are often taking up the entirety of the raft with little to no extra room.

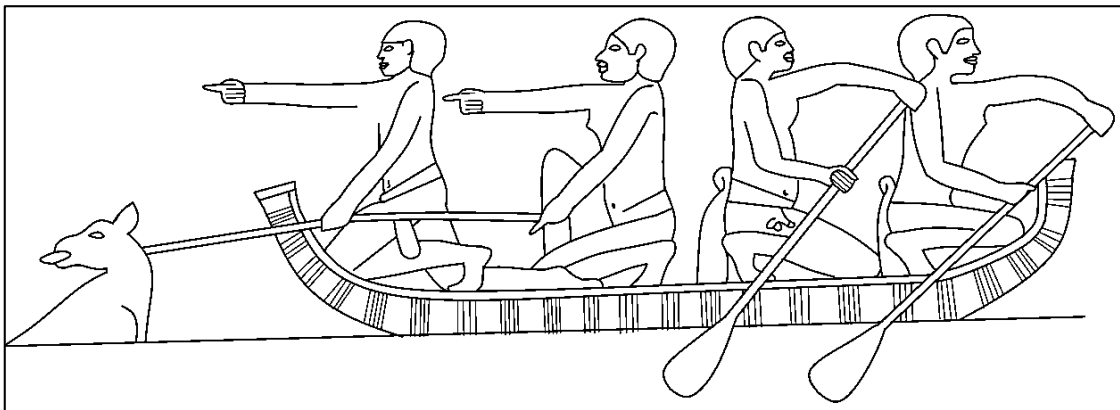
The raft itself was made by creating several tied bundles of papyrus reeds and then laterally lashing them together. Many examples of this process exist in iconography from the Old Kingdom. In a relief from the tomb of Nefer and Kahay from the 5<sup>th</sup> Dynasty, four men are shown working on a raft (Figure 3.12). It appears that construction was completed by working from the front of the raft, systematically binding smaller reed bundles together until the stern was reached. A man is required to hold together the bundle ends as a second man binds them with a thick rope. It is not clear what tasks occupy two other figures in the relief; one is holding an extra length of coiled rope while watching the end of the raft being bound while the fourth man seems to be walking toward them. However, in another image found in the tomb of Anta, also from the 5th Dynasty, two men work from opposite ends of the raft binding it simultaneously while a damaged third figure completes an unknown task in the middle of the craft

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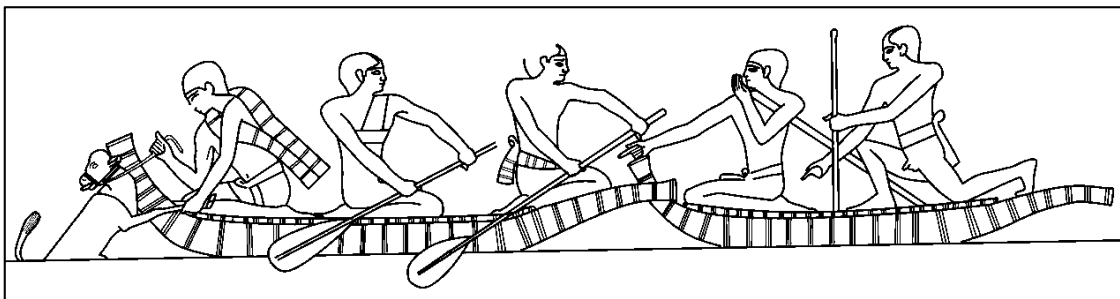
<sup>146</sup> Hocker & Ward 2004, 13.



**Figure 3.13.** Constructing a papyrus raft, tomb of Anta. 5<sup>th</sup> Dynasty, adapted from Petrie 1898, pl.5.



**Figure 3.14.** Mastaba of 'Ankhn 'ahor, fording a large herd. 6<sup>th</sup> Dynasty. Adapted from Badawy 1978, pl.26.



**Figure 3.15.** Reed rafts with gunwale-like bundles. Mastaba of Kagemni, 6<sup>th</sup> Dynasty. Adapted from Firth & Gunn 1926, pl.7 & 52.



(Figure 3.13). Ethnographically, when constructing reed rafts, the workmen beat the bundles with a blunt object, such as a stone, in order to tighten the reed bundles which would otherwise loosen during construction and subsequent use.<sup>147</sup> This may in fact be the unknown occupation of the other workmen in these reliefs. Instead of using a second workman to hold the bundles together, in this relief, tension is created by running the rope around the workman's foot before pulling it taught.

When the reed bundles are bound together, the rope is passed several times laterally around them rather than singly as seems to be implied in the Anta relief. Most examples of this construction method imply that the rope was passed around the bundles twice, although there are several instances where it was done up to four times (Figure 3.14).<sup>148</sup> A model of a papyrus raft from the 11<sup>th</sup> Dynasty tomb of Meketre may indicate how the raft's bundles were arranged.<sup>149</sup> On this model, not only are the transverse lashing lines shown, but thinner, longitudinal lines appear. These lines run the length of the raft and may depict the individual bundles used. If this is the case, rafts of this type could have been made of up to ten thinner bundles across. In the construction method laid out by Landström, the raft builder begins with single core bundle of papyrus to which he continues to add new bundles until the desired raft width is reached.

These models also show a smaller gunwale-like bundle lashed to the watercraft. Similar gunwale-like bundles are also shown in tomb reliefs (Figure 3.15).<sup>150</sup> These

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<sup>147</sup> Vosmer 200, 236; Heyerdahl 1978, 806-27.

<sup>148</sup> Badawy 1978, pl.26.

<sup>149</sup> Painted wooden models from Thebes, tomb of Meketre. El-Shahawy & Atiya 2005, 131. See also Merriman 2011, § 25, Winlock 1955.

<sup>150</sup> See Appendix A A.2, A.4, A.5, and A.11.

bundles in many cases appear more tightly lashed than the body bundles of the raft with the rope being passed more frequently around them. Nearly all of the papyrus raft depictions show a higher, nearly incurving stern with a low, outward curved stem. Additionally, the stern is almost always thicker than the stem, although this does not appear to be the case in the Meketre models.

While papyrus reeds are more durable after they are dried, it is uncertain that they were left to cure before being used to construct rafts. In many reliefs, such as the one above, the craft being created is shown with green pigment, which seems to indicate that fresh reeds were used. Models too, like the fishing rafts of Meketre, are painted green. This coloration, however, could be simply an artistic convention like that of showing Egyptian women with white skin while painting men brown.<sup>151</sup> Despite this suggestion, is not entirely outside the realm of possibility that fresh reeds were used as they would not have become waterlogged as quickly as their dried counterparts. In the Coffin Text Spell 195 the construction of a *smḥ* is commanded and the tasks of cutting the papyrus and twisting the ropes are mentioned but drying the papyrus is not.<sup>152</sup>

## Conclusions

Cattle ferries and other livestock carriers all had similar characteristics. In general, these boats had a high stern and lower bow, and because they were Nilotic vessels, they were able to have a relatively flat bottom with a sharp turn of the bilge.

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<sup>151</sup> Partridge 1996, 14.

<sup>152</sup> Miosi 1975, 92.

Old Kingdom livestock transports were not use-specific and carried only a few animals at a time along with other types of cargos. In art, these ships are heavily loaded down with goods, using every available space so that even the helmsman had to sit on top of cargo or a storage enclosure to operate the steering oar.

The New Kingdom saw the development of the fully-fledged cattle ferry, or *hn-ih*, the ship type depicted in the tomb of Huy. These ships were moderately sized, probably between 14 and 20 meters long, with a length-to-beam ratio similar to other working boats at about 3:1. Unlike the Old Kingdom transports, *hn-ih*-boats did not carry additional cargo and had a livestock enclosure on a deck which occupied most of the vessel's deck space.

In order to carry the heavy live cargo, cattle ferries employed a series of methods to ensure hull strength. Hogging trusses appear in the tomb of Huy wall paintings and many transport depictions demonstrate joggling of the planks to increase longitudinal hull strength. In addition to this, sources such as the fragments from tomb of Meryneith show the use of throughbeams, a common feature of Egyptian planked watercraft. The use of throughbeams finds archaeological support in the Dashur boats and timbers found at Mersa/Wadi Gawasis.

The movement of cattle has always been heavily associated with the papyrus rafts used to ford large herds across the river. *Smh*, *shn*, and *sht* papyrus rafts and their use likely influenced the decoration of later cattle ferries. Rafts like these were made of bound bundles of papyrus and often had an extra gunwale-like bundle along its edge. This was later mimicked in the painting of zigzag or diagonal lines along the strake just

below the gunwale on later animal transports. It is possible that this mimicking of a papyrus raft in wood was an effort by the shipwrights to impart divine or magical protection for the livestock, a mythic quality the rafts may have held. Another theory explaining these designs may be that they represent the method of construction used to make these vessels, namely lashing of wooden planks.

The cattle ferry has seen a long evolution from papyrus raft, to small cargo ships, and finally to the purpose-built *hn-ih*-boats of the New Kingdom. Like other elements of the ancient Egyptian civilization, changes were moderate and slow, maintaining a tangible continuity with the past. These differences, as minute as they seem had a large impact on the way cattle were moved throughout Egypt.

## CHAPTER IV

### CREW AND LIVESTOCK INTERACTIONS ON CATTLE FERRIES

When considering the movement of live cargo, the make-up of the crew of *hn-ih*-boats is just as integral as the vessel's design in the successful transference of cattle. Elements such as crew size, livestock responsibility, and containment strategies can be identified clearly in both the iconographic and literary records. In addition to this, *hn-ih*-boats provide a unique opportunity to study the social paradigms of the ancient Egyptian maritime world and can be interpreted through components such as costume, hierarchy of size in art, and scene context.

#### Crew Size

Depending on the type of source consulted, figures for crew size on working vessels vary wildly. In the Middle Kingdom Egypt fantastical crew sizes are reported in literature like the Shipwrecked Sailor, 120 stout-hearted men on an expedition to the pharaoh's mines.<sup>153</sup> Even dockyard records seemed to record large crew sizes. In documents from the reign of Sesostri I an *imu* is listed with a crew of thirty men.<sup>154</sup>

The large Middle Kingdom crew sizes, or at least the hyperbole of them, did not extend into the Ramesside period. Crews of commercial vessels during this time were much smaller, consisting of three to no more than fifteen sailors.<sup>155</sup> For example, the

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<sup>153</sup> Lichtheim 1975, 212.

<sup>154</sup> Vinson 1994, 36.

<sup>155</sup> Vinson 1996, 24.

<b>Tomb</b>	<b>Dynasty</b>	<b>Location</b>	<b>Scene Type</b>	<b>Crew</b>
Tomb of Akhethotepher	5 <sup>th</sup>	Saqqara	Sacred Cattle Transport	7
Tomb of Hesi-min	5 <sup>th</sup>	El-Hawawish	Fording Scene	3(?)
Mastaba of Ptahhotep	5 <sup>th</sup>	Saqqara	Livestock & General Cargo	4-5
Tomb of Ptahshepses	5 <sup>th</sup>	Abusir	Livestock & General Cargo	7
Tomb of Ti	5 <sup>th</sup>	Saqqara	Fording Scene	3
Tomb of Mehu	6 <sup>th</sup>	Saqqara	Cattle & General Cargo	3
Mastaba of Mereruka	6 <sup>th</sup>	Saqqara	Fording Scene	3
Mastaba of Kagemni	6 <sup>th</sup>	Saqqara	Livestock & General Cargo	3/2
Tomb of Kaïemânkh	6 <sup>th</sup>	Giza	Cattle Transport	5
Mastaba of ‘Ankhm’ahor	6 <sup>th</sup>	Saqqara	Fording Scene	4
Tomb of Ka-Hep	6 <sup>th</sup>	El-Hawawish	Fording Scene	(?)
Tomb of Kheni	6 <sup>th</sup>	El-Hawawish	Fording Scene	2(?)
Tomb of Gehesa	6 <sup>th</sup>	El-Hawawish	Fording Scene	3(?)
Tomb of Khety	11-12 <sup>th</sup>	Beni Hassan	Fording Scene	3
Tomb of Antef	18 <sup>th</sup>	Thebes	General Cargo	4 (?)
Tomb of Huy	18 <sup>th</sup>	Thebes	Cattle Ferry	2
Tomb of Meryneith	18 <sup>th</sup>	Saqqara	Cattle Ferry	1(?)
Tomb of Nefer-Hotep	18 <sup>th</sup>	Thebes	General Cargo	4
Tomb of Rekhmire	18 <sup>th</sup>	Thebes	Stone Carrier	5-6

**Table 4.1.** Crew sizes for working boats in iconography. Reproductions of all the scenes including in this table can be found in Appendix A. Entries followed by a (?) represent a damaged scene, so exact crew size cannot be determined with absolute certainty. All crew sizes are per vessel as more than one may appear in a scene.

*wsḥ*-boat in Papyrus Turin 2008 +2016 left Thebes with a crew of four.<sup>156</sup> The crew sizes of cattle ferries in particular seems to align with these patterns. In the Papyrus Anastasi VIII rt. 3/1-2 and 1/4, the cattle ferry mentioned has a crew of six men. Iconography seems to favor smaller crew sizes on cattle transport ships (see table 5.1). In representation of cargo or livestock transports, crew sizes are the largest in the Old Kingdom, ranging from perhaps 2 to 7. By the end of the New Kingdom, crew sizes are represented as even smaller, ranging between one to three men. However, it is possible

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<sup>156</sup> Janssen 1961, 78.

that the discrepancy between the literary record and art may have occurred because the artists did not feel the need to represent every crew member. This is likely due to the Egyptian artistic convention discussed in Chapter I, of depicting an object, in the case of a ship, in its most representative state, which may not have required the artist to show each man individually.

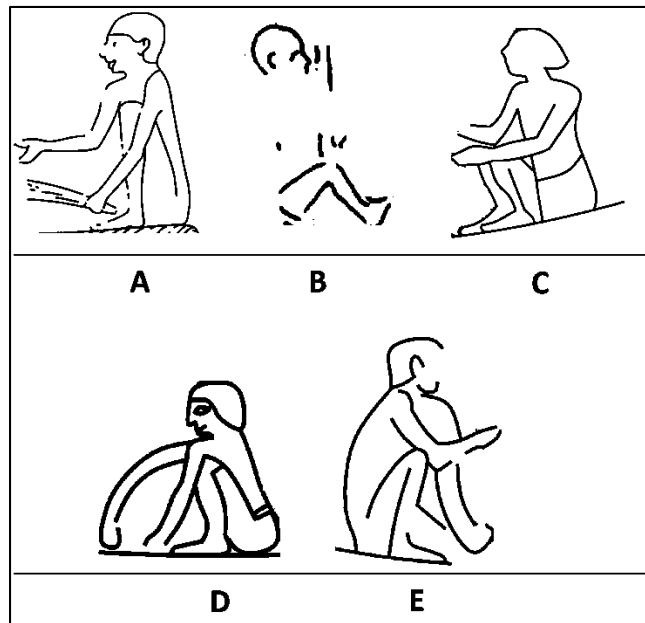
### **The Ferryman's Costume: Indicating Rank**

Costume can be a powerful tool in the identification of crew members, their function, and even their place in the social hierarchy. Egyptians used clothing in art as key indicators of station and occupation, which would easily have been identified by the viewer. These patterns can be applied to the crews of cattle ferries to help better understand not only the different roles of crewmembers aboard *hn-ih*-boats and other livestock carriers, but also how the crews of these vessels fit into the larger maritime paradigm. The different types of dress for cattle tenders on livestock transports are represented in figure 4.1.

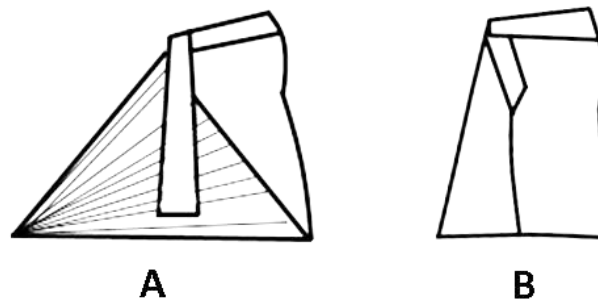
In order to understand where the costume of cattle ferry crews falls in the greater picture of Egyptian dress, a baseline of common clothing types must be drawn. The principle fabric for clothing in ancient Egypt throughout all periods was linen and the clothing types were fairly simple.<sup>157</sup> On a daily basis, most men wore a simple loincloth. Made of a triangle with ties or thongs at two corners, it was tied around the waist and the

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<sup>157</sup> Romano 1990, 9; Peck 2013, 49.



**Figure 4.1.** Costume of cattle tenders on animal transport vessels. (A) Mastaba of Kagemni, 6<sup>th</sup> Dynasty after Firth & Gun 1926, pl.53 Appendix A, D.2; (B) Mastaba of Akhethotepher, 5<sup>th</sup> Dynasty adapted from Landström 1970, 56 Appendix A, D.1; (C) Tomb of Meryneith fragment, 18<sup>th</sup> Dynasty, adapted from Bormann et al, Figure 40 Appendix A, D.7; (D) Tomb of Ptahshepses, 5<sup>th</sup> Dynasty, adapted from McFarlane & Mourad 2012, Figure 9.8 Appendix A, D.5; (E) Tomb of Mehu, 6<sup>th</sup> Dynasty, adapted from McFarlane & Miurad 2012 pl.107 Appendix A, D.6.



**Figure 4.2.** Social ranking and kilt shape. (A) Stiffly starched kilt signifies a higher status than the non-starched kilt (B). Drawing of generic kilt type examples by author, based on a survey of iconography, adapted from Badawy 1978, Davies 1900, 1920, 1973, 1963, 2004; Harpur 1987; Kanawati 1980; Manniche 1988.



third corner was then pulled to the front and tucked under the ties.<sup>158</sup> Loincloths have been recovered from several burials; one example comes from a coffin at Deir el-Medina.<sup>159</sup> A well preserved leather version of this garment was recovered in Thebes el-Medina.<sup>160</sup> A well preserved leather version of this garment was recovered in Thebes from the tomb of Maiherpra, a fanbearer of the king during the 18<sup>th</sup> Dynasty.<sup>161</sup> The loincloth could be worn by a male of any status, but is most closely associated with the working class. Often workmen wore nothing beyond this, although occasionally a wide belt was added around the waist.<sup>162</sup>

Although the loincloth is the most common and basic costume for workmen, other attire is also worn by that group. The kilt was a long rectangular piece of linen which was wrapped around the waist and belted in the front. While the length of the kilt changed from period to period most often it was about knee length. In iconography this costume can be used to identify elevated status. In art, if the kilt was stiffly starched and came to a point about 30 cm or more from the body, the wearer has higher status than other figures that appear with non-starched kilts in the scene (Figure 4.2).<sup>163</sup> The length of the kilt could also signal that the wearer occupied a higher position, the longer the kilt, the higher the rank.<sup>164</sup>

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<sup>158</sup> Brier & Hobbs 2008, 127.

<sup>159</sup> Vogelsang-eastwood 1996, 287.

<sup>160</sup> Vogelsang-eastwood 1996, 287.

<sup>161</sup> The loincloth is made of gazelle-skin and was recovered in 1899, Accession Number 03.1035, Museum of Fine Arts Boston, 2015.

<sup>162</sup> Montet 1981, 74.

<sup>163</sup> Brier & Hobbs 2008, 132-3.

<sup>164</sup> Peck 2013, 56.

Status is also indicated in other ways for peasant or workmen attire. Broad bands across the chest indicated elevated social position, and narrow bands around the neck indicated that the wearer was an overseer.<sup>165</sup> Furthermore, according to social norms and etiquette Egyptians practiced the removal of sandals in the presence of a superior, so that in art, the highest ranking individual would be wearing footwear.<sup>166</sup>

Boatmen in particular had a few variations in attire from the rest of the Egyptian populace. Often, they wore nothing more than a fringed girdle, or a girdle which was tied to hang down the front, although equally common was complete nakedness. Another difference, although less prevalent, was the material that was occasionally used for the sailor's clothing. While the most common material choice for clothing was linen as mentioned above, some boatmen had skirts made of matting similar to those worn occasionally by shepherds.<sup>167</sup>

The make-up of the small crews on cattle boats is difficult to determine. It is known that they had at the very least, a skipper. In P. Anastasi VIII, the commander of a cattle ferry is referred to as an *nf*.<sup>168</sup> *Nf* is the term used for steersman, and he would have been in charge of the cattle-ferry and responsible for its navigation along the Nile.<sup>169</sup> The skipper, or *nf*, appears in the tomb of Huy reliefs where a cattle ferry captain beats a subordinate. The *nf* can be identified by the starched and pleated kilt, whose front folds extend beyond the knee.

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<sup>165</sup> Erman 1971, 211.

<sup>166</sup> Romano 1990, 12.

<sup>167</sup> Erman 1971, 211-2.

<sup>168</sup> Vinson 1996, 21, 42.

<sup>169</sup> Ibid.

In addition to the *nf*, cattle ferries in general had one or two other crew members. These included rowers and crewmen who managed the steering oar or sounding pole. These lower ranking crewmembers wore plain kilts without pleats or folds. These plain kilts could also be belted with a wide belt, although others are simply tucked or possibly tied with thin strips of fabric or leather. Lower in rank than these rowers or steersmen were general crewmen who appear wearing only either plain girdles or loincloths. Cattle-ferry crewmen seem to all wear garments made of linen, rather than the kilts made of matting worn by other types of boatmen.

While other members of the crew wear a variety of styles of clothing, cattle tenders are always dressed in either a simple kilt, or are naked. Their kilts, if they are wearing them, are always short and never have the starched pleats or sharp point at the knee of higher ranking attire. Dressed in the same way as those operating steering oars and rowers their rank may be similar. Rank for these men, however, is difficult to ascertain as they may not in reality be part of the boat's permanent crew. They may instead be attached to the particular cattle being transported in the scene and were likely herdsmen rather than sailors. Similar practices of 'crewmen' like these, coming and going in association with cargo during a boat's travels, are indicated in Papyrus Leiden and Papyrus Turin.<sup>170</sup>

### **Livestock Responsibility and Containment Strategies**

The question of who was responsible or liable for the cargo being transported on

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<sup>170</sup> Janssen 1961, 78.

boats along the Nile is complex, particularly when considering the vessels may have been owned by temples, the state, enterprising individuals, or even the skippers or captains themselves. Papyrus Amiens, rt. I seems to imply that the captain was liable for goods once they were in his possession.<sup>171</sup> The text states that the goods were 'given' to the captain, suggesting that they were now his responsibility, rather than the responsibility of some outside overseer or other official. Cattle, though, are a more complex and less illuminated issue. As stated earlier, some cattle-ferries appear to have a livestock tender who is concerned with the care of cattle aboard ship and this person may not be a permanent member of the crew. In Papyrus Leiden I 350 Verso, a person travelling on the vessel (it is unclear whether this person was a crewman or not) is sent to retrieve a cow from the herd of princess Isinofre.<sup>172</sup> The man, Tjay, is listed as being a retainer, and seems to be in charge of the animal's wellbeing during transport. During the journey, this fodder was taken on daily for the animals aboard.<sup>173</sup> Bundles of fodder appear at the bow of the cattle ferry in the tomb of Huy, and this is also what is possibly represented on the Dynastic graffito 30 M 365a (Figure 5.3).<sup>174</sup> It is interesting to note that Tjay is mentioned by name while other crewmen are not, and in addition special mention is made of his paternity.<sup>175</sup>

Ships transporting cattle on the Nile are shown both with and without cattle tenders. The appearance of a cattle tender also does not have a temporal correlation,

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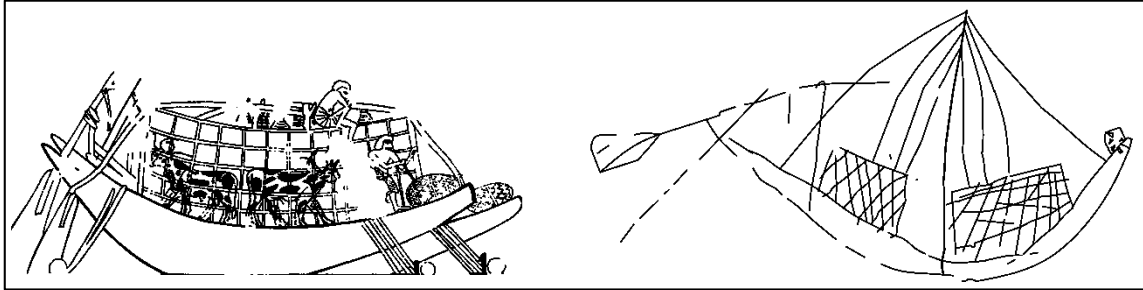
<sup>171</sup> Janssen 2004, 12.

<sup>172</sup> Janssen 1961, 33.

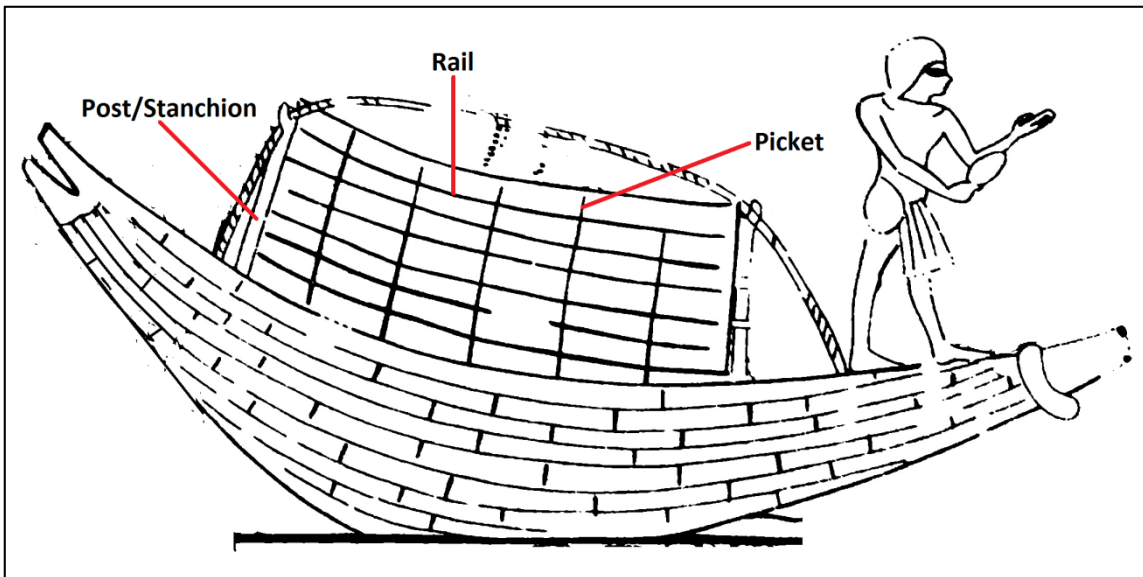
<sup>173</sup> Janssen 1961, 1-7.

<sup>174</sup> Davies 1926, pl. 32; Winkler 1939, v.1, pl.9

<sup>175</sup> Tjay is the son of Efniwēr, Janssen 1961, 43.



**Figure 5.3.** Fodder stored in the bow. (Left) Tomb of Huy at Thebes; (Right): Dynastic Graffito 30 M 365a from the road between Armant and Nag' al-Ḥamâdi. Adapted from Davies 1926, pl. 32 and Winkler 1939, v.1, pl.9. For a larger view of these figures refer to Appendix A, B.4 & C.12.



**Figure 5.4.** Components of a cattle pen of a generic cattle boat. Generic boat modeled adapted from Davies 1926, pl. 18.

they are found in iconography spanning the Old to New Kingdoms. In examples such as a fragment from the tomb of Meryneith of the 18<sup>th</sup> Dynasty, or the tomb of Kaïemâkh from the 6<sup>th</sup> Dynasty, a man looks after the cattle by holding onto lead ropes attached either to a halter or tied around their necks.<sup>176</sup> However on other ships, the tender just keeps a watchful eye over animals, which are tied to throughbeams or are kept in pens on the deck.<sup>177</sup>

There seems in art to be a progression from the transportation of cattle with halter restraints and tenders in the Old Kingdom to the development of cattle pens on designated transports in the New Kingdom. Yet this could be merely the result of a shift in artistic style and not a shift in technology. Like the representation of pack mule baskets stacked one atop of the other discussed in Chapter I, it is possible that cattle were being shown on top of the enclosures in which they were transported. A significant factor in containment strategies is that, unlike static cargo such as grain or stone, these vessels were dealing with a dynamic cargo—livestock. Not only was this a heavy cargo, but it was a mobile one whose weight could at the worst, shift suddenly to destabilize the vessel. In addition to the fact that such a dynamic cargo is mobile, moving livestock can greatly stress animals, and this in turn can have an immediate and long-term effect on their health. Indeed, the management of stress in a cattle herd can have a large impact on the attrition rates of transported animals. Practices in animal husbandry and cattle physiology lend insight into this problem.

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<sup>176</sup> See Appendix A, D.3 & D.7.

<sup>177</sup> See D.5, D.7, D.8.

Stress is identified in cattle by abnormal behavior, a rise in cortisol levels, and an increased heart rate. It is triggered by both fear and physical stressors such as movement. Excessive stress can greatly lower immune function, which could affect fertility and ultimately result in death.<sup>178</sup> Even cattle transported in a free-standing manner undergo a considerable amount of stress, experiencing a fifteen percent increase in heart rate over pastured animals, even after acclimating to the mode of transportation. Ancient Egyptian cattle would most likely have been handled by humans far more closely and frequently than are modern cattle today, which would make them in general, calmer. However Temple Grandin references several transportation studies that showed tamed cattle experience the most stress during actual transportation rather than during loading and offloading, while the responses of untamed cattle are the reverse.<sup>179</sup> If in addition to the inherent stress of transportation, the animal was also fully restrained for a long period of time, this greater stress would cause attrition rates to rise during transport.

The ancient Egyptians who operated livestock transports appear to have held a firm grasp on the concept of stress management in herds. In the Old Kingdom, cattle stress was managed by transporting animals free-standing, haltered with a tether that was managed by a tender. The cattle tender was tasked with keeping the animals calm during the entire transportation process. The fact that cattle are so greatly affected by transportation-induced stress may be the reason cattle tenders or retainers such as Tjay from the Papyrus Leiden were not part of the ship's crew, but rather attached to the

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<sup>178</sup> Grandin 2007, 136.

<sup>179</sup> Grandin 2007, 135.

animals themselves. This would limit the liability of a skipper with such a valuable cargo, a risk he indifferently took with static cargo as revealed in the Papyrus Amiens, rt.<sup>180</sup>

The shift in the New Kingdom to the use of deck pens for cattle may indicate an increase in the number of cattle that were being moved on the Nile. A greater volume of cattle on board a boat required new methods for livestock stress management, which resulted in the deck pen. This scenario seems probable, as the development of the deck pen coincides with the large numbers of cattle that Papyrus Harris indicates were being moved around Egypt at the time.<sup>181</sup> While cattle were still highly valuable, in the New Kingdom it was not unheard of for workmen to own an ox.<sup>182</sup> This also may indicate that larger numbers of bovines were being moved along the Nile and that they play a larger role than before in local economies, while maintaining their status as a staple of elite exchange and tribute.

On cattle ferries where the crew size is 2-3 members, such as the ones in the tomb of Huy, crew members who helped in the operation of the ship likely tended the cattle when necessary, although the short nature of the journeys made by these types of vessels did not require many extra tasks associated with the animals. The pen-like deck structures on livestock transport vessels like these also made cattle tenders needless. These structures appear in iconography to have taken up approximately fifty percent of

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<sup>180</sup> Janssen 2004, 12.

<sup>181</sup> The Papyrus Harris lists 45,544 head of cattle among the temple endowments, British Museum 1876, pl.32a ln.1.

<sup>182</sup> Zingarelli 2010, 58.



the vessel's overall length. This would make the pens roughly 10 meters long, and about 2.5 meters tall. However, these approximations must be taken with a consideration for artistic license. Michael Bormann suggests instead that the cattle pens were 6.5 meters in length and 3.25 meters in width, drawing on evidence from the tomb of Meri-Re.<sup>183</sup> Pens of this size, Bormann writes, would have held six to eight cattle, although he does not provide his evidence for arriving at this number so it is unknown whether he deduced it from cattle weights, iconography, texts, or just an educated guess. It is more likely that cattle transports would have carried greater numbers of individuals as small groups are seen transported on general cargo vessels which collected tribute.<sup>184</sup>

The tomb of Hüy relief shows only four cattle onboard, inside the pen. It is possible that the artist only painted two pairs of cattle simply to represent the ship's cargo and not the actual head of cattle that was usually transported on these ferries although, as mentioned previously the transport of individual animals is attested to in Papyrus Leiden. This evidence makes the transport of small groups of animals more believable and perhaps suggests that larger herds such as those mentioned in Papyrus Harris were both herded and then forded across the Nile, or larger barges were adapted for cattle transportation.

Regarding placement of the cattle pen, the hogging truss' main stanchion, as well as the mast itself, would have gone through the center of the pen. Other stanchions were present at either end of the pen and also along the centerline of the vessel although these

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<sup>183</sup> Bormann, M., et al 2013, 36.

<sup>184</sup> Janssen 1961, 1-52.

are lacking in representation. According to iconographic examples, the pen itself did not extend the entire beam of the vessel; rather deck space was left on either side for the crew to pass by and possibly to carry other goods.<sup>185</sup> If graffito 30 M 365a is indeed a cattle transport vessel, it demonstrates a new arrangement for livestock enclosures (Figure 5.3). Here, there are two pens, placed on either side of the mast. This indicates two possibilities: 1) The graffitist wanted to make sure the mast was clearly visible and so did not represent the center of what would have been a single pen, or 2) this cattle ferry was a significantly larger vessel which could accommodate two pens and a larger number of cattle.

The enclosures on cattle ferries were constructed by erecting four large posts at each corner of the pen and then smaller pickets and rails were used and tied together to create the fence railing (Figure 5.4).<sup>186</sup> In the tomb of Huy, the pen is five rails high and eleven pickets long. The manner of attachment of the deck pen to the ferry itself is unclear. The posts and possibly pickets would likely have been lashed to deck beams. Bormann proposes that the rails were connected in pairs by a transversal beam at the top of the pen and that a rope was passed over these pen “frames” through v-shaped elements to lash them to the deck beams (Figure 5.5).<sup>187</sup> However the use of ropes in this manner is not present in cattle-ferry art.

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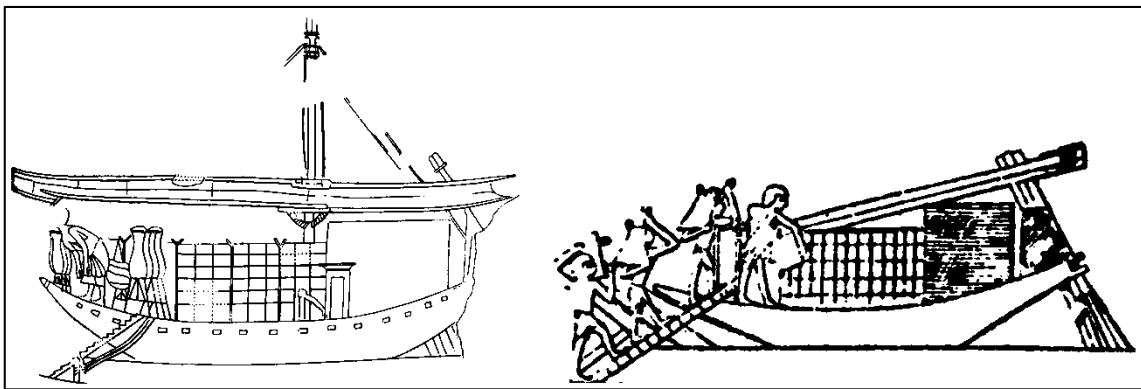
<sup>185</sup> See Figure 5.3; Davies 1926, pl.32; Winkler 1939, v.1, pl. 9.

<sup>186</sup> The term 'picket' here is the portion of the fencing which is vertical; the pickets are not generally anchored through the deck but rest on top of it and are lashed to the rails where they cross over each other. Refer to figure 5.4 for fence component terms.

<sup>187</sup> Bormann et al. 2013, 36.



**Figure 5.5.** Bormann et al reconstruction of a cattle pen. Adapted from Borman et al 2013, Figure 44.



**Figure 5.6.** Gangplanks used for the loading and unloading. 18<sup>th</sup> Dynasty. (Left) Tomb of Meryra at Tel el-Amarna; (Right) Tomb of Paheri at el-Kab. Adapted from Davies 2004, pl. 29 and Naville, Lewis, Tylor, & Griffith 1894, pl.3.

## Loading and Unloading Livestock

The methods employed for loading and unloading cattle were just as important as the strategies for containing them. Iconography seems to indicate one of two possibilities for the offloading of cattle. The first is that a gangplank was laid either amidships or portside near the bow. The latter is represented in the tomb of Paheri painting from the 18<sup>th</sup> Dynasty which depicts the loading of a grain ship and in the tomb of Meryra (Figure 5.6). Bulls are also seen disembarking from Syro-Canaanite ships in the tomb of Kenamun, and in this image also shows the vessels being unloaded via

The cattle kept in Ancient Egypt were probably raised in small groups of 25 individuals or less, and because of their close association with people, would have had a relatively small flight zone.<sup>188</sup> Larger operations, however, such as those at Kom el-Hisn are known to have existed. Today, cattle kept in this manner are usually driven, rather than led by a halter.<sup>189</sup> These cattle are generally docile and this coupled with the animal's natural herd mentality makes it easy for one or two people to urge the group in a certain direction with moderate ease.<sup>190</sup> This is called a following behavior, meaning that if one individual can be encouraged in a certain direction, the rest of the herd will not hesitate to flow in that direction as well.<sup>191</sup> At first glance, this behavior would make offloading cattle over a gangplank located on the portside of the vessel ideal; in reality it was distinctly improbable.

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<sup>188</sup> Grandin 2014, 78.

<sup>189</sup> Ibid., 78-80.

<sup>190</sup> Ibid, 78-83.

<sup>191</sup> Grandin 1997, 109.

While Egyptian cattle would have had a relatively small flight zone, sensitivity to this area is increased in enclosed spaces. Additionally, cattle tend to circle around a handler. If tenders tried to herd the cattle out of a point along the widest side of the pen the circling behavior would repeatedly enter the animals' flight zone causing balking. This coupled with the fact that cattle often interpret sharp turns as dead ends and again result in balking, contributes to the unlikelihood that cattle were offloaded in a manner similar to those in the Meryra and Paheri reliefs.<sup>192</sup>

It is far more likely that cattle were offloaded directly off the bow, which may be the reason cattle ferries are often depicted with truncated extremities. This could allow the bow to be pulled directly up to a dock or unloading platform, providing not only an exit without a sharp turn but also surer footing than a gangplank, a feature which helps facilitate the offloading of cattle in general. Loading or unloading directly from the bow without a gangplank is shown often in reliefs depicting grain transports of the New Kingdom. This is the case in both the relief from Theban tomb A4 and the relief from the tomb of Ipy (Figure 5.7). The existence of harbor structures such as the unloading platform described above may also be alluded to in the list of benefactions in Papyrus Harris by the line "Acacia boats, stations at the banks for transporting cattle, barges, arks, 78;"<sup>193</sup>

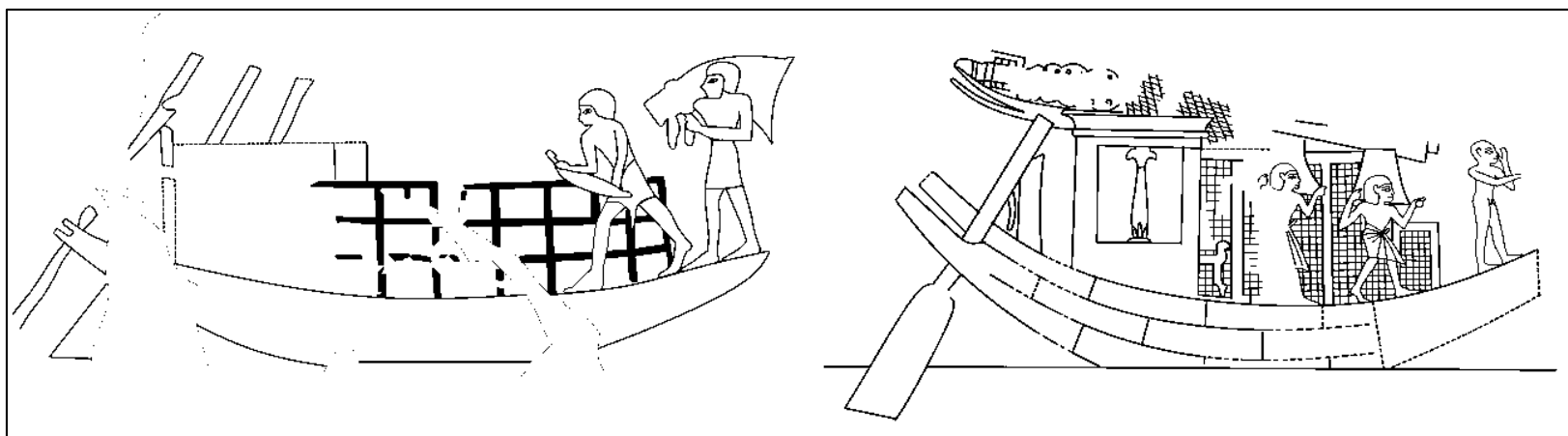
## **Conclusions**

The dynamics of crew and livestock interactions onboard cattle ferries elucidates

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<sup>192</sup> Grandin 1997, 103-119.

<sup>193</sup> Birch 1876, pl. 69a, ln. 13.



**Figure 5.7.** Loading and offloading from the bow. (Left) TT A4, Grain Barge 18<sup>th</sup> Dynasty from a tomb possibly in Thebes; (Right) Tomb of Ipy, Grain Transport 19<sup>th</sup> Dynasty in Thebes. Adapted from Manniche 1988 and Davies 1927, pl. 30.

the function and use of cattle ferries themselves, as well as how they fit into the larger paradigm of Egyptian society. Crew size on these vessels and other cargo transports varied widely from the Old to the New Kingdoms, and there is a large discrepancy between the iconographic and the textual records. Art depicting the vessels in use had crew size anywhere from 2 to 7 crew members, while literary evidence elevates the range from 30 to 120.

The general make-up and hierarchy of the crew can be identified through costume. On cattle ferries the captain, or *nf*, is designated by a sharply starched kilt, which comes to a point and is usually longer than the kilts of other men as he is the most important or distinguished figure. Second in rank are the oarsmen and helmsmen, often wearing plain kilts. The general crew is usually shown in simple girdles or loincloths. At the very bottom of the hierarchy are the cattle tenders who only appear in simple kilts or are completely nude. Their position at the bottom of the hierarchy may be attributed to the fact that they were not a part of the regular crew, but were rather attached to the cattle being transported, boarding and offloading along with the herd.

The study of cattle behavior along with ancient iconographic evidence has allowed for the reconstruction of loading and offloading practices concerning livestock. Rather than exiting a side opening in the deck pen and down a portside gangplank, cattle were most likely driven out of the vessel over the bow, which may have been squared off for this purpose.

The evolution of cattle containment strategies onboard transport vessels may also indicate a shift in the position of cattle in the Egyptian economy. While the Old

Kingdom saw extensive use of cattle tenders and the transport of free standing, tethered cattle, an increase in the number of animals being transported along the Nile resulted in the development of deck pens and the use of specific cattle ferries. As a purpose built vessel, the cattle ferries, or *hni-ih*-boats, provide a unique opportunity for the continued study of the Egyptian economy and maritime community.



## CHAPTER V

### CONCLUSIONS

Cattle represented an important commodity in ancient Egypt, and the movement of these animals on the Nile required the development of specialized vessels. The study of these vessels provides an insight into not only Egyptian naval architecture and ship use, but also uniquely expands our understanding of Egyptian ideology as it pertains to working vessels. The cattle transport was an important vessel type in Nilotic shipping.

#### **Ideology of Cattle Transport**

Cattle were moved on the Nile for several reasons. A large portion of cattle transport was done seasonally to move animals from Upper Egypt to grazing grounds in the floodplains of the Delta.<sup>194</sup> Papyrus Harris mentions this practice regarding a herd of black cattle, and excavations at Kom el-Hisn have uncovered very few bovid bones but an overabundance of cattle dung suggesting cattle were being raised or kept in the Delta before being shipped south.<sup>195</sup>

Cattle were also moved on the Nile through the collection of tribute or taxes. Single animals were often listed as tribute or taxes collected by state or temple officials in documents such as P. BM 104101 and Papyrus Leiden I 350 Verso.<sup>196</sup> Cattle were an important component of *inw*, a type of tribute collected from Egyptians and from foreign

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<sup>194</sup> Moens & Wetterson 1988, 159.

<sup>195</sup> British Museum 1876, 20; Bard & Fattovich 2013, 147.

<sup>196</sup> Janssen 1991, 79-88; Janssen 1961, 78.

lands to solidify the relationship between those peoples and the pharaoh.<sup>197</sup> In addition to *inw*, cattle were also a key element of *b3kw*, which was collected on behalf of temples along with other agricultural goods and slaves.<sup>198</sup> Many breeds of cattle are listed in the Annals of Thutmosis III as part of the tribute collected from Syria.<sup>199</sup>

The vessels used to collect tribute and move cattle to grazing grounds were often reported to be owned or commissioned by both the state and temples.<sup>200</sup> Nevertheless, private ownership of cattle boats was not unheard of. Papyri occasionally describe a prosperous man as one who owned his own cattle transport ship.<sup>201</sup> These specialized vessels were often used to transport other goods after the seasonal transport of livestock to grazing grounds. In fact, Papyrus Anastasi VIII includes the chastising of a steward for sending a cattle ferry empty on its return voyage.<sup>202</sup>

### **Characteristics of the Cattle Boat**

One of the most common names ascribed to cattle transports is *hn-ih*, which has been interpreted to mean cattle ferry. This term has been found in inscriptions in the tomb of Huy, labeling the boats in the scene.<sup>203</sup> This name is used to describe cattle boats in Papyrus Anastasi VIII, Papyrus Koller, and Papyrus Harris I.<sup>204</sup> These vessels are included among lists of ships made of acacia, a local wood.<sup>205</sup>

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<sup>197</sup> Bleigberg 1984, 158.

<sup>198</sup> Spalinger 1996, 360.

<sup>199</sup> Bleiberg 1988, 157.

<sup>200</sup> Castle 1992, 243.

<sup>201</sup> Marx 1946, 22.

<sup>202</sup> Wente 1990, 120-1.

<sup>203</sup> See Appendix A, B.3 & B.4.

<sup>204</sup> British Museum 1855, 8; Gardiner 1911, 39-40; Vinson 1996, 21, 42.

<sup>205</sup> BAR 1962, v, 1 § 149; Ward 2000, 15-6.

Other ship types were also used to collect cattle as foreign and local tribute and include *wsh*-ships, *dw'-twy*-boats, and large freighters simply referred to as *dpt*. *Wsh*-ships are reported to have collected cattle as tribute from Nubia and *dw'-twy*-boats have ceremonial connotations which make their involvement in the collection of cattle as tribute probable.<sup>206</sup> While these larger freighters might have transported cattle, they were often part of a larger diverse cargo.

Old Kingdom iconographic examples of cattle-carrying ships are not the specialized cattle transports which appeared later in New Kingdom literature and art. Instead they are general cargo vessels whose hull shape varies between the 5<sup>th</sup> and 6<sup>th</sup> Dynasties. During the 5<sup>th</sup> Dynasty, the truncated extremities of these ships are relatively close to the waterline and at times have an out-curving bow, but in the 6<sup>th</sup> Dynasty there is a shift to deeper hulls, which almost universally have a stern that rises high above the bow.<sup>207</sup> Despite this change, deck structures retain a high degree of similarity, making it probable that the observed change represents a shift in artistic conventions rather than in hull design. The New Kingdom cattle boats evolved from previous designs. Hulls have a truncated or squared bow and the extremities are angled high above the waterline with the stern being the highest point of the vessel.

The length-to-beam ratio of cattle transport ships would probably have been 3:1, similar to other working Nilotic boats. Determining the carrying capacity of these ships is difficult, but can be estimated. Depictions of these boats in the tomb of Huy show

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<sup>206</sup> BAR 1962, v.1 § 11, 65; Grandet 1999, 42.

<sup>207</sup> See Figure 3.2.

them carrying four head of cattle, while it is likely that they could carry larger numbers of animals this can be taken as a minimum. Assuming an average wither height of 53 inches for fattened cattle, a formula developed by Allan Gilbert shows that these boats must have been able to carry at least 1,200 kilograms.<sup>208</sup> Other scholars on the topic suggest these ships actually carried 6 to 8 head of cattle and in this case the carrying capacity would double to an estimated 2,400 kilograms.<sup>209</sup>

To be able to carry this heavy, not to mention, mobile cargo, cattle boats required through beams for extra hull strength and to receive the deck planking necessary to transport livestock. These throughbeams can be seen clearly in a fragment of a Nile shipping scene from the tomb of Meryneith at Saqqara.<sup>210</sup> They may also be present in the dynastic graffito 30 M 365a from the road between Armant and Nag'al-Ḥamâdi.<sup>211</sup>

Although cattle transport ships were utilitarian vessels, iconography shows that they were decorated. The tomb of Huy depicts cattle boats whose hulls were painted bright red or green.<sup>212</sup> Many cattle boats are also represented with a zigzag pattern painted on the strake below what could be considered the gunwale.<sup>213</sup> There are two possible explanations for this decorative element. It may be that these zigzags were to mimic the lashing cordage of papyrus rafts because of their firm association with not only the movement of cattle but also theological ideas of supernatural protection from

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<sup>208</sup> Gilbert 1988, 71-7.

<sup>209</sup> Bormann et al. 2013, 36.

<sup>210</sup> Bormann et al 2013, Figure 40; See Appendix A, D.7.

<sup>211</sup> The graffito is a possible representation of a cattle boat, Winkler 1939, v.1, pl. 9; See Appendix A, C.12.

<sup>212</sup> Davies 1926, 19.

<sup>213</sup> See Appendix A, D.2b also Figure 3.9.

Nile hazards.<sup>214</sup> The second possibility is that the design was the artists' attempt to convey the idea that the vessels were constructed by lashing the planks together, or as Landström suggests, they represent a girdle to provide additional hull strength.<sup>215</sup>

### **Shipboard Dynamics of Crew Members and Live Cargo**

A survey of iconography has shown that cattle boats have a crew size of 3 to 7 men.<sup>216</sup> These crews were in general made up of a skipper, or *nf*, 1-5 general crew members, and a specialized cattle tender. Boatmen often wore no more than a girdle or simple kilt. The higher ranking *nf* is frequently distinguished from the crew by the presence of a starched and pleated kilt, whose folds extend below the knee.<sup>217</sup> While other crew members wear several different types of simple garments, cattle tenders are always shown with a simple kilt or are nude. Their dress is similar to that of oarsmen and their rank may be similar.

Livestock responsibility is not explicitly stated, but can be inferred from several literary sources. The captain was held liable for the goods he transported; however texts such as Papyrus Leiden I 350 Verso seem to indicate a cattle tender was responsible for the animal's wellbeing during transport.<sup>218</sup> Despite the depiction of cattle being kept on top of deck structures, it is probable this was an artistic convention to show the animals which would otherwise be obscured by pen walls. These pens may have been subdivided into two or more compartments to minimize animal movement which would

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<sup>214</sup> Miosi 1975, 86-8.

<sup>215</sup> Landström 1970, 59-65.

<sup>216</sup> See table 4.1

<sup>217</sup> Davies 1926, pl. 32.

<sup>218</sup> Janssen 1961, 1-7, 78.

otherwise affect the vessel's stability. This is suggested by the Dynastic graffito 30 M 365a.<sup>219</sup> Due to behavioral traits of bovids, it is probable these cattle were then loaded and unloaded from the bow, which may be the reason why it appears truncated in iconography. Squared-off bows could be abutted against loading docks, the existence of which may be alluded to in Papyrus Harris I.<sup>220</sup>



Cattle in ancient Egypt were a measure of wealth and prestige, and as such figured prominently in tomb art, inscriptions, and even literature. Elite titles and roles such as “Overseer of Cattle” were granted to high ranking officials or nobility during the New Kingdom, and large numbers of cattle were collected as tribute throughout the Pharaonic period.<sup>221</sup> The movement of these animals along the Nile, whether for secular or sacred reasons, required the development of specialized vessels. The cattle barges of ancient Egypt provide a unique opportunity to understand more facets of the Egyptian maritime community.

These ships were used in both secular and sacred contexts through the collection of tribute, taxes, and the movement of herds to grazing grounds. The multifunctional nature of cattle transports is reflected in their hull design and their use for the conveyance of other goods in off-seasons. It is vital to develop a greater understanding

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<sup>219</sup> Winkler 1939, v.1, pl. 9.

<sup>220</sup> Birch 1876, pl.69, ln.13.

<sup>221</sup> British Museum 1876, 8-15; Dodson 1990, 89; Gardiner 1952, 15.

of cattle barges, which played such a large role in the Egyptian maritime community. This vessel type's associations with elite status and wealth, despite it being a working vessel, provide a unique window through which new insight can be gained on the powerful and long-lived Egyptian civilization.

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## APPENDIX A

### CATALOG OF CATTLE BOATS, GENERAL TRANSPORTS & REED RAFTS

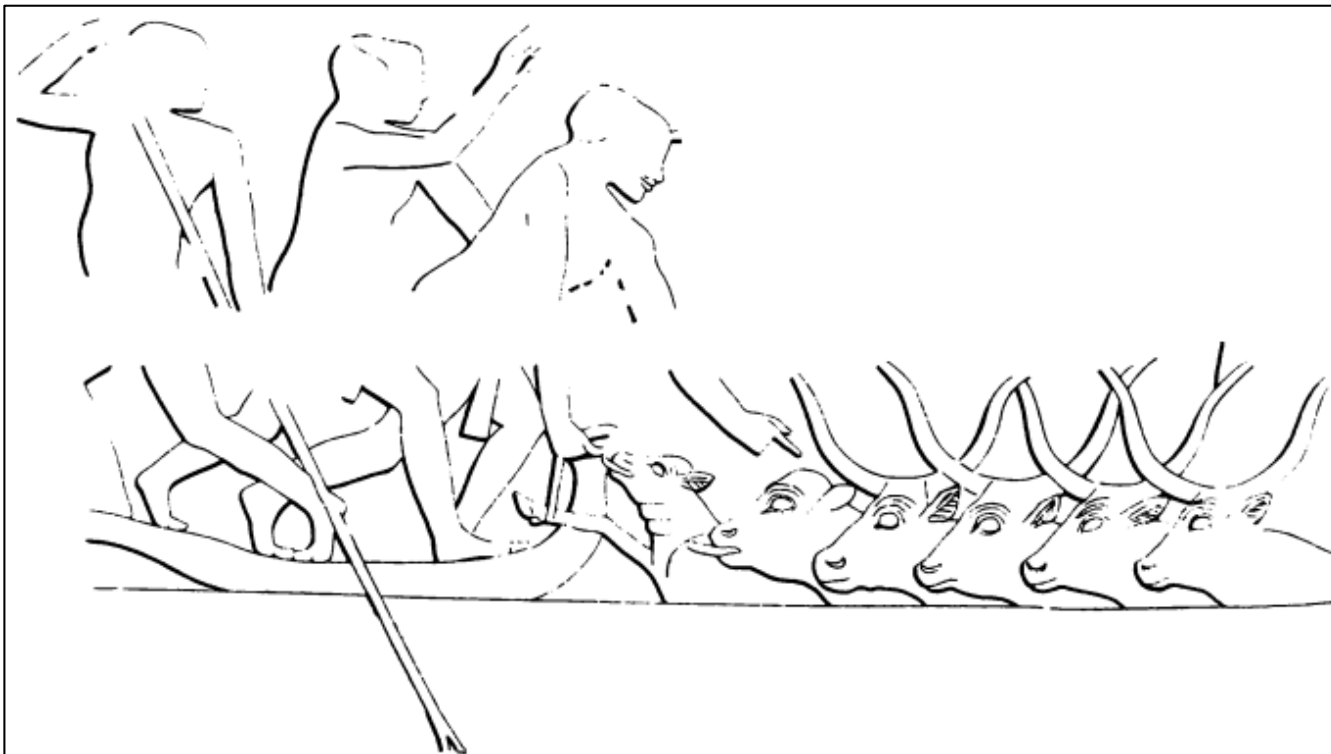
## **Smh, Shn, Šht and Other Papyrus Rafts**

[A.1]

Date: 5<sup>th</sup> Dynasty

Tomb: Ptahhotep

Description: Papyrus Harvest—From the East wall of the mastaba of Ptahhotep at Saqqara. Papyrus raft being used to ford cattle across the Nile. Adapted from Davies 1900, pl. 32.

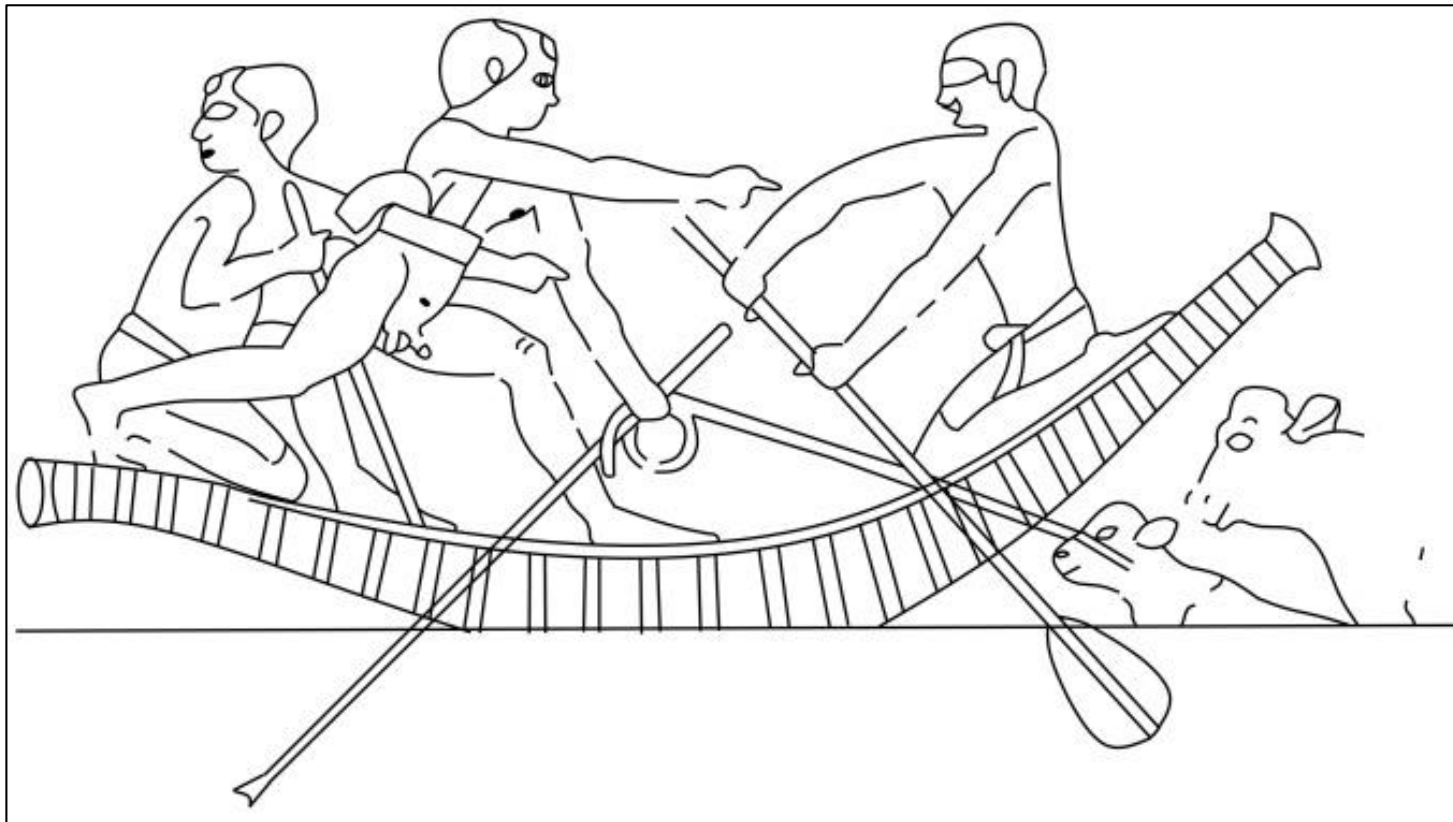


[A.2]

Date: 5<sup>th</sup> Dynasty

Tomb: Ti

Description: Fording Cattle Across the Nile—From the tomb of Ti at Saqqara. Towing a calf behind a papyrus raft to entice the herd to ford the river. Adapted from Vandier 1969 vol. 5, Figure 39-40.

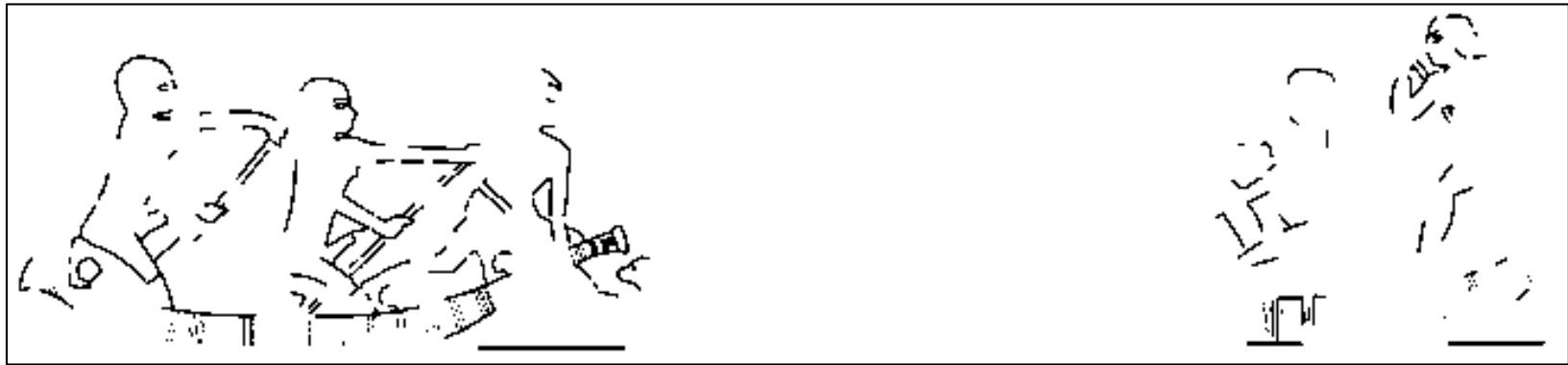


[A.3]

Date: 5<sup>th</sup> Dynasty

Tomb: Hesi-min

Description: Fording Herd Scene—From the East wall of the shrine of the tomb of Hesi-min at el-Hawawish. Fording a herd across the Nile pulling a calf to entice cattle. Adapted from Kanawait 1980, pl.7.

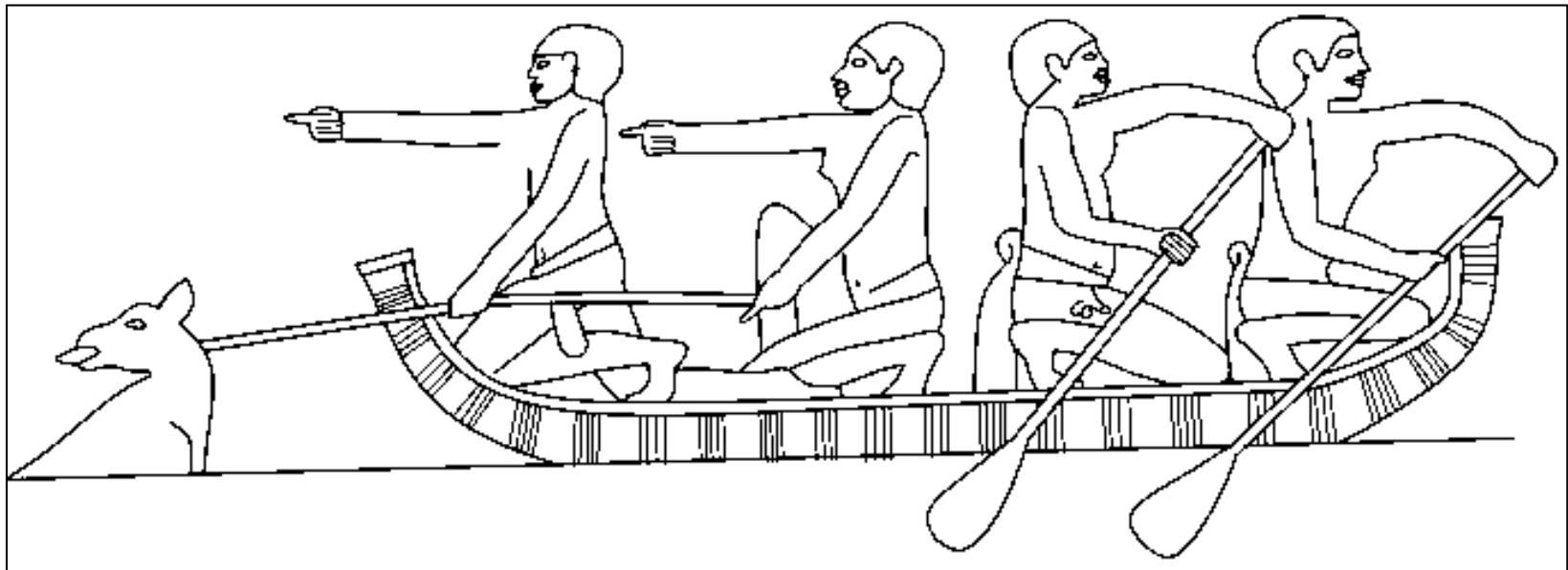


[A.4]

Date: 6<sup>th</sup> Dynasty

Tomb: 'Ankhm'ahor

Description: Fording A Large Herd—From room I, East wall of the mastaba of 'Ankhm'ahor at Saqqara. Two papyrus rafts being used to ford a large herd of 32 head across the Nile, each with a crew of 4 (two herdsman each). Adapted from Badawy 1978, pl.26.



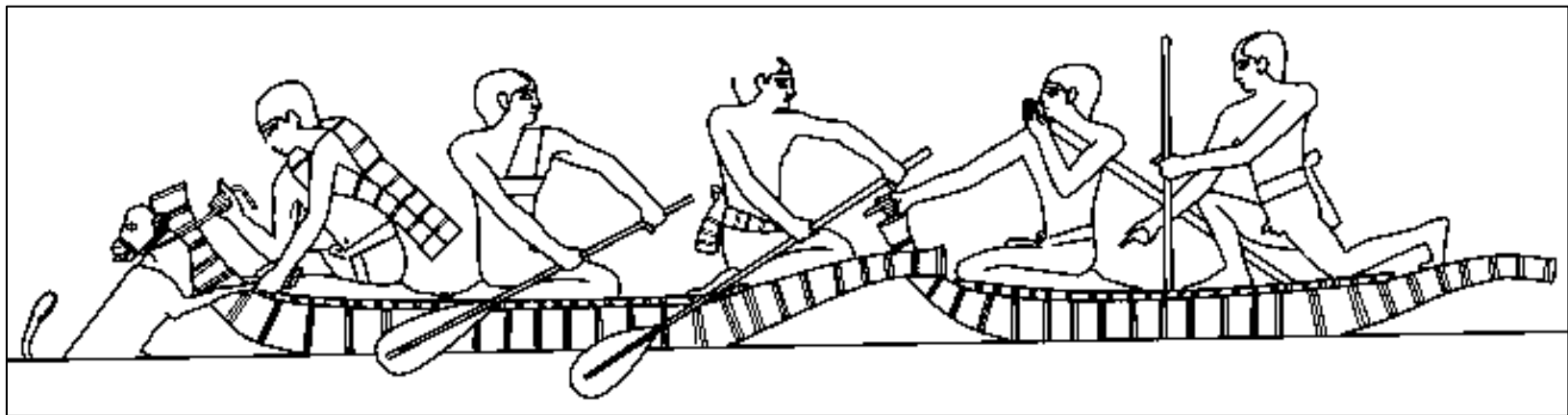


[A.5]

Date: 6<sup>th</sup> Dynasty

Tomb: Kagemni

Description: Fording Cattle—From the North wall of the pillared hall of Kagemni. Two papyrus rafts being used to ford a herd of cattle across the Nile. Adapted from Firth and Gunn 1926, pl. 7, 52.

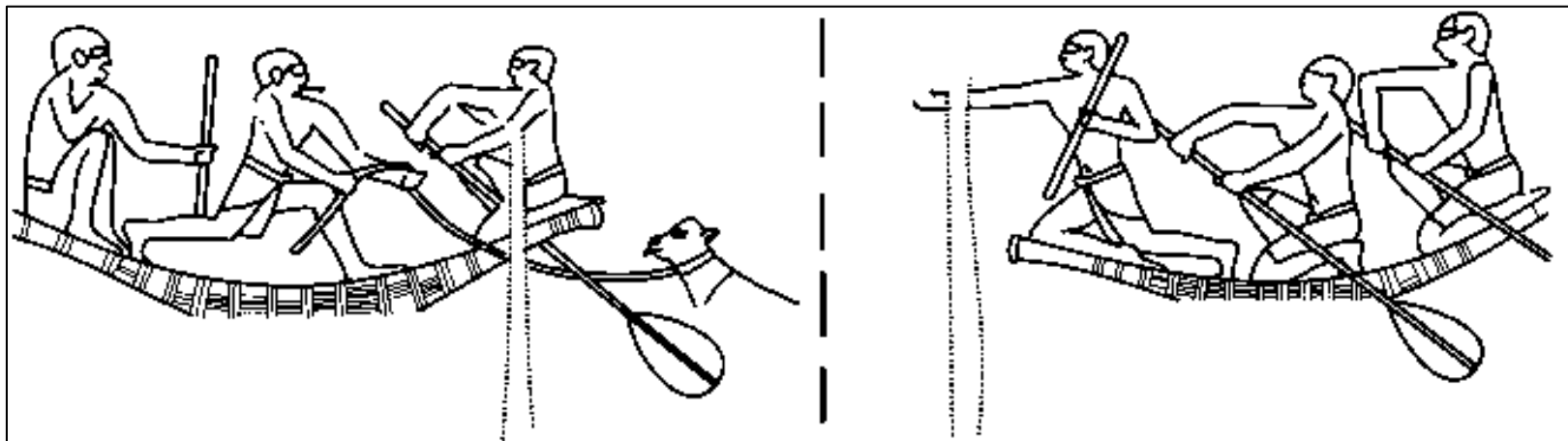


[A.6]

Date: 6<sup>th</sup> Dynasty

Tomb: Mereruka

Description: Two Papyrus Rafts Fording a Herd of Cattle—The herd has been removed to facilitate the comparison of the two rafts. Adapted from Vandier 1969, vol. 5 Figure 52.

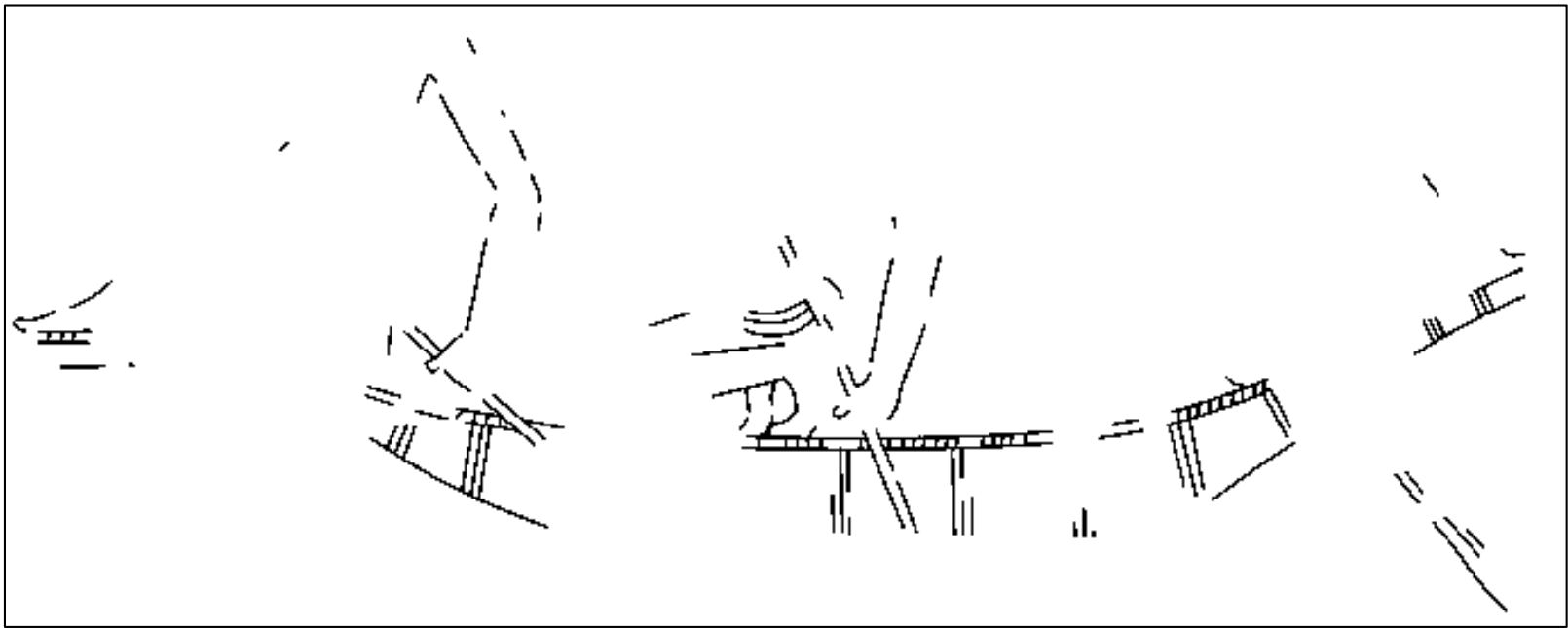


[A.7]

Date: 6<sup>th</sup> Dynasty

Tomb: Gehesa

Description: Fording Cattle Scene—From the South wall of the chapel in the tomb of Gehesa at el-Hawawish. Only one papyrus raft is used, following a herd, the cattle are enticed across the river by a man carrying a calf on his back wading through the water. Adapted from Kanawait 1980, Figure 30.

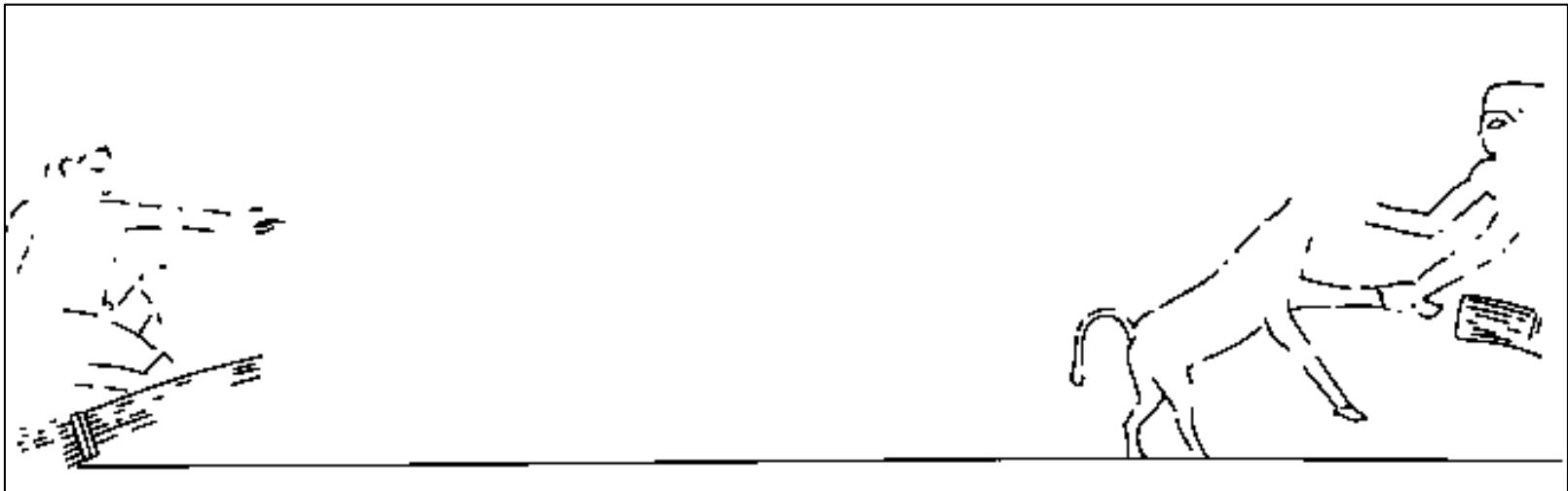


[A.8]

Date: 6<sup>th</sup> Dynasty

Tomb: Ka-Hep

Description: Fording A Small Herd—From the North wall of the chapel of Ka-hep at el-Hawawish. One calf and five oxen being driven across the river. Very damaged. Adapted from Kawanwait 1980, pl.12.

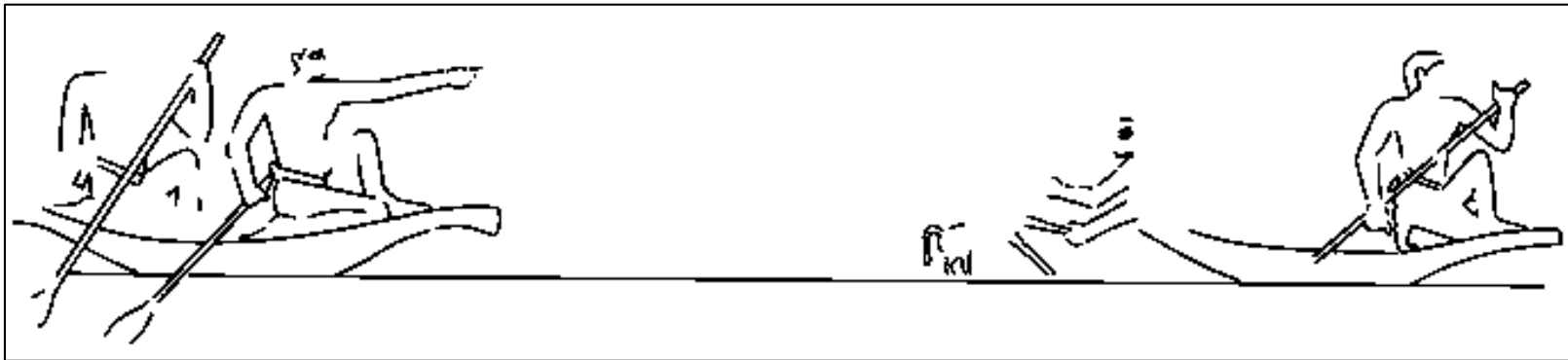


[A.9]

Date: 6<sup>th</sup> Dynasty

Tomb: Kheni

Description: Fording Cattle—From the North wall of the chapel of the tomb of Kheni at el-Hawawish. Herd of five bulls/oxen and one cow being enticed by a calf to cross the river. Adapted from Kanawait 1980, pl.7.

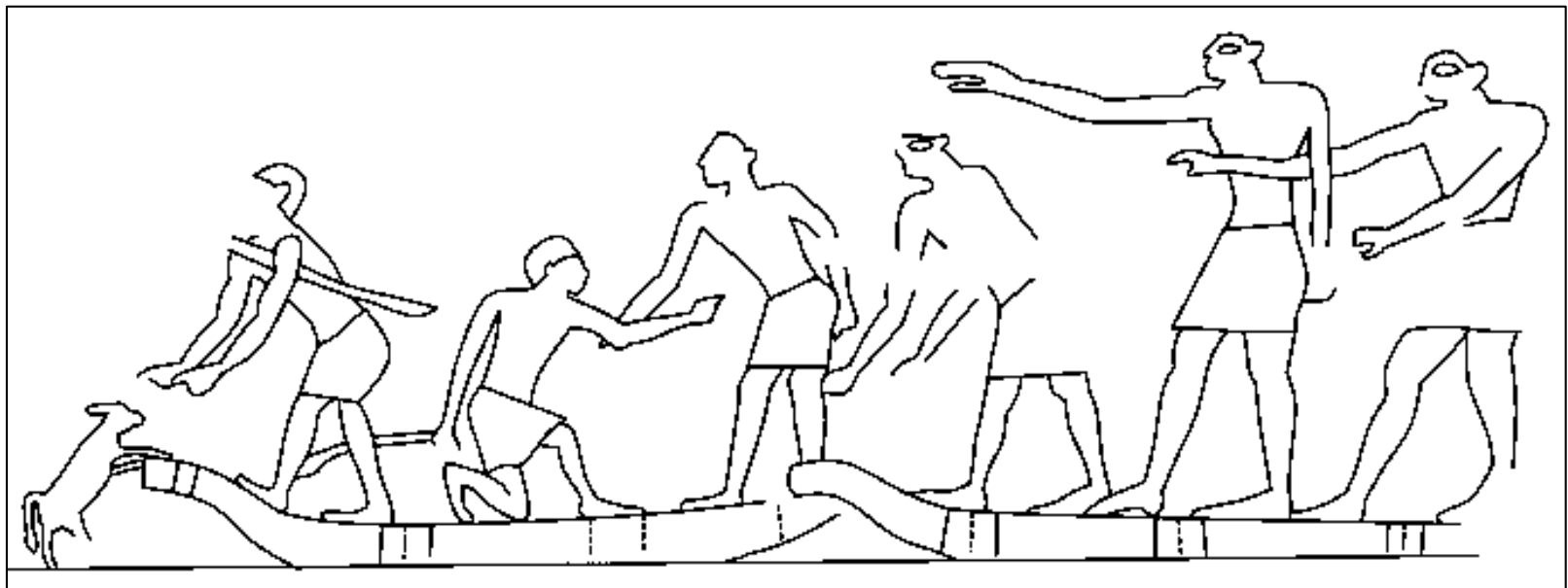


[A.10]

Date: 11<sup>th</sup> or 12<sup>th</sup> Dynsty

Tomb: Khety (no.17)

Description: Boatmen and a Calf—From the tomb of Khety at Beni Hassan. Two papyrus reed rafts are used in a fording scene. Adapted from Kanawati and Woods 2010, pl. 159.

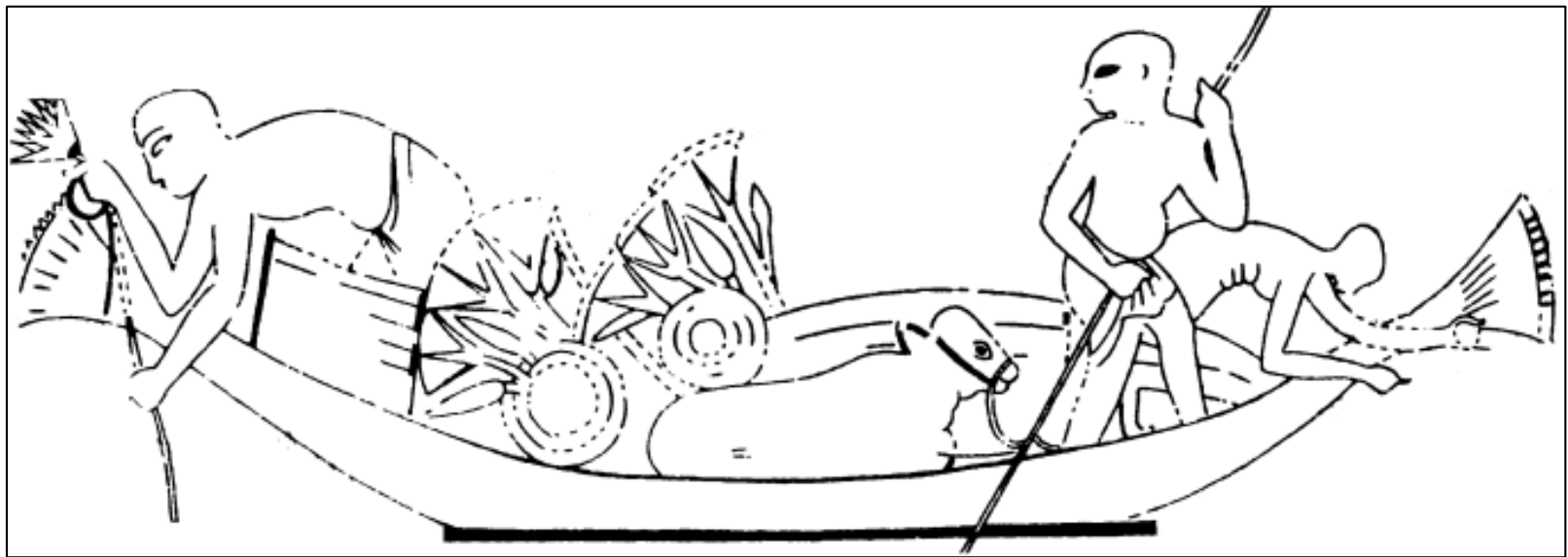


[A.11]

Date: 18<sup>th</sup> Dynsty

Tomb: Nefer-Hotep

Description: Papyrus Harvest—From the North wall of the inner room of the tomb of Nefer-Hotep at Thebes. Papyrus raft being used for harvesting papyrus and transporting a small calf across the Nile. Adapted from Davies 1973b, pl.44.



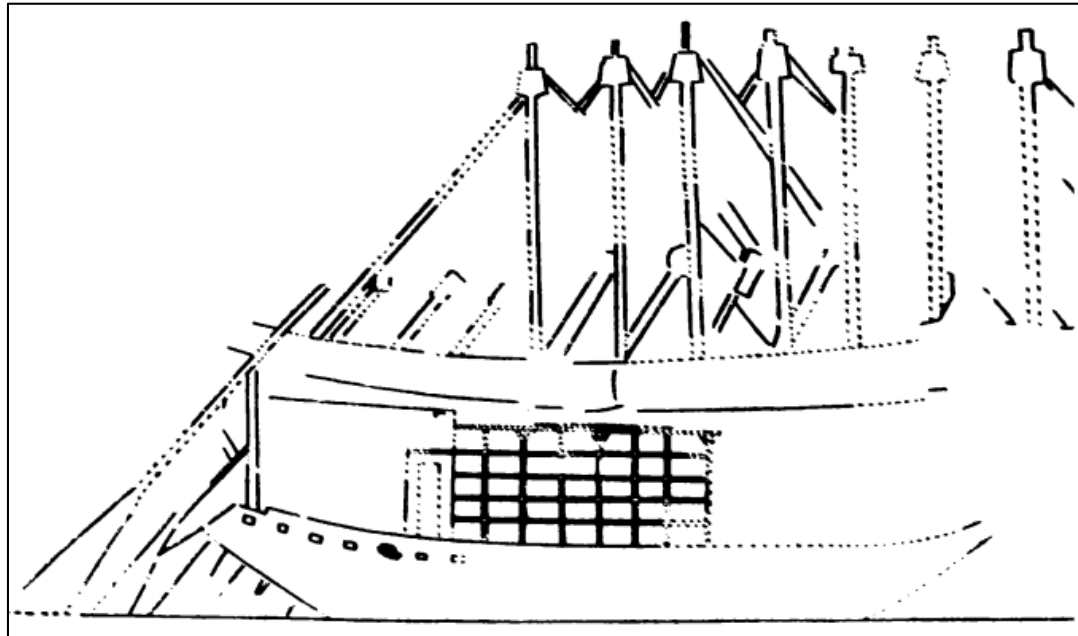
## Freight Ships with Deck Structures

[B.1]

Date: 18<sup>th</sup> Dynasty

Tomb: Penthu

Description: Freight Boats—From the south wall of the rock cut tomb of Penthu at Tel el-Amarna. The scene is of 19 single-masted freight ships moored along the Nile's bank. Adapted from Davies 2004, pl. 8.



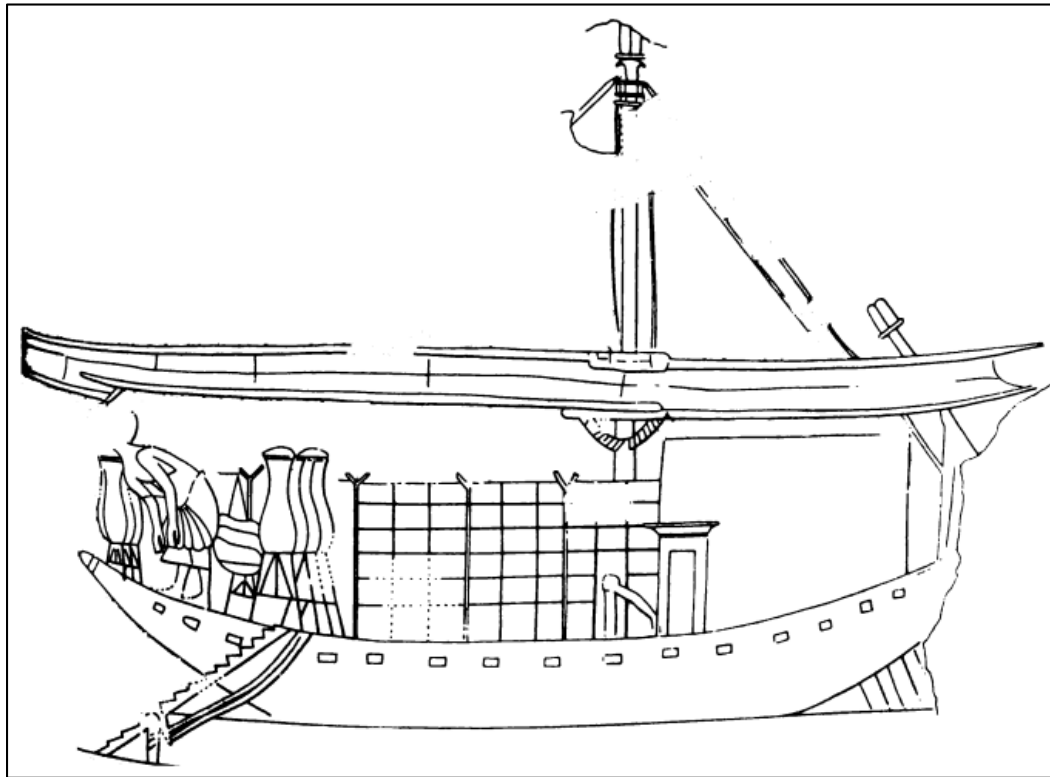


**[B.2]**

Date: NK, Dyn. 18

Tomb: Meryra

Description: Royal Barges Outfitted with Pens—From the East wall, lower half of the rock cut tomb of Meryra at Tel el-Amarna. This barge is part of a fleet of royal barges outfitted with deck pens in the reward of Meryra scenes. Adapted from Davies 2004, pl. 29.

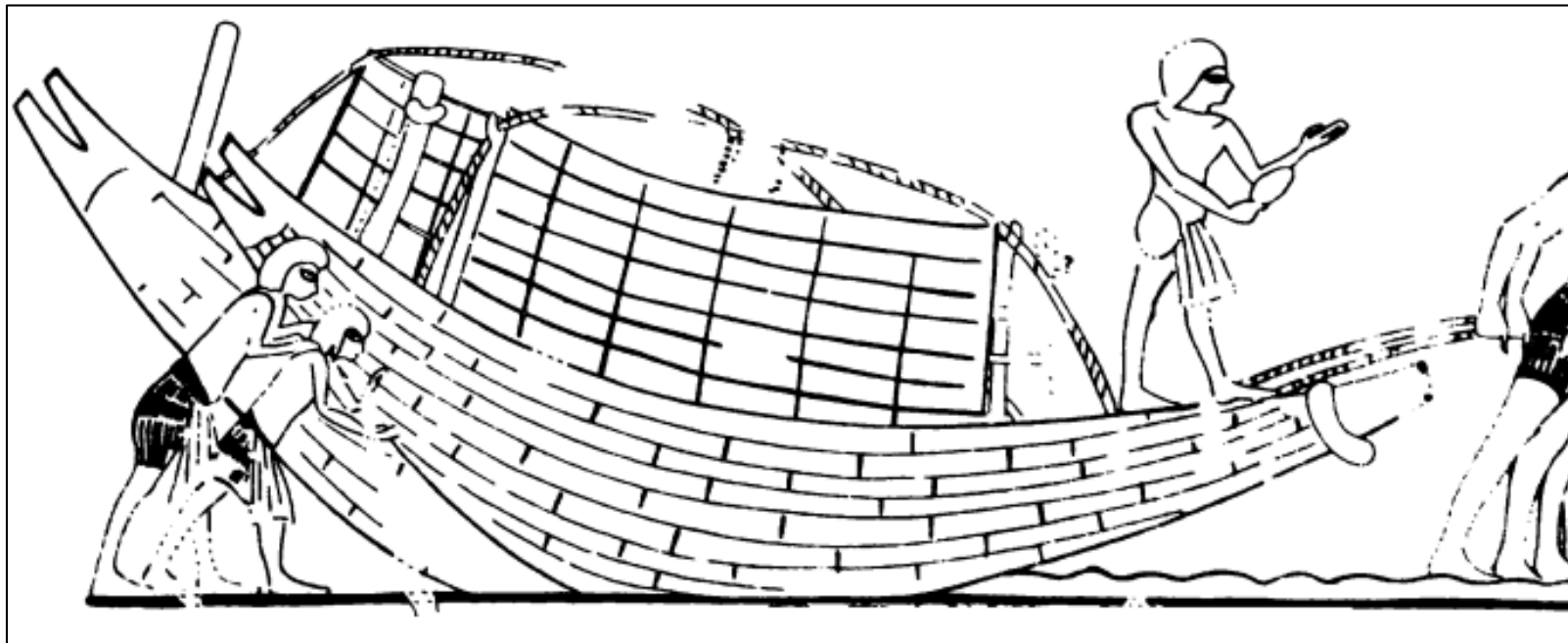


[B.3]

Date: 18<sup>th</sup> Dynasty

Tomb: Huy

Description: Transport Boats with Green & Red Hulls—From the East wall of the tomb of Huy at Thebes. Pulling the transport ship along the mud flats of the Nile bank. One of several very similar transport ships in this scene, most have green hulls, although one is red. Adapted from Davies 1926, pl. 18.

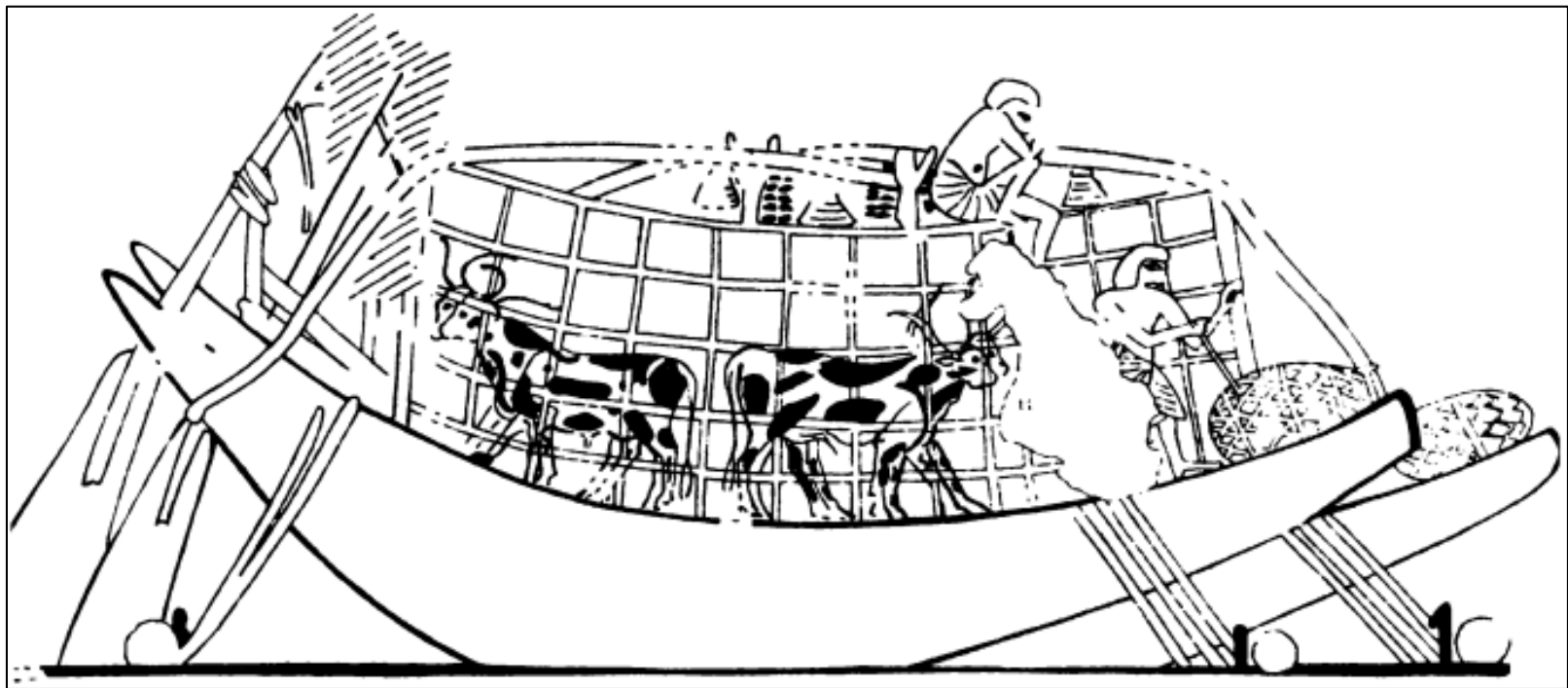


[B.4]

Date: 18<sup>th</sup> Dynasty

Tomb: Huy

Description: Cattle Transport Boats—From the West wall of the Tomb of Huy at Thebes. From the top register of a three-register scene of cattle transport ships moored on the Nile banks. Adapted from Davies 1926, pl. 32.



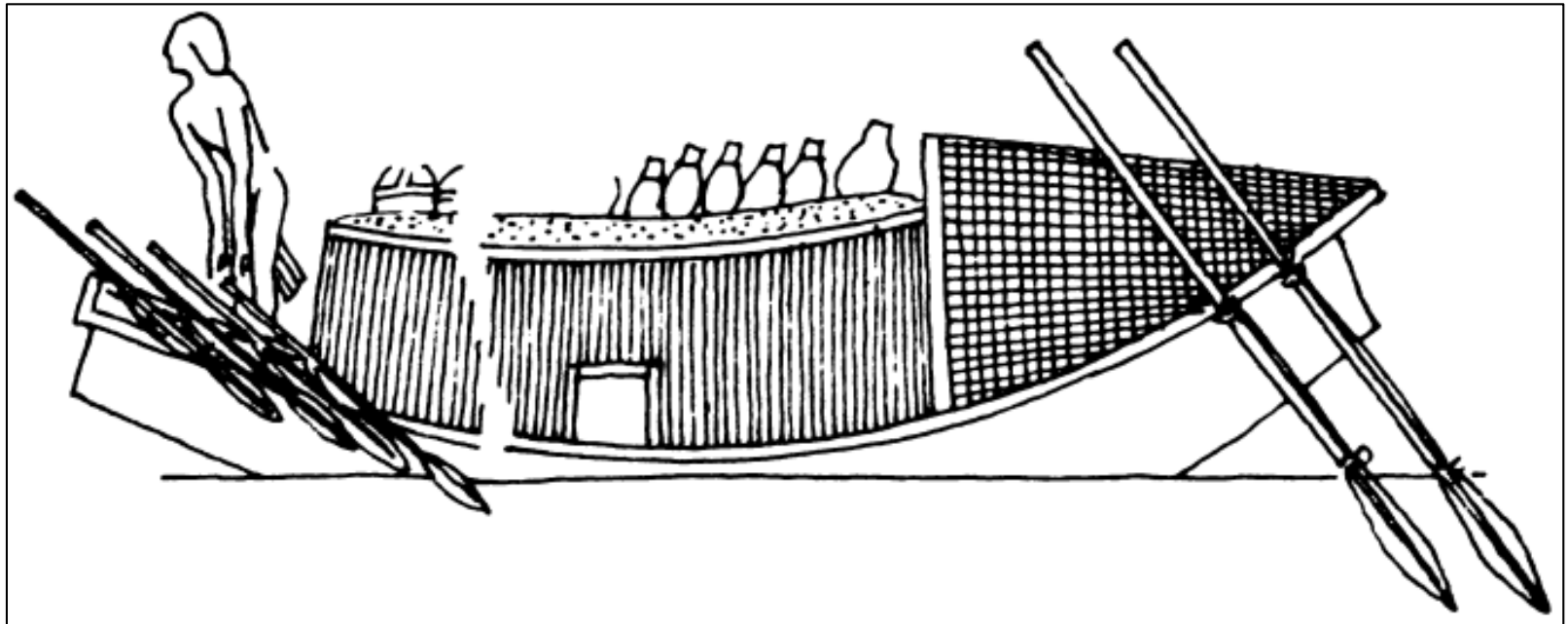
***Comparanda: Transport Ships Carrying a Variety of Cargos***

**[C.1]**

Date: 5<sup>th</sup> Dynasty

Tomb: Ti

Description: Small General Cargo vessel—Small cargo ship with one crewman, no livestock, from the mastaba of Ti at Saqqara. Adapted from Landström 1970, 60.

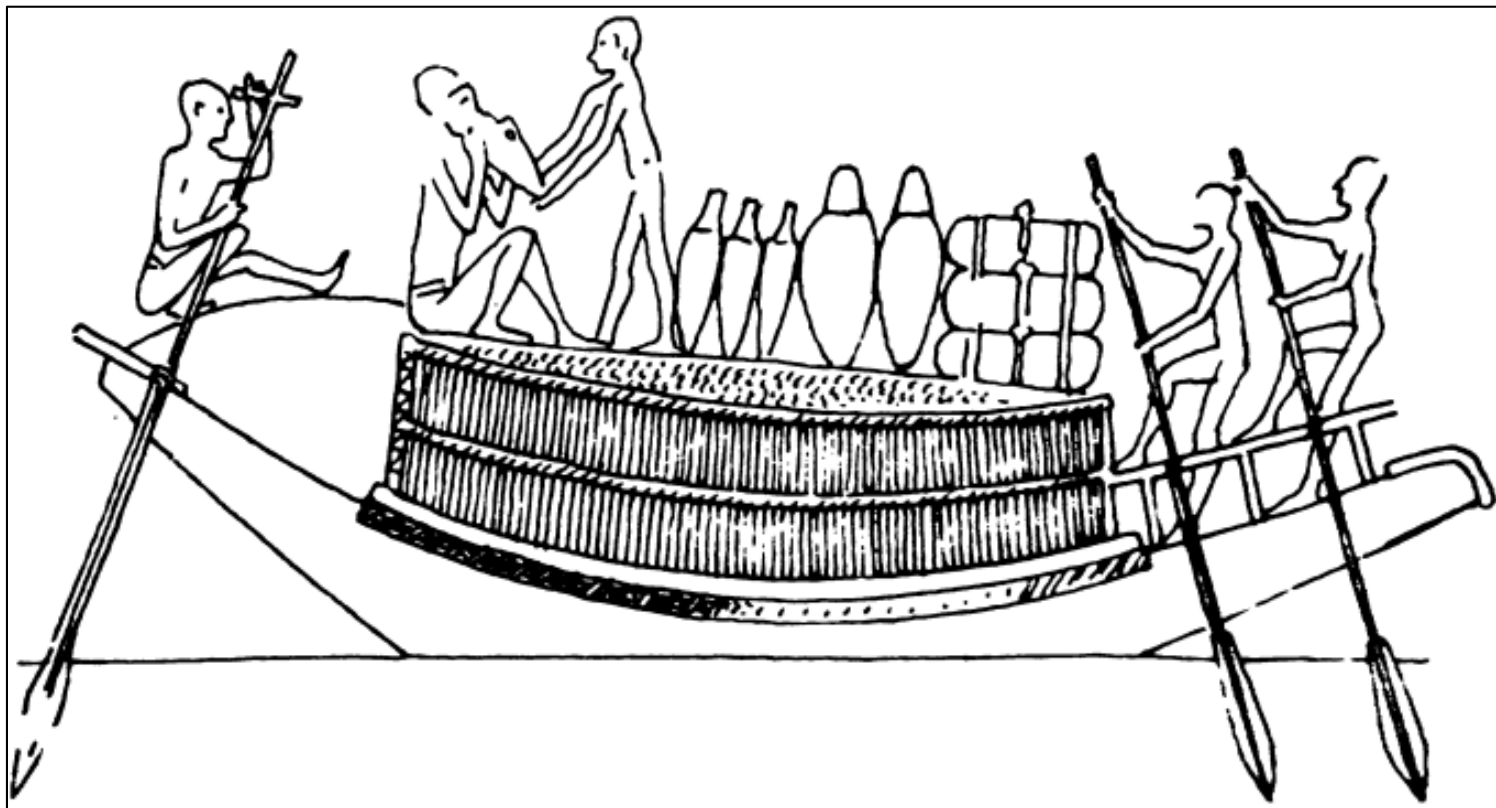


[C.2]

Date: 6<sup>th</sup> Dynasty

Tomb: Meri

Description: Old Kingdom Small Cargo Ship—Cargo ship with a large crew of five men, from the tomb of Meri at Saqqara. Adapted from Landström 1970, 60.

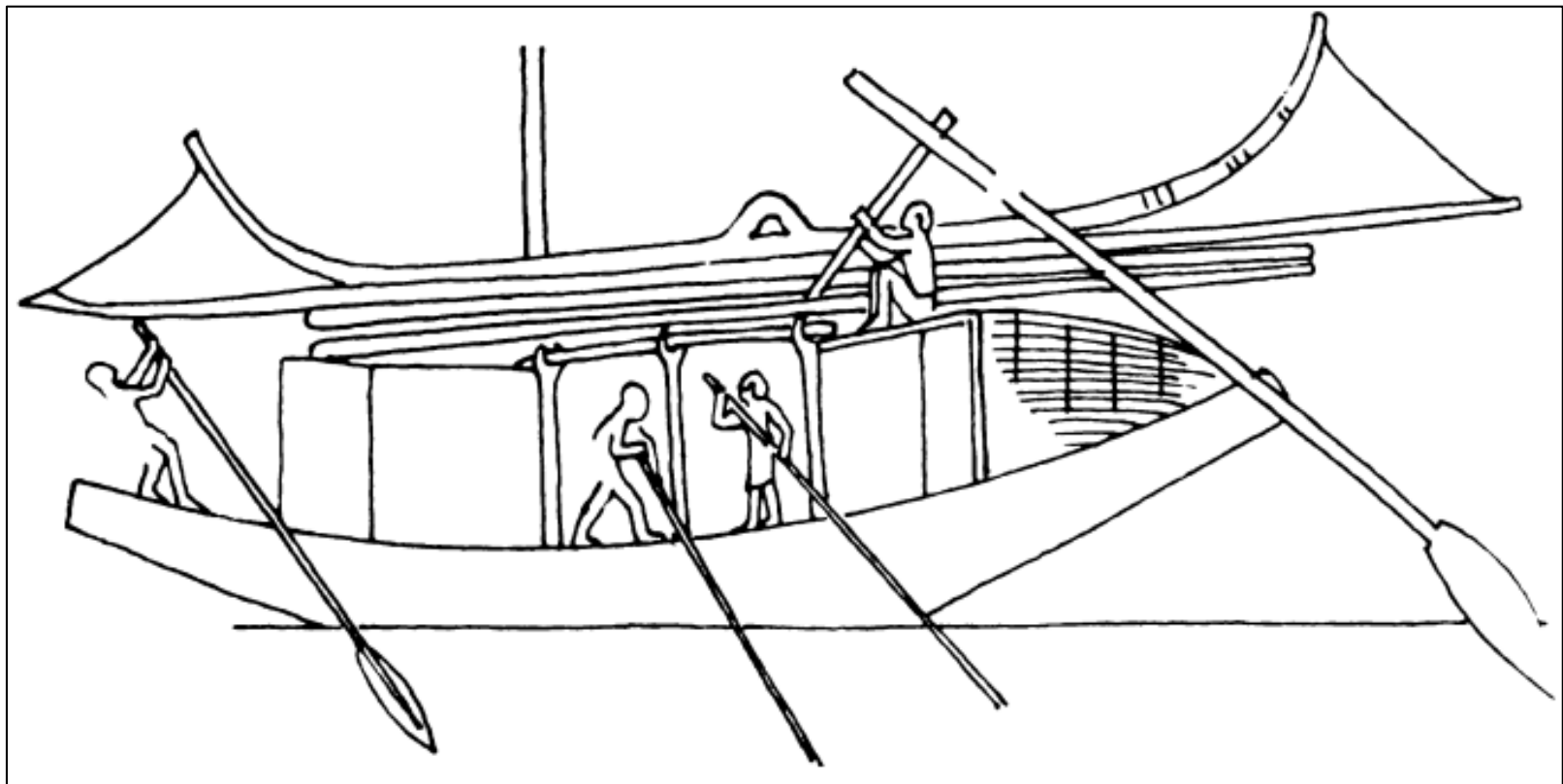


[C.3]

Date: 6<sup>th</sup> Dynsty

Tomb: Mereruka

Description: Old Kingdom Small Cargo Ship—Cargo ship with a large crew of four men, from the mastaba of Mereruka at Saqqara. Adapted from Landström 1970, 60.

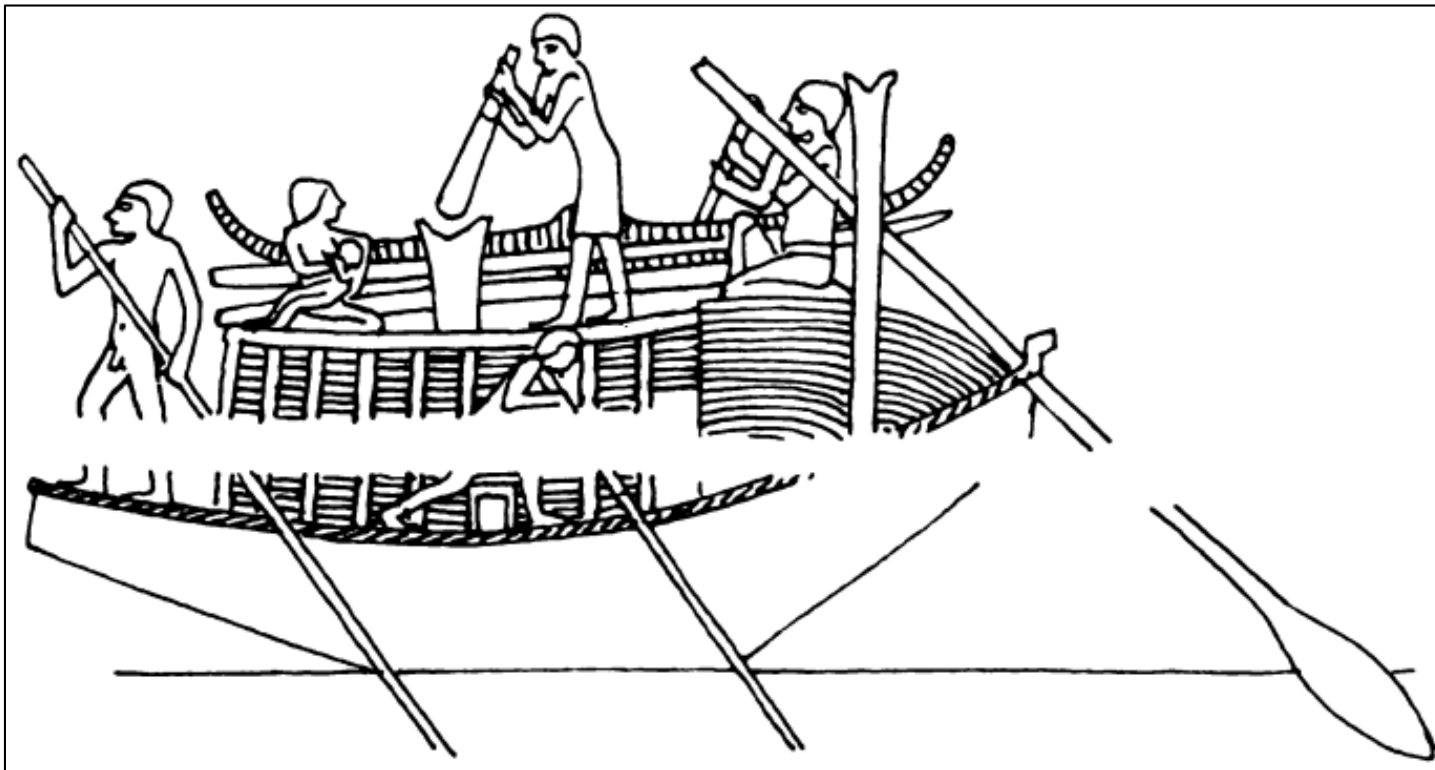


[C.4]

Date: 6<sup>th</sup> Dynasty

Tomb: Ipi

Description: Old Kingdom Small Cargo Ship—Cargo ship with a large crew of five men, from the mastaba of Ipi at Saqqara. Adapted from Landström 1970, 60.

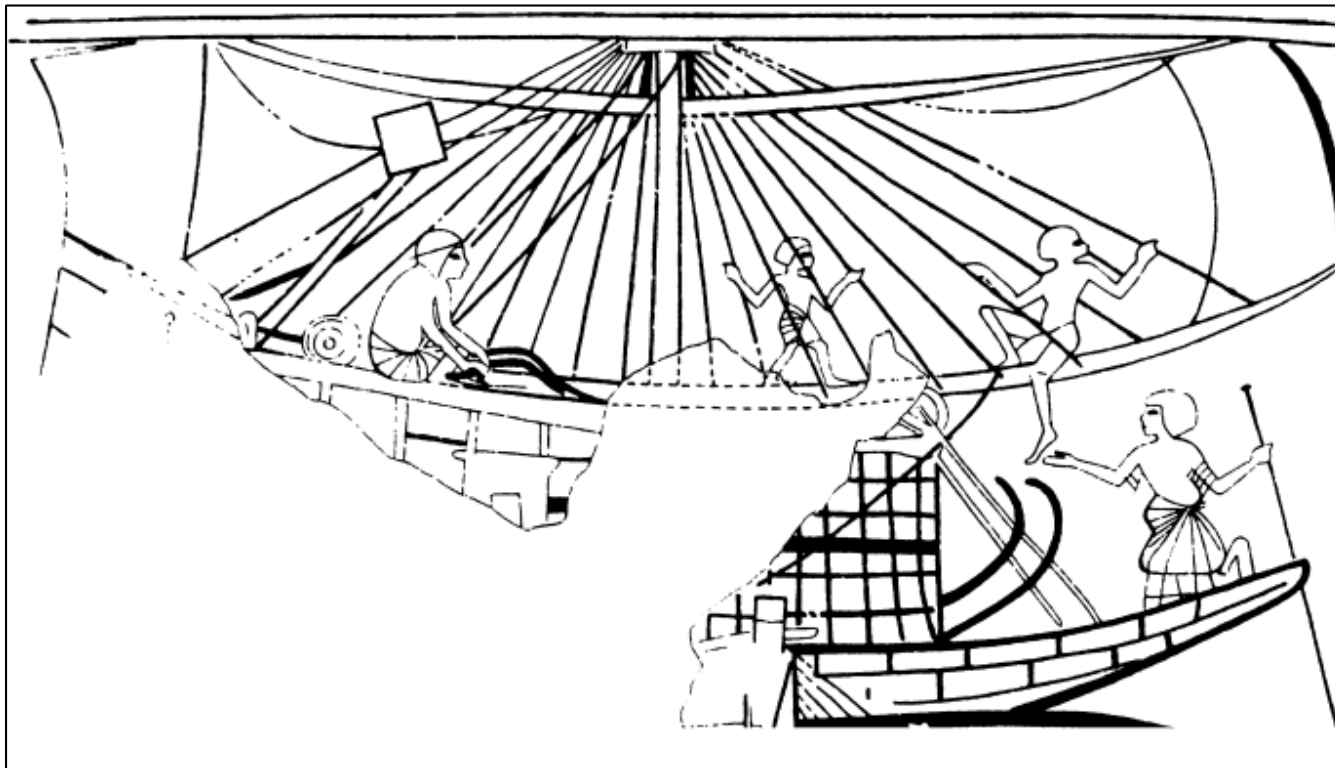


[C.5]

Date: 18<sup>th</sup> Dynsty

Tomb: Nefer-Hotep

Description: Nile Shipping Scene—From the North wall of the inner room of the Tomb of Nefer-Hotep at Thebes. One of two passenger or transport ships. These vessels have been outfitted with a cabin for sleeping passengers, a bed can be seen in the cabin of the second vessel. Adapted from Davies 1973b, pl. 42.



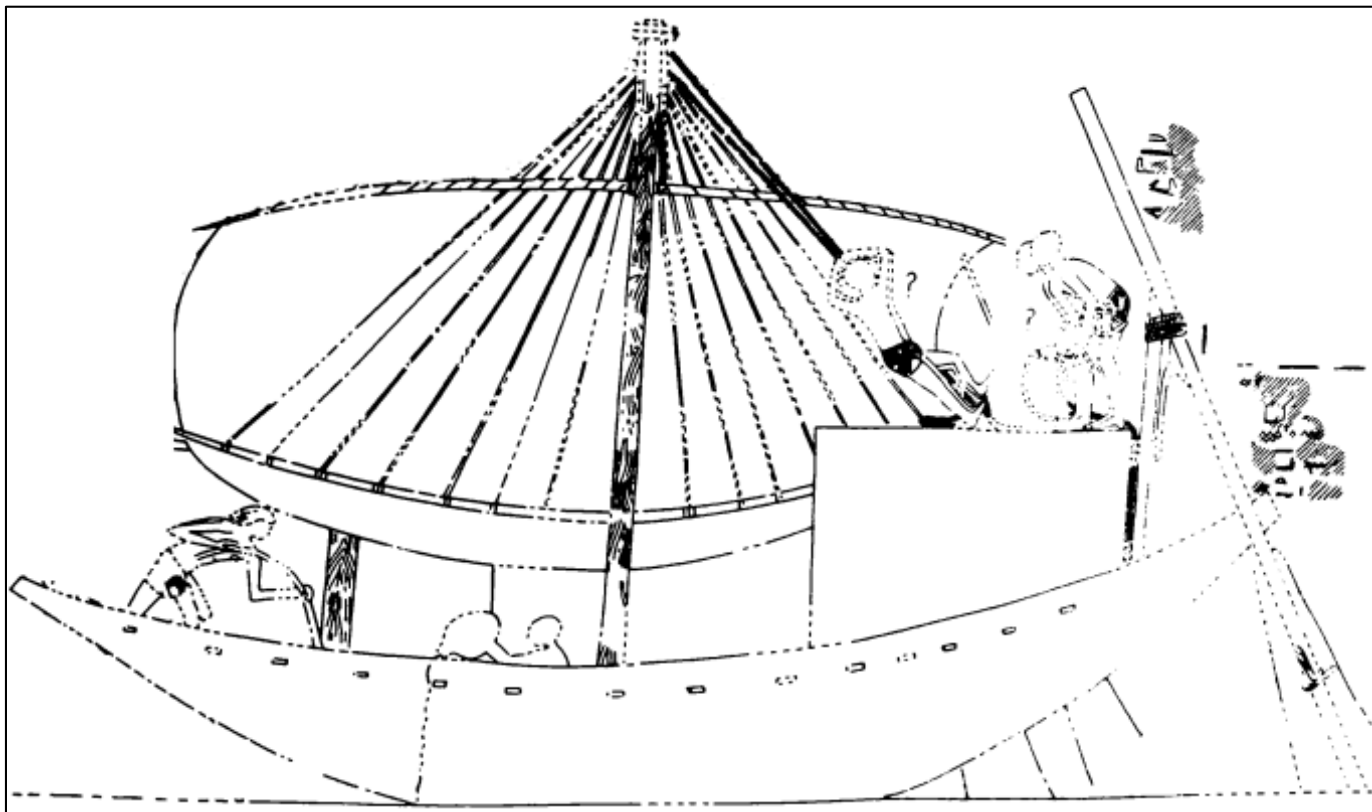


[C.6]

Date: 18<sup>th</sup> Dynasty

Tomb: Rekhmire (TT100)

Description: Transport Ship—From the South wall of the passage, East side lower portion of the tomb of Rekhmire at Thebes. One of three ships arriving with blocks of stone from Karnak. Adapted from Davies 1973 pl. 61.

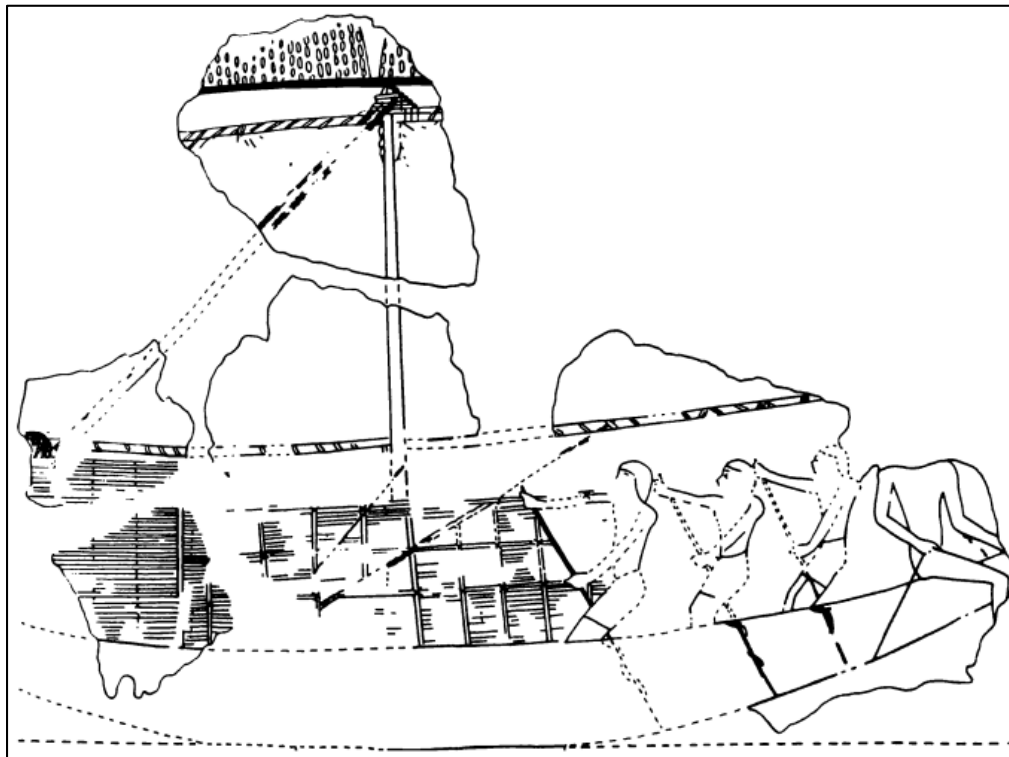


[C.7]

Date: 18<sup>th</sup> Dynasty

Tomb: Antef

Description: A Transport Ship—From the piers of the tomb of the Great Herald Antef at Thebes. Fragments of transport ships, possibly participating in a grain taxation scene heading for the City of Amūn. Adapted from Säve-Söderbergh 1957, pl. 10.

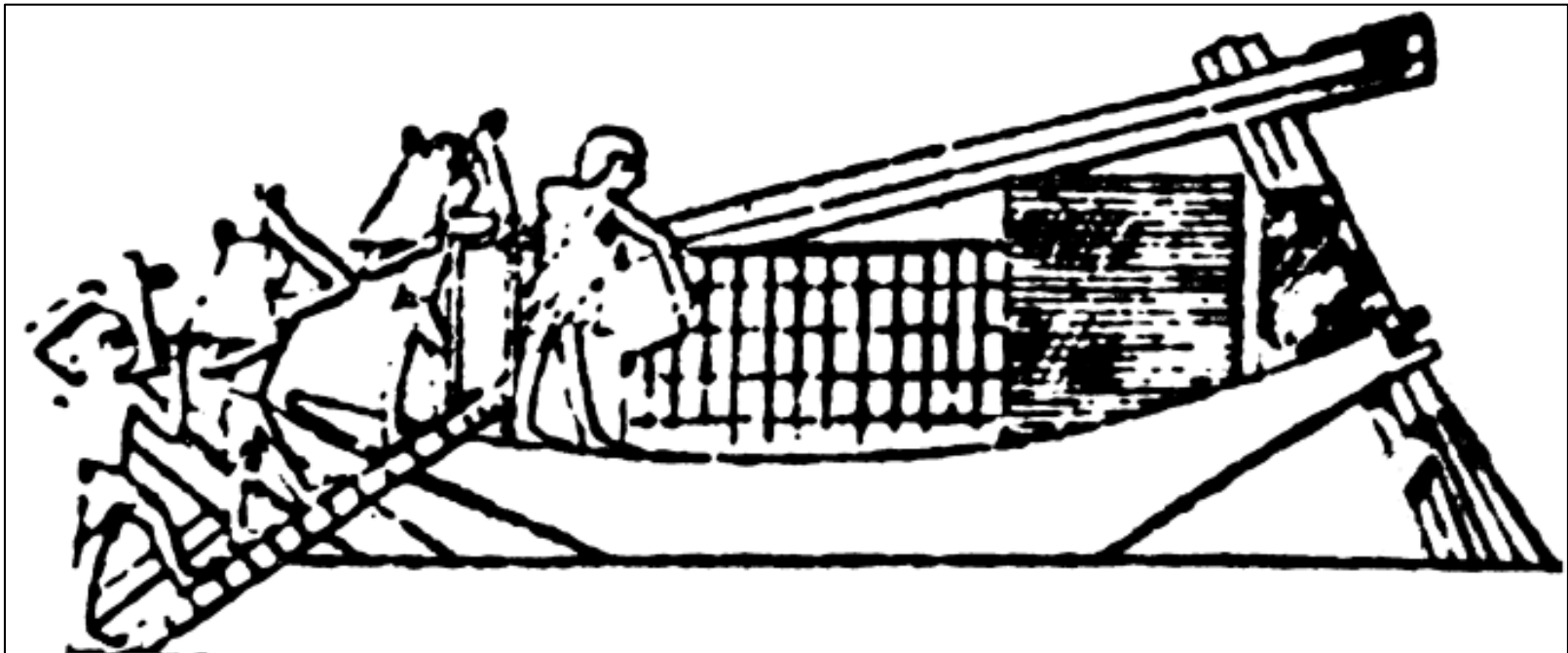


[C.8]

Date: 18<sup>th</sup> Dynsty

Tomb: Paheri

Description: Loading a Grain Ship—From the tomb of Paheri at el-Kab. From a scene of six transport ships, three being loaded and three underway. Adapted from Naville, Lewis, Tylor, & Griffith 1894, pl. 3.

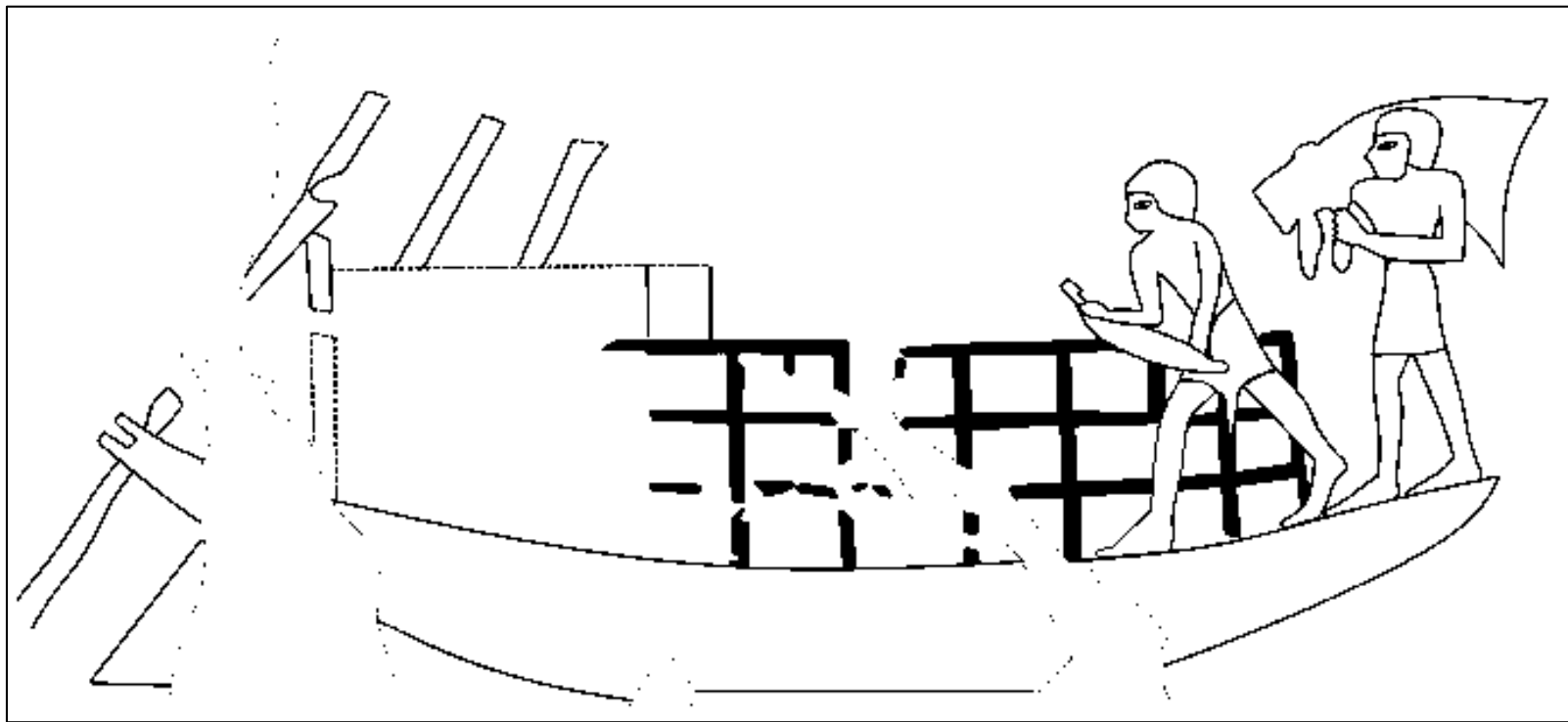


[C.9]

Date: 18<sup>th</sup> Dynsty

Tomb: Fragment from Thebes (TT A4)

Description: TT A4 Grain Barges Louvre N1430—Fragments from a tomb possibly in Thebes. Loading a grain barge.  
Adapted from Manniche 1988, pl. 9.

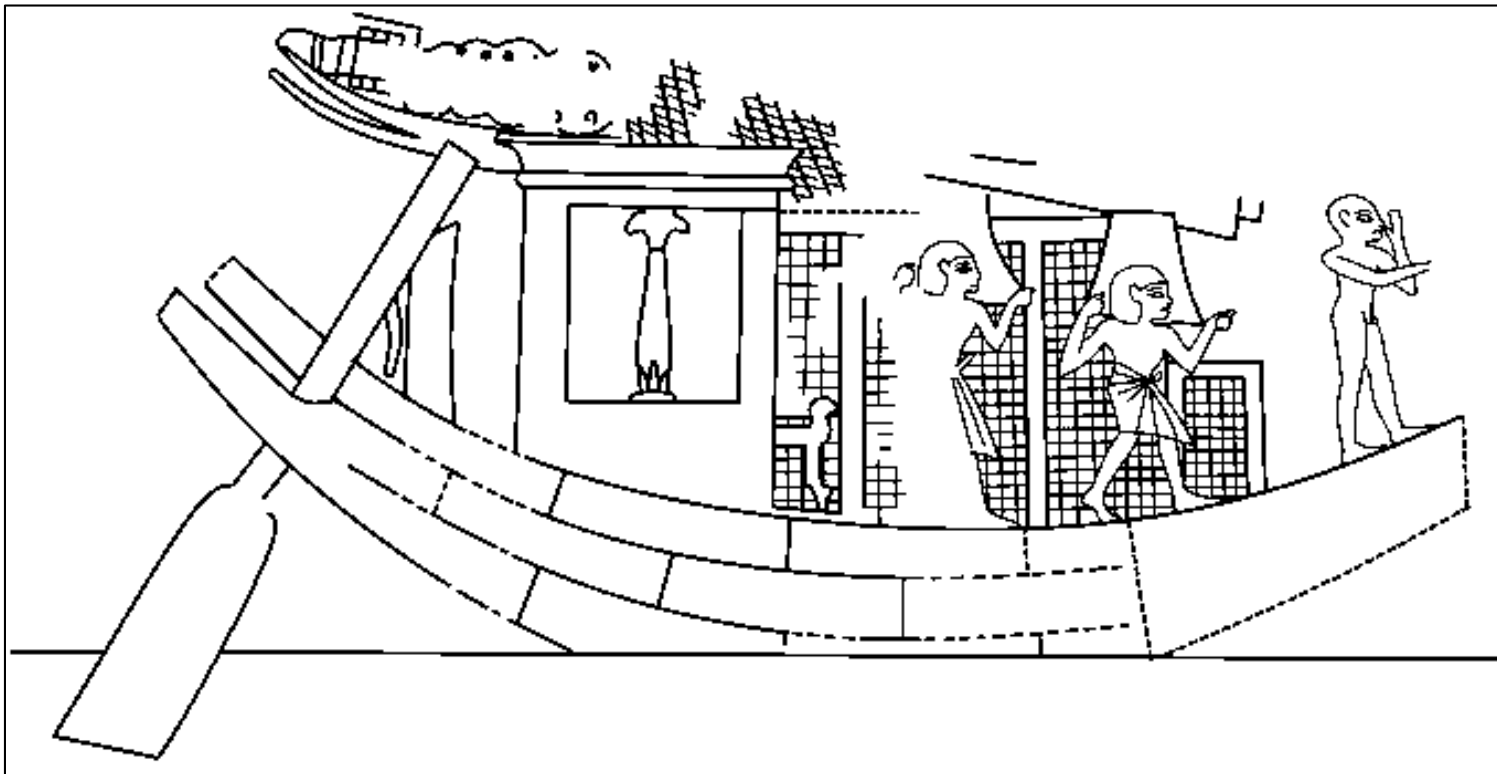


[C.10]

Date: 19<sup>th</sup> Dynasty

Tomb: Ipy

Description: Grain Transport—From the Tomb of Ipy at Thebes. Agricultural scenes on the East wall, including the loading of two transport ships with grain. Each ship has a latticed enclosure for cargo and a small cabin with a bed and a decorated window. Adapted Davies 1927, pl. 30.

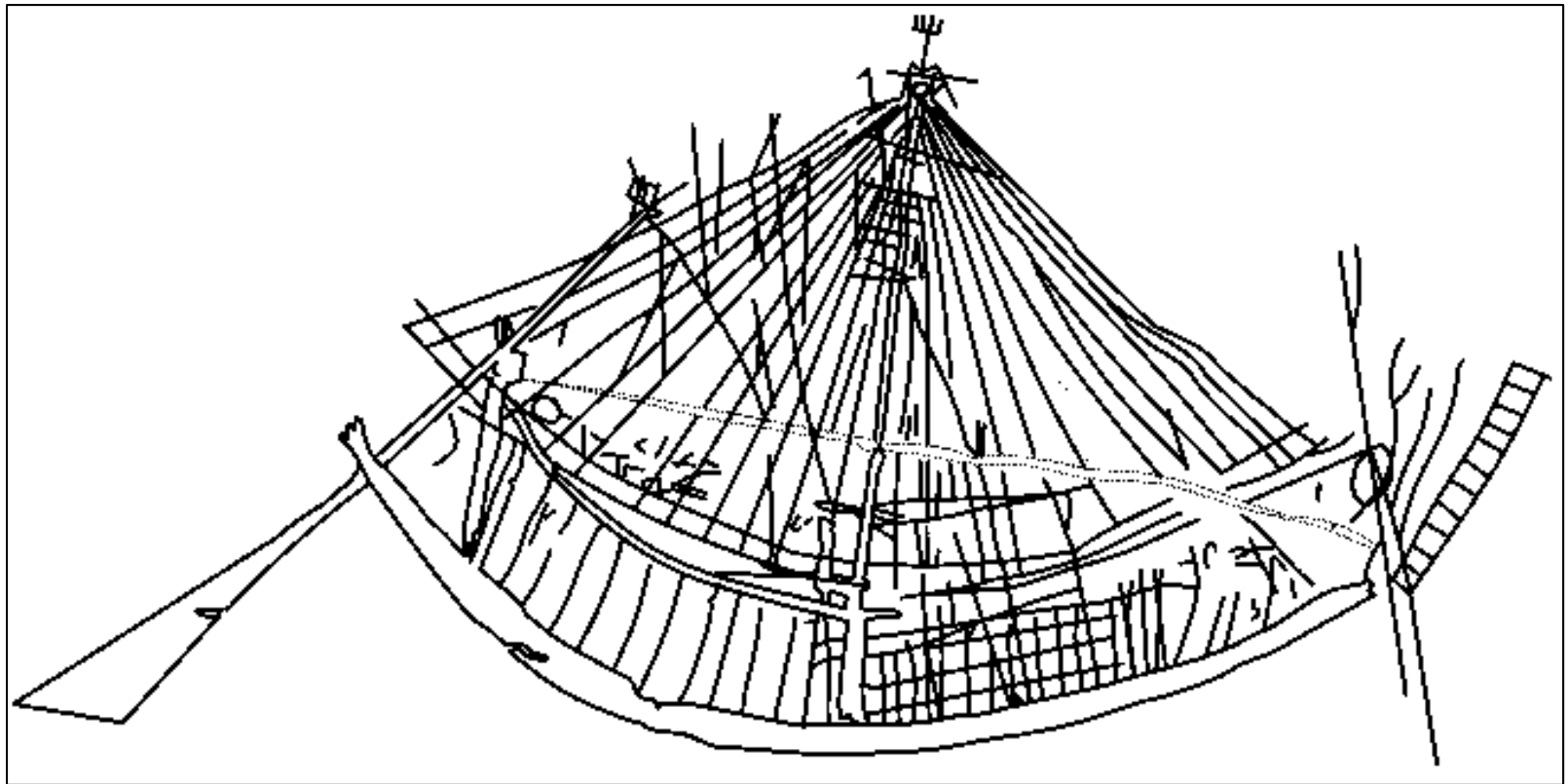


[C.11]

Date: Dynastic

Tomb: n/a

Description: Dynastic Graffito 45 M 535a from Wâdi Barqá—Boat Drawings. Adapted from Winkler 1939, vol.2, pl. 10.

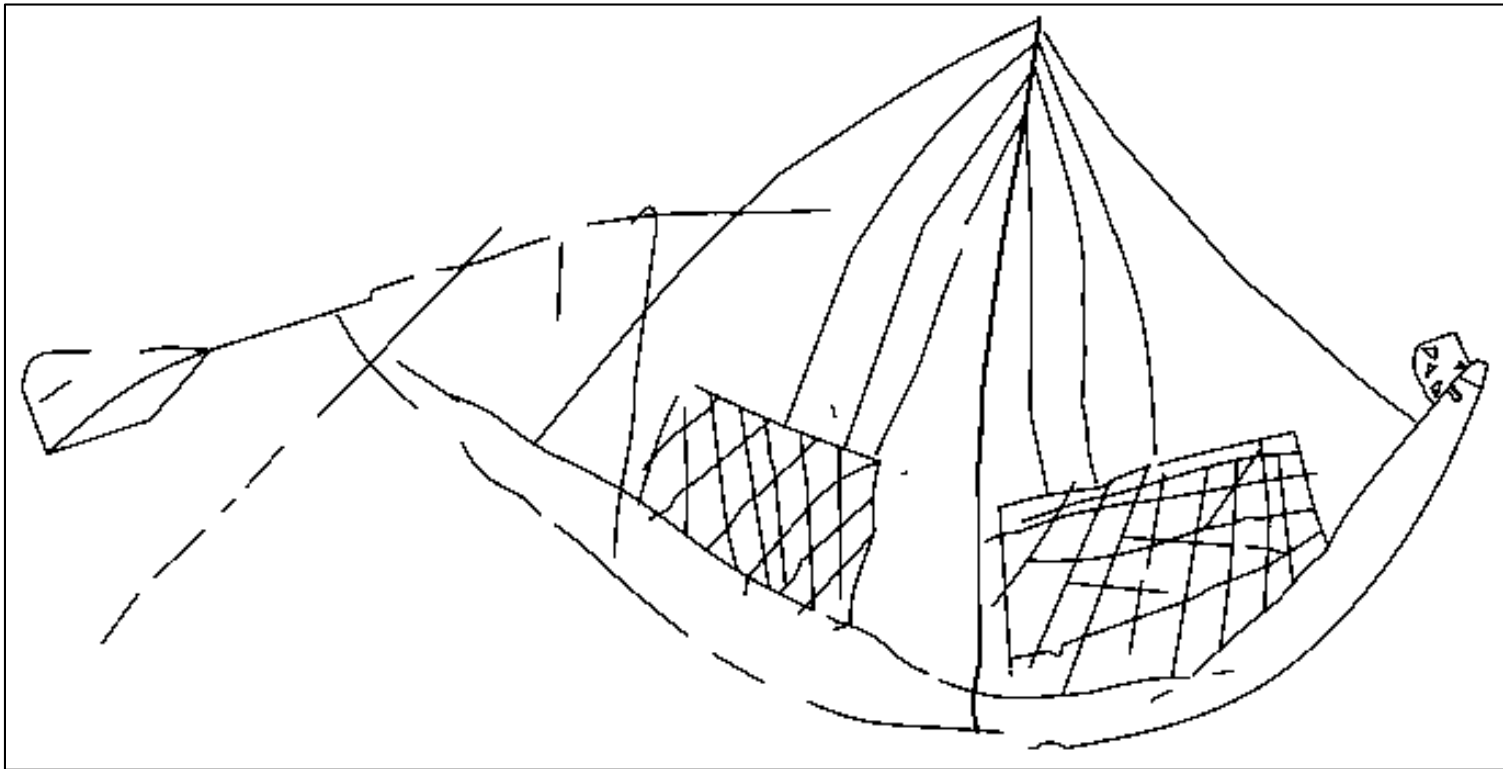


[C.12]

Date: Dynastic

Tomb: n/a

Description: Dynastic Graffito 30 M 365a from the Road Between Armant and Nag'al-Ḥamâdi—Below the ship is a man and a quadruped with horns, possibly a goat or bovine as it has straight horns and not curved like an ibex. They are surrounded by geometric shapes. Adapted from Winkler 1939, vol.1, pl. 9.



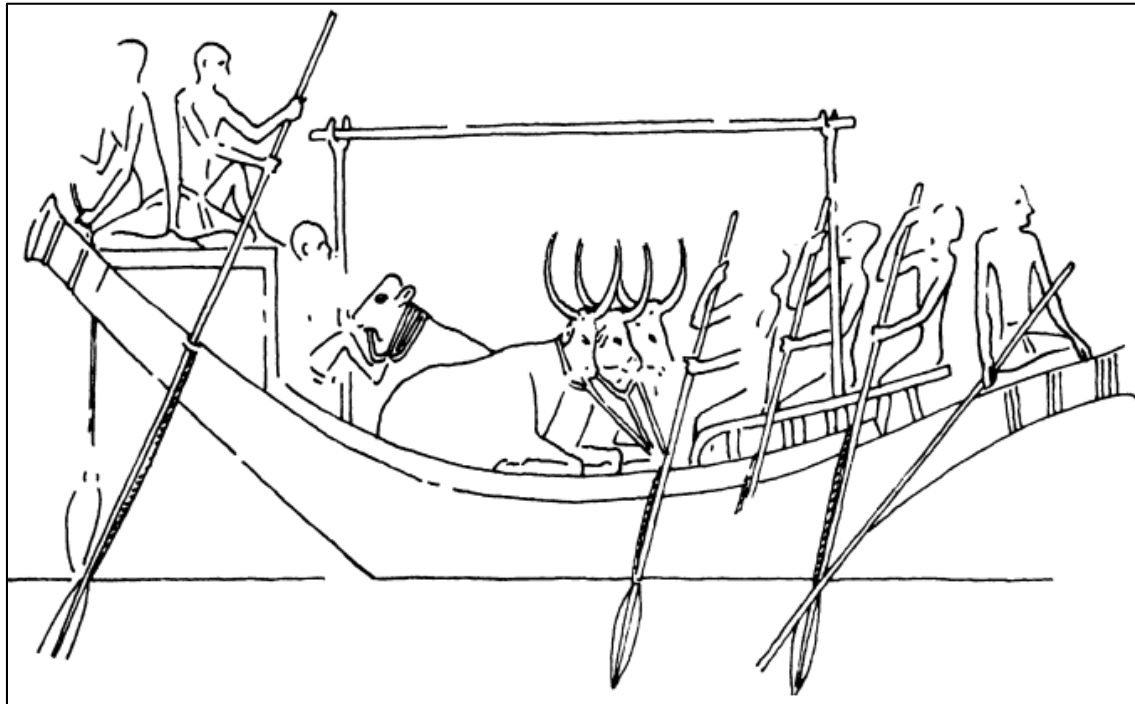
## Vessels Transporting Cattle on Deck

[D.1]

Date: 5<sup>th</sup> Dynasty

Tomb: Akhethotepher

Description: Papyriiform Cargo Vessel—From the Mastaba tomb of Akhethotepher at Saqqara. The transportation of possibly holy cattle on a papyriiform cargo vessel. Adapted from Landström 1970, 56.



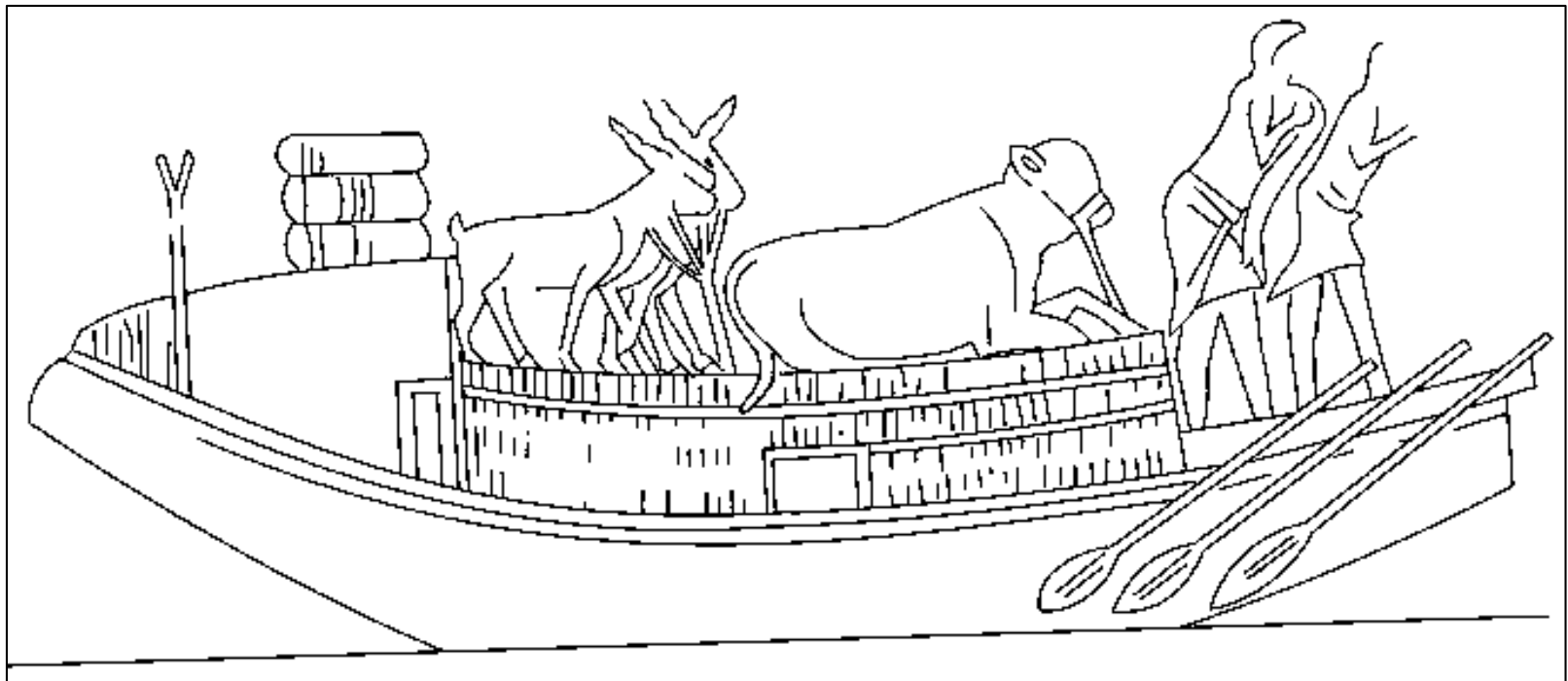


**[D.2a]**

Date: 6<sup>th</sup> Dynasty

Tomb: Kagemni

Description: Livestock Transport—From the Mastaba of Kagemni. Scene of cargo boats transporting grain and livestock. A large steering oar was present in the original scene. Adapted from Firth & Gun 1926, pl.53.

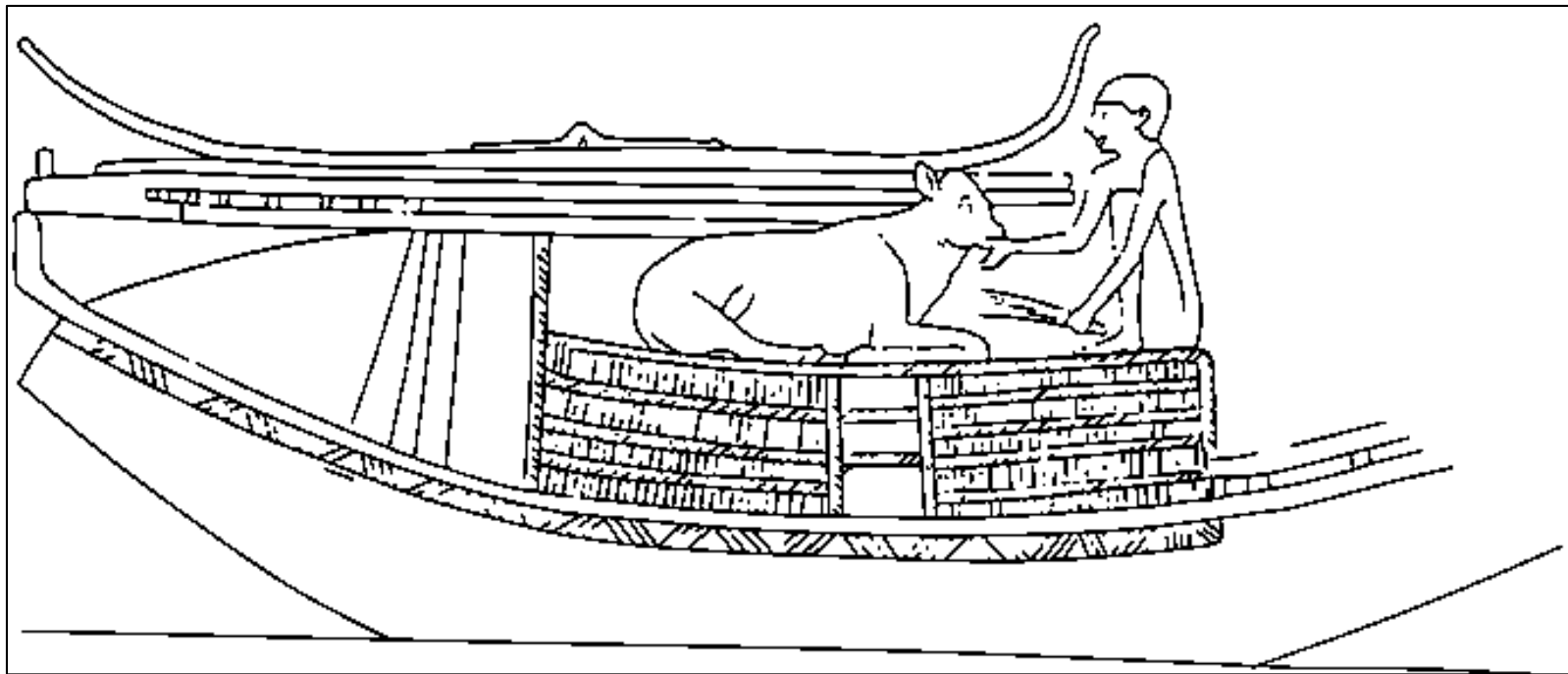


[D.2b]

Date: 6<sup>th</sup> Dynasty

Tomb: Kagemni

Description: Livestock Transport—From the Mastaba of Kagemni at Saqqara. Scene of cargo boats transporting grain and livestock. Adapted from Firth & Gun 1926, pl.53.

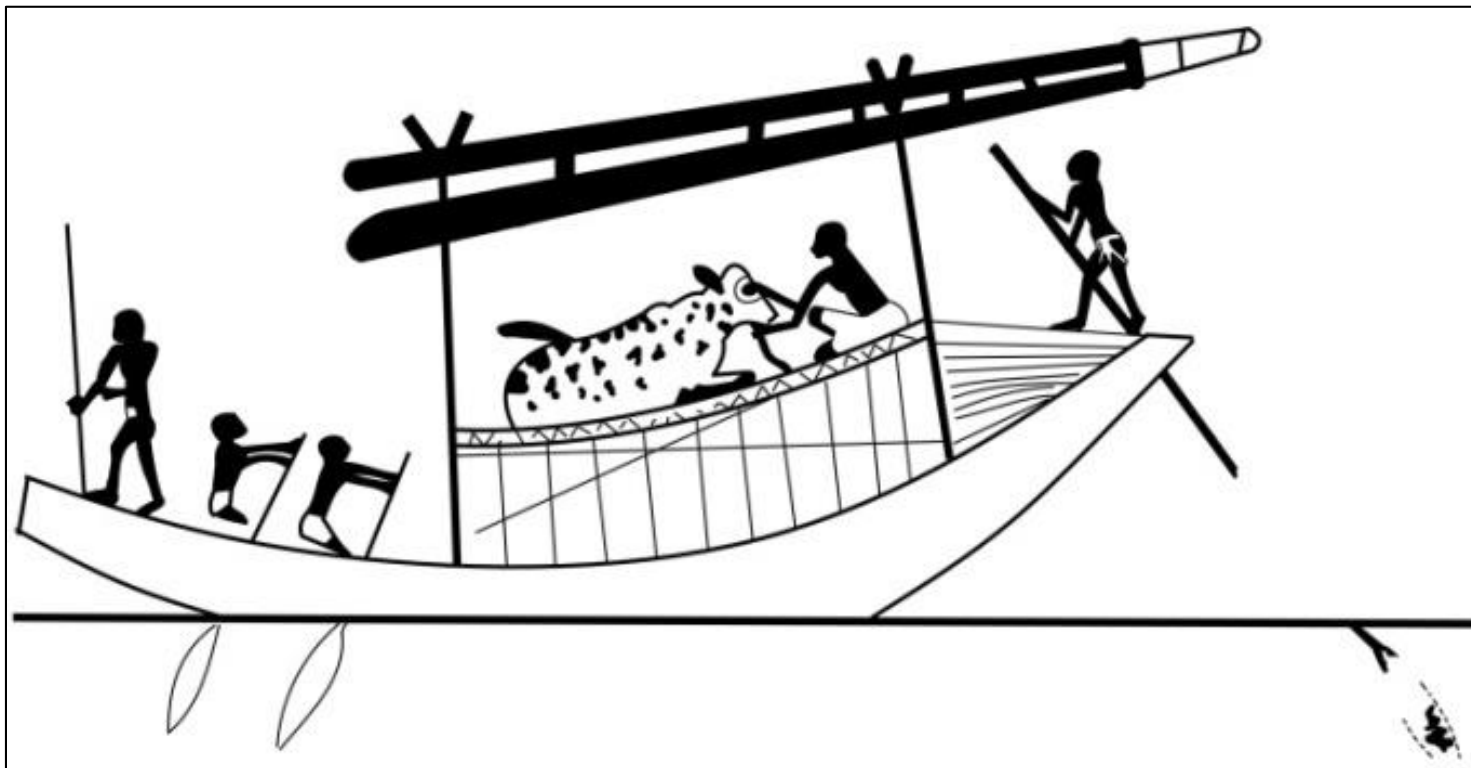


[D.3]

Date: 6<sup>th</sup> Dynasty

Tomb: Kaïemânkh

Description: Cattle Transport—From the tomb of Kaïemânkh at Giza. Cattle transport scene, two ships each with a crew of four to five crew members transport a single bovine on top of a deck structure, likely the enclosure was for the animals and their depiction on top is an artistic convention to display the enclosure's contents. Adapted from Davies 1936, pl. 3.

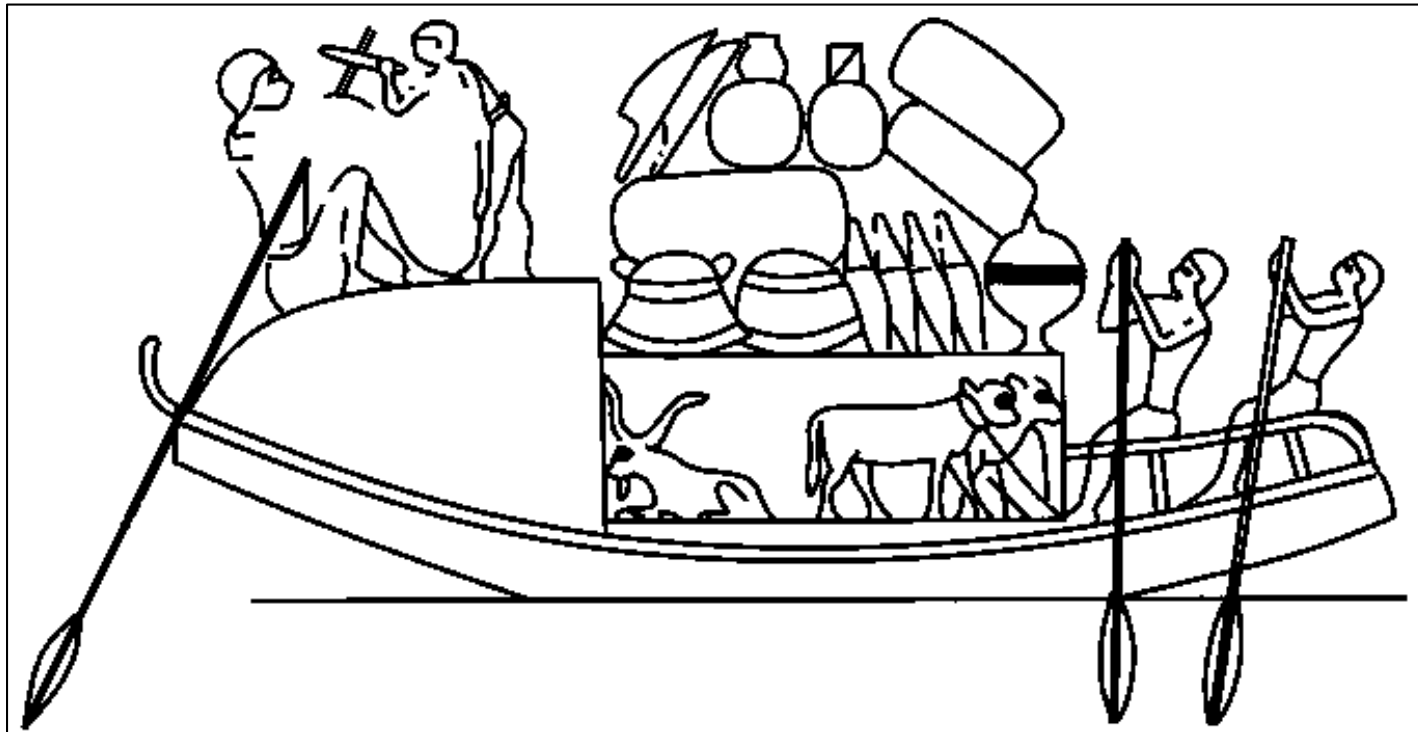


[D.4a]

Date: 5<sup>th</sup> Dynasty

Tomb: Ptahhotep I

Description: Transport ship with livestock—From the tomb of Ptahhotep at Saqqara. Part of a scene of six general cargo ships moving goods on the Nile, five of these ships have tethered livestock on deck. Adapted from Vandier, vol.5, Figure 296.

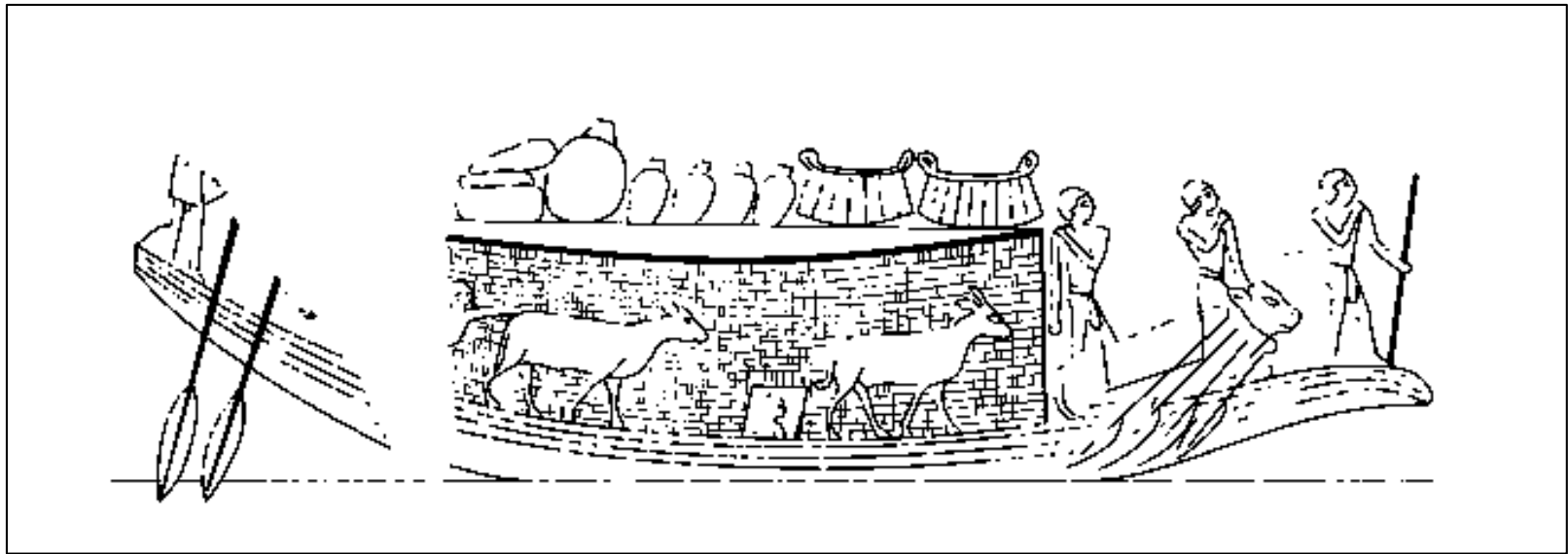


[D.4b]

Date: 5<sup>th</sup> Dynasty

Tomb: Ptahhotep I

Description: Transport Ship with Livestock—From a scene with five general cargo ships one with livestock, from the tomb of Ptahotep I at Saqqara. Adapted from Vandier 1969, v.5, fig. 298.

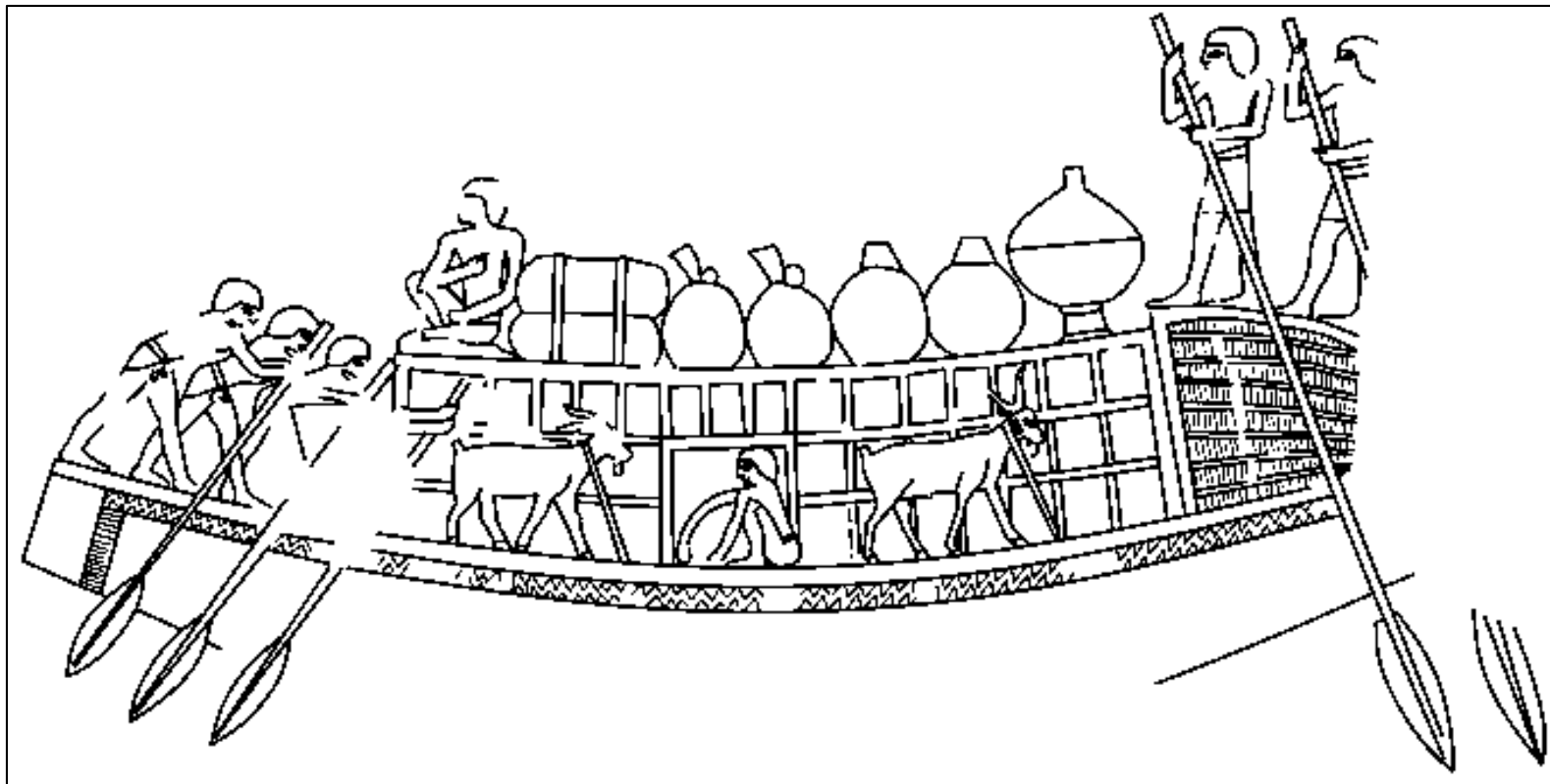


[D.5]

Date: 5<sup>th</sup> Dynasty

Tomb: Ptahshepses

Description: Cargo Ships with Livestock—From the tomb of Ptahshepses at Abusir. Adapted from McFarlane & Mourad 2012, Figure 9.8.

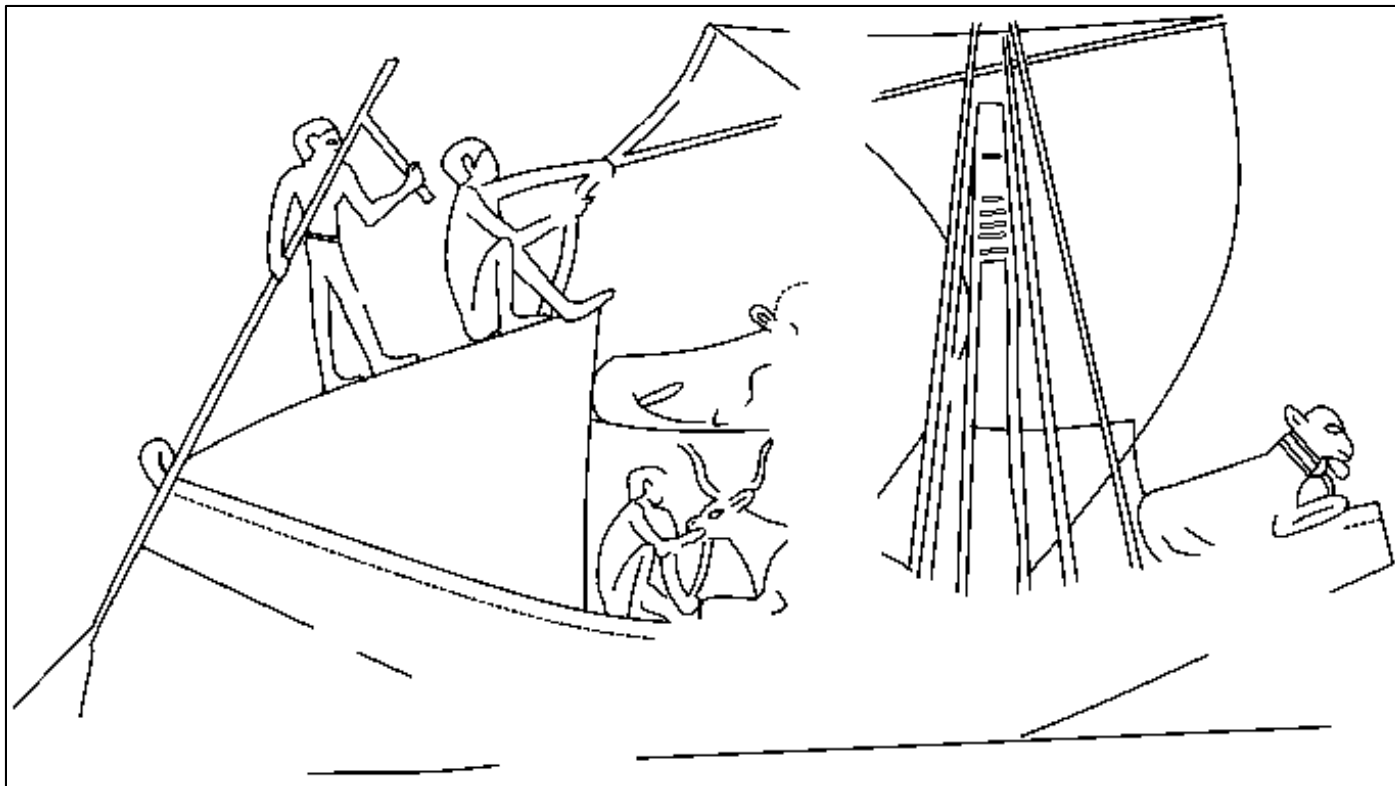


**[D.6]**

Date: 6<sup>th</sup> Dynasty

Tomb: Mehu

Description: Small Transport Boat—From the tomb of Mehu at Saqqara. A cargo boat sailing on the Nile with three head of cattle. Crew consists of two sailors and one cattle tender. Adapted from Mcfarlane & Mourad 2012, pl. 107.

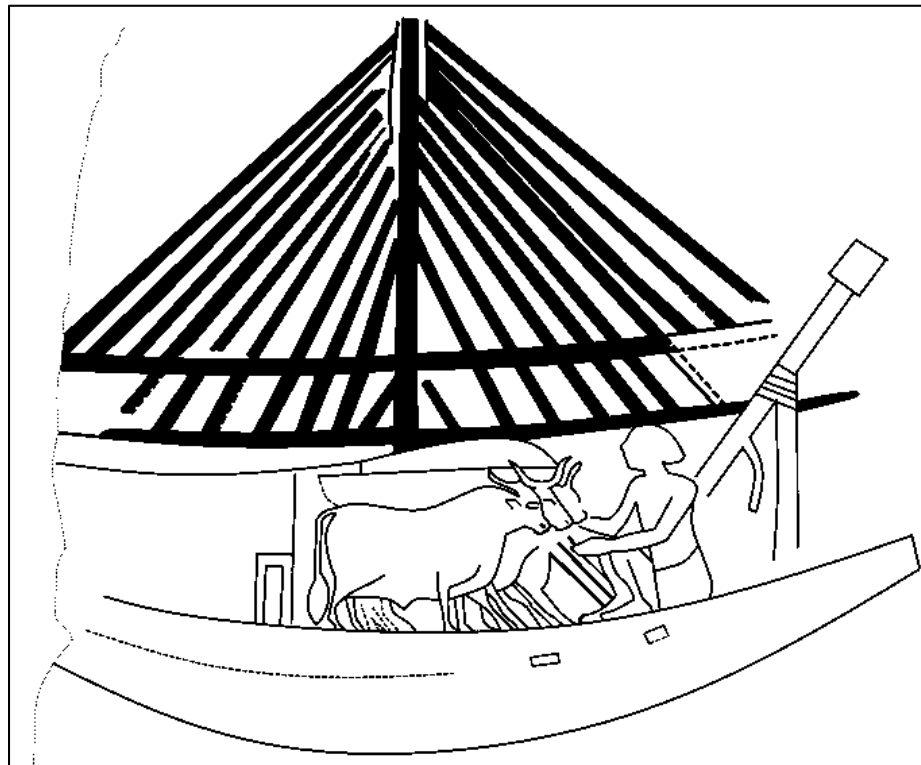


[D.7]

Date: 18<sup>th</sup> Dynasty

Tomb: Meryneith

Description: Nile Shipping Scenes—Possibly from the tomb of Meryneith at Saqqara. Two cargo ships are in the top of the scene both with tethered cattle; two lower vessels have what may be cattle pens on deck. The ship hulls have remnants of red pigment. Adapted from Bormann et al 2013, Figure 40.





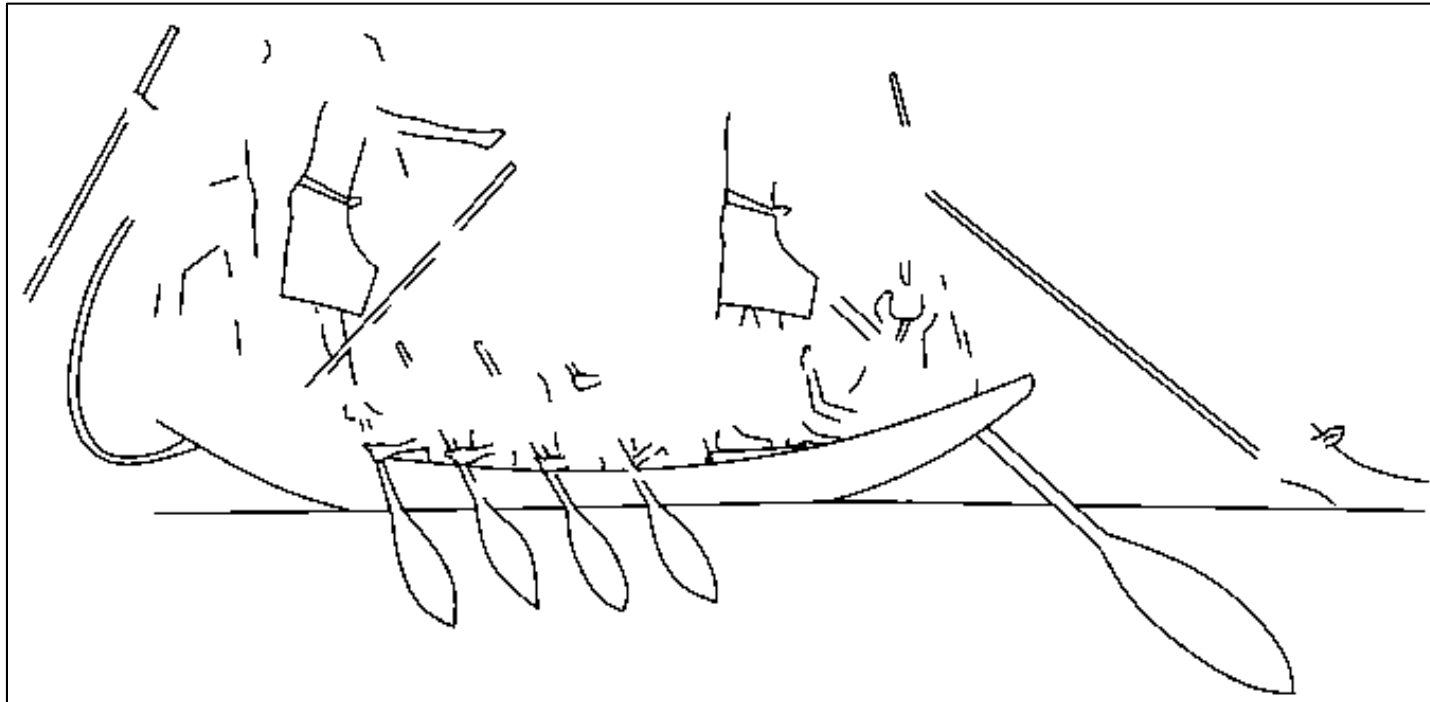
## Miscellany and Outliers

[E.1]

Date: 5<sup>th</sup> Dynasty

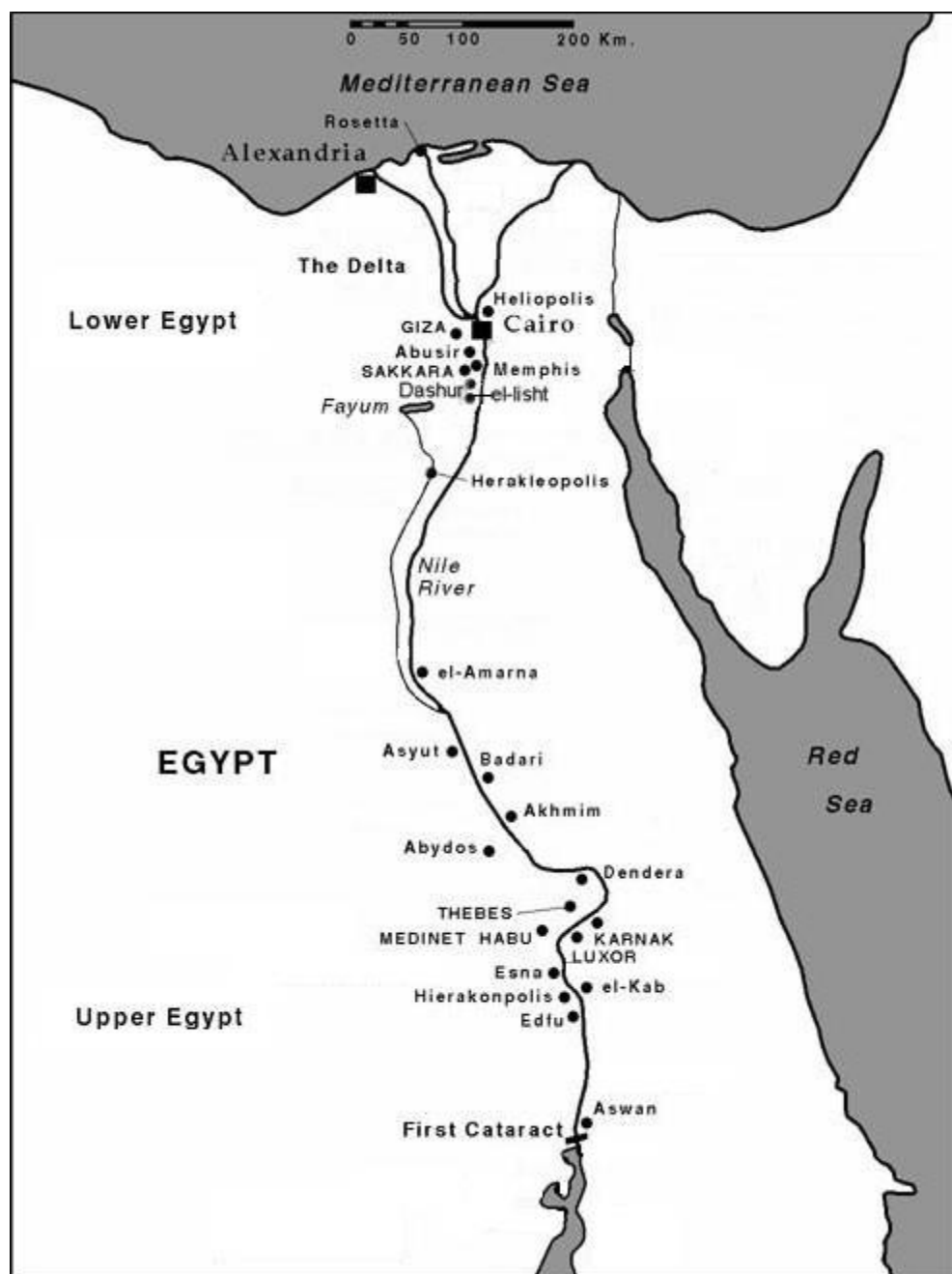
Tomb: Shedu

Description: Small Vessel Used to Ford Cattle—From the East wall of the tomb of Shedu at Deshasheh. Three men in a small possibly wooden-planked boat, lead a herd of cattle across the river. Adapted from Petrie 1898, pl. 15.



## APPENDIX B

### MAP OF LOCATIONS DISCUSSED & CHRONOLOGY



**Figure 1.** Map of ancient Egyptian sites. Adapted from Oriental Institute, University of Chicago 1988, edited by Sven Moons 2006-2012.

## CHRONOLOGY

Adapted from Shaw, I. 2000. *The Oxford History of Ancient Egypt*, pp.585-601.

<b>Predynastic Period</b>	<b>c.5300-3000 BCE</b>
<b>Early Dynastic Period</b>	<b>c.3000-2686 BCE</b>
<i>1<sup>st</sup> Dynasty</i>	<i>c.3000-2890</i>
Aha, Djer, Djet, Den, Queen Merneith	
<i>2<sup>nd</sup> Dynasty</i>	<i>c.2890-2686</i>
Hetepsekhemwy, Raneb, Nynetjer, Weneg, Sened, Peribsen, Khasekhemwy	
<b>Old Kingdom</b>	<b>2686-2160 BCE</b>
<i>3<sup>rd</sup> Dynasty</i>	<i>2686-2631</i>
Nebka (2686-2667)	
Djoser (2667-2648)	
Sekhemkhet (2648-2640)	
Khaba (2640-2637)	
Sanakht?	
Huni (2637-2613)	
<i>4<sup>th</sup> Dynasty</i>	<i>2613-2494</i>
Sneferu (2613)	
Khufu/Cheops (2589-2566)	
Djedefra (2566-2558)	
Khafrā/Chephren (2558-2532)	
Menkaura (2532-2503)	
Shepseskaf (2503-2498)	
<i>5<sup>th</sup> Dynasty</i>	<i>2494-2345</i>
Userkaf (2494-2487)	
Sahura (2487-2475)	
Neferirkara (2475-2455)	
Shepseskara (2455-2448)	
Raneferef (2448-2445)	
Nyuserra (2445-2421)	
Menkauhor (2421-2414)	
Djedkara (2414-2375)	
Unas (2375-2345)	

<i>6<sup>th</sup> Dynasty</i>	<i>2345-2181</i>
Teti (2345-2323)	
Userkara (2323-2321)	
Pepy I (2321-2287)	
<i>6<sup>th</sup> Dynasty continued</i>	<i>2345-2181</i>
Merenra (2287-2278)	
Pepy II (2278-2184)	
Nitiqret (2184-2181)	
<i>7<sup>th</sup> &amp; 8<sup>th</sup> Dynasties</i>	<i>2181-2160</i>
Numerous, referred to as Neferkara	
<b>1<sup>st</sup> Intermediate Period</b>	<b>2160-2055 BCE</b>
<i>9<sup>th</sup> &amp; 10<sup>th</sup> Dynasties</i>	<i>2160-2125</i>
Khety/Meryibra, Khety/Nebkaura, Khety/Wahkara, Merykara	
<i>11<sup>th</sup> Dynasty (Thebes)</i>	<i>2125-2055</i>
Mentuhotep I, Inef I (2125-2112)	
Intef II (2112-2063)	
Intef III (2063-2055)	
<b>Middle Kingdom</b>	<b>2055-1650 BCE</b>
<i>11<sup>th</sup> Dynasty</i>	<i>2055-1985</i>
Mentuhotep II (2055-2004)	
Mentuhotep III (2004-1992)	
Mentuhotep IV (1992-1985)	
<i>12<sup>th</sup> Dynasty</i>	<i>1985-1773</i>
Amenemhat I (1985-1956)	
Sensuret I (1956-1911)	
Amenemhat II (1911-1877)	
Sensuret II (1877-1870)	
Sensuret III (1870-1831)	
Amenemhat III (1831-1786)	
Amenemhat IV (1786-1777)	
Queen Sobekneferu /Sobekkara (1777-1773)	
<i>13<sup>th</sup> Dynasty</i>	<i>1773-c.1650</i>
Wegaf, Sobekhotep II, Iykhernefert Neferhotep, Amen- inhef-amenemhat, Hor, Khendjer/Userkara, Sobekhotep III, Neferhotep I/Khasekhemra, Sahathor, Sobekhotep IV, Sobekhotep V, Ay/Merneferria	
<i>14<sup>th</sup> Dynasty</i>	<i>1773-1650</i>
Minor rulers	

<b>Second Intermediate Period</b>	<b>1650-1550 BCE</b>
<i>15<sup>th</sup> Dynasty (Hyksos)</i>	<i>1650-1550</i>

<i>16<sup>th</sup> Dynasty (Theban)</i>	<i>1650-1580</i>
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<i>17<sup>th</sup> Dynasty</i>	<i>c.1580-1550</i>
Rahotep, Sobekemsaf I, Intef VI, Intef VII, Intef VIII, Sobekemsaf II, Siamun (?) Taa (c.1560) Kamose (1555-1550)	

<b>New Kingdom</b>	<b>1550-1069 BCE</b>
<i>18<sup>th</sup> Dynasty</i>	<i>1550-1295</i>

Ahmosé (1550-1525)  
Amenhotep I (1525-1504)  
Thutmose I (1504-1492)  
Thutmose II (1492-1479)  
Thutmose III (1479-1425)  
Queen Hatshepsut (1473-1458)  
Amenhotep II (1427-1400)  
Thutmose IV (1400-1390)  
Amenhotep III (1390-1352)  
Amenhotep IV/Akhenaten (1352-1336)  
Nefertiti (1338-1336)  
Tutankhamun (1336-1327)  
Ay (1327-1323)  
Horemheb (1323-1295)

<b>Ramessid Period</b>	<b>1294-1069 BCE</b>
<i>19<sup>th</sup> Dynasty</i>	<i>1295-1186</i>

Rameses I (1295-1186)  
Seti I (1295-1294)  
Rameses II (1279-1213)  
Merenptah (1213-1203)  
Amenmessu (1203-c.1200)  
Seti II (1200-1194)  
Siptah (1194-1188)  
Queen Tausret (1188-1186)

<i>20<sup>th</sup> Dynasty</i>	<i>1186-1069</i>
Sethnakht (1186-1184) Rameses III (1184-1153) Rameses IV (1153-1147) Rameses V (1147-1143)	

<i>20<sup>th</sup> Dynasty continued</i>	<i>1186-1069</i>
Rameses VI (1143-1136)	
Rameses VII (1136-1129)	
Rameses VIII (1129-1126)	
Rameses IX (1126-1108)	
Rameses X (1108-1099)	
Rameses XI (1099-1069)	
<b>Third Intermediate Period</b>	<b>1069-664</b>
<i>21<sup>st</sup> Dynasty</i>	<i>1069-945</i>
<i>22<sup>nd</sup> Dynasty</i>	<i>945-715</i>
<i>23<sup>rd</sup> Dynasty</i>	<i>818-715</i>
<i>24<sup>th</sup> Dynasty</i>	<i>727-715</i>
<i>25<sup>th</sup> Dynasty</i>	<i>747-656</i>