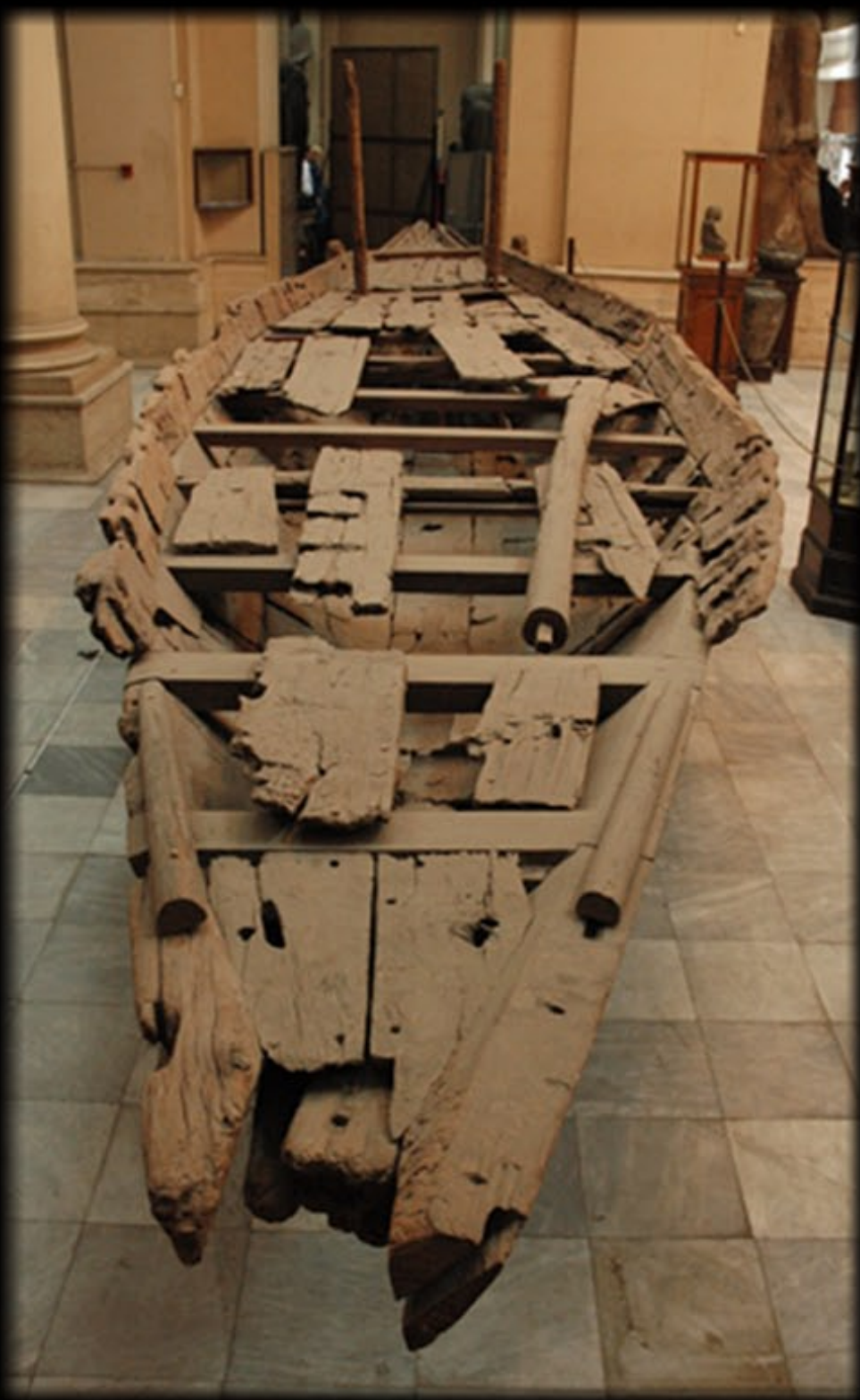


# DOVETAILS OR LASHINGS IN MIDDLE KINGDOM SHIP CONSTRUCTION?

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## Case Study: 4,000 Year-old Boats from Ancient Egypt

In AD 1894, while excavating the pyramid complex of Senwosret III, archaeologist Jacques de Morgan unearthed the world's oldest collection of contemporaneous boats available for study. Senwosret III ruled Egypt from 1870-1831 BC. The most powerful ruler of the Twelfth Dynasty, and one of the most revered from ancient Egypt, he led his people through a renaissance. The inclusion of boats in the burial arrangements of such a powerful king underscores the importance of watercraft in their culture.

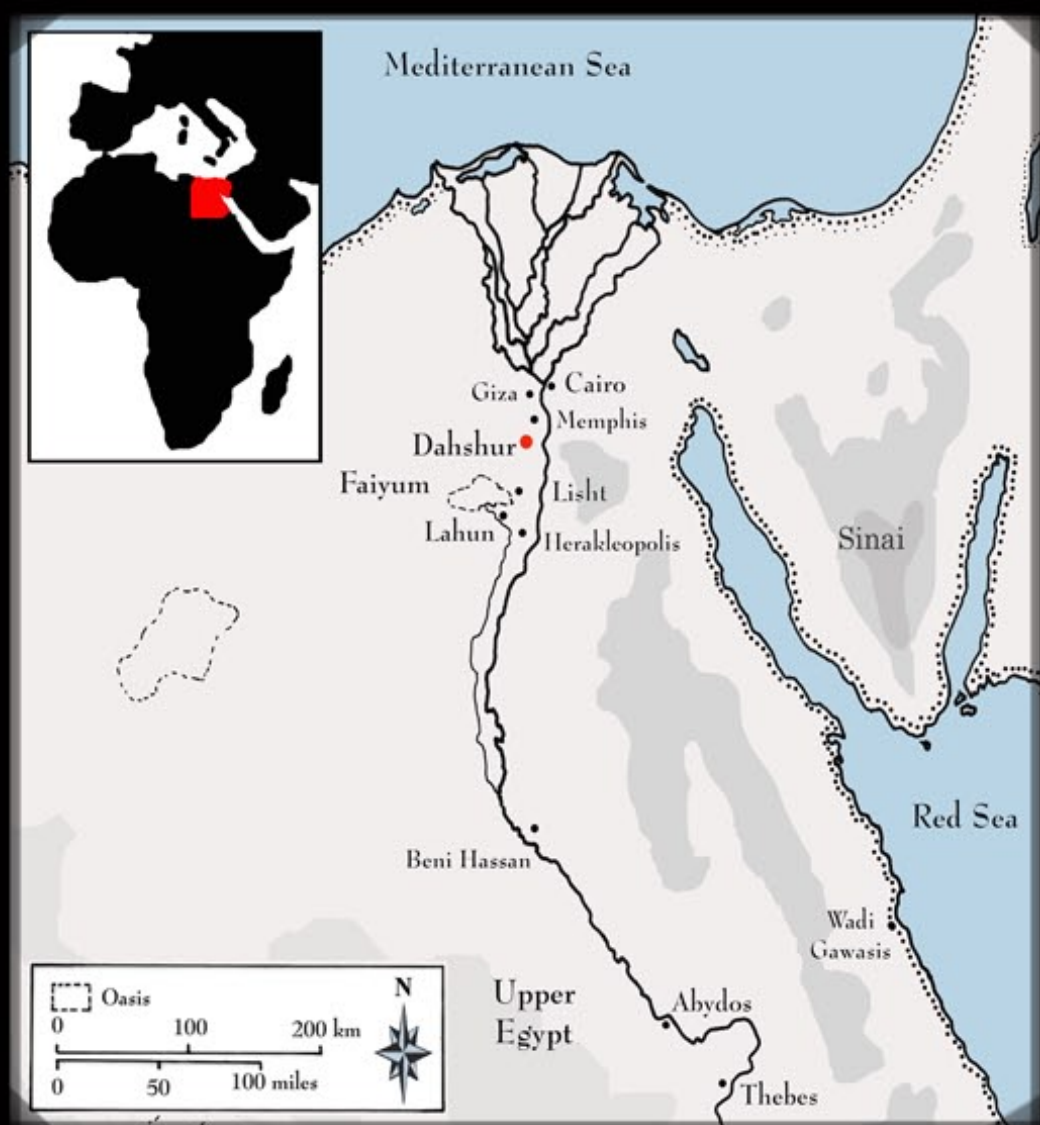
Today, four out of five of the collection can be located; two are in the United States, one in the Carnegie Museum of Natural History in Pittsburgh and one in the Field Museum of Natural History in Chicago, and the remaining two are on display in The Egyptian Museum, Cairo. The comparison of these boats provides a unique opportunity in archaeology.

Since their excavation the boats in Cairo have remained relatively inconspicuous and largely unpublished. Here, I present a summary of the interpretations from my thesis (The Cairo Dahshur Boats, 2005) and discuss suggestions for further research. I employed personal recording of the Cairo Dahshur boats to reveal the unique characteristics of the hulls and to better understand the philosophy employed by those who built the boats.



## The Pharaoh

The pharaoh Senwosret III, later known to the Greeks as the deity *Se-nusert*, reigned for thirty-nine years, 1870 to 1831 BC. This was the golden age of the Middle Kingdom. As pharaoh he led his people to great military victories that re-conquered the Upper Nile. Under his guidance Egypt expanded its borders farther than ever before.

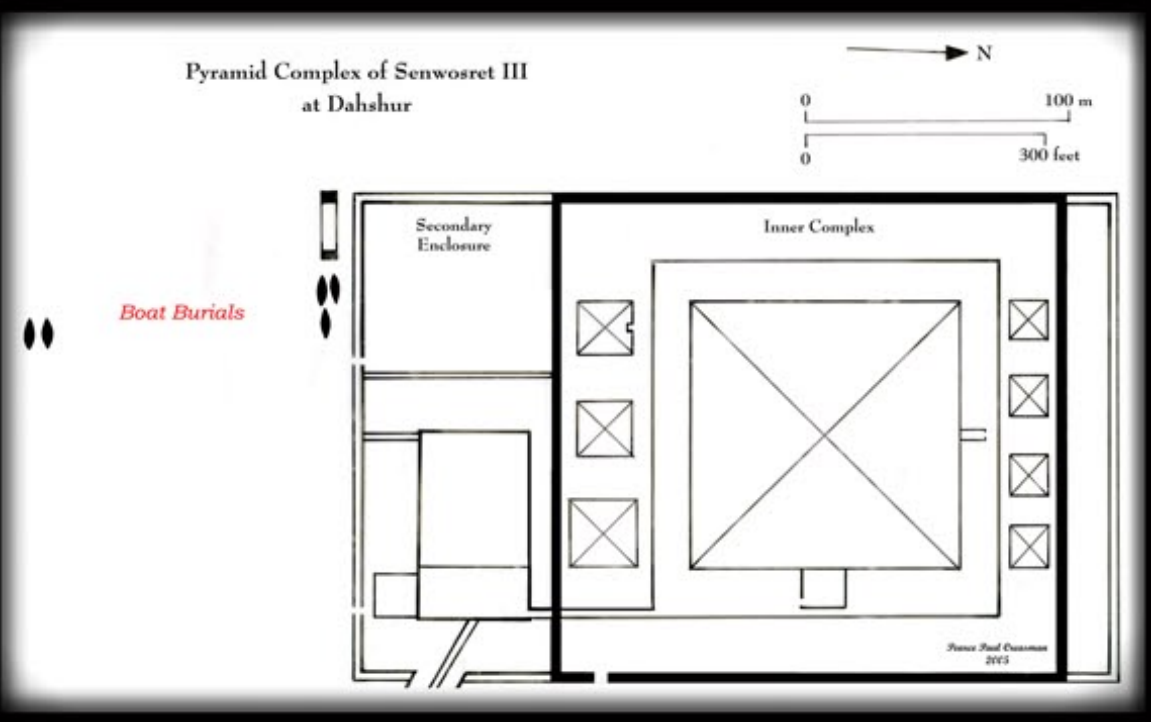


Unfortunately, Senwosret's pyramid at Dahshur was a target for looting and grave robbing over the millennia. Yet, the excavations in AD 1894 revealed great finds, including five small boats: transportation for the afterlife.

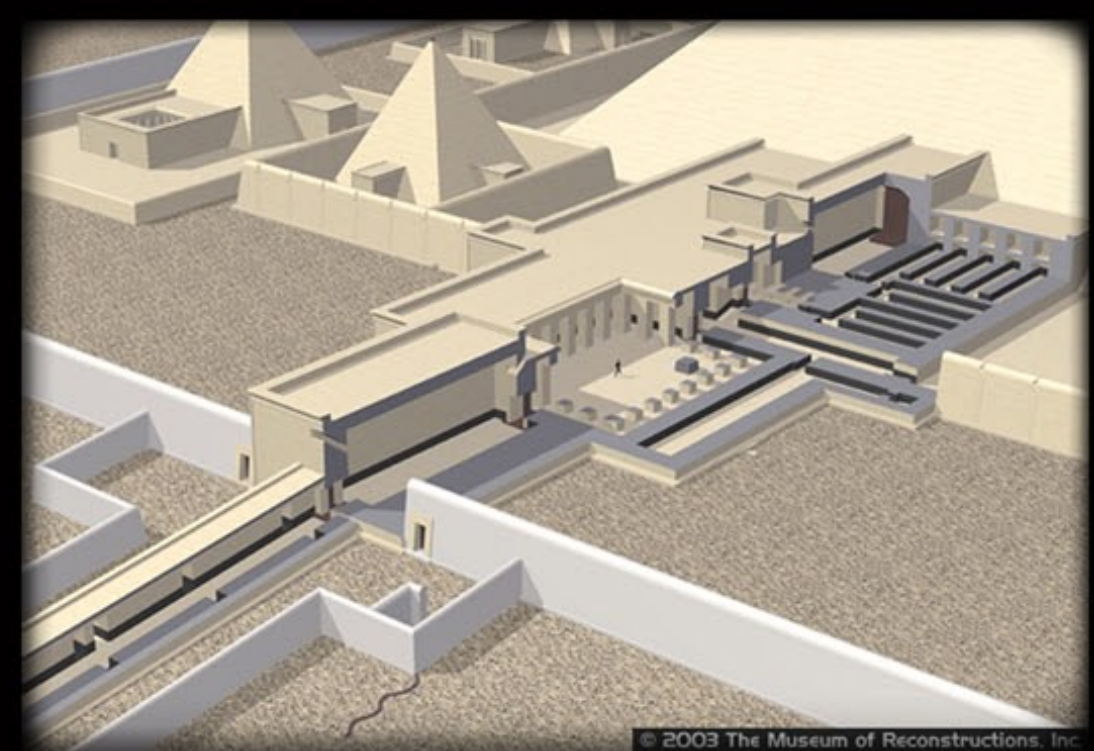
This project would not have been possible without the support of the director of the Egyptian Museum Dr. Wafaa El Saddik, Middle Kingdom artifact curator Mdm. Salwa, head of restorations Dr. Abla, sub-directors Mr. Magdy and Mdm. Nariman, assistant curator Waheed E dwar and Egypt's Supreme Council on Antiquities. The contributions of RPM Nautical Foundation, Institute of Nautical Archaeology, L.T. Jordan Institute for International Awareness, Melbern G. Glasscock Center for Humanities Research, and Dr. Donny L. Hamilton made this project possible.

## The Excavation

In 1894-1895 J.J de Morgan, Director-General of Antiquities in Egypt, excavated Senwosret III's pyramid complex at Dahshur.



The complex yielded one of the most valuable treasure hoards ever found in Egypt, including several caches of jewels and golden grave goods.



De Morgan's publication of the excavations, (*Fouilles à Dâhchour*, 1895) came at a time when archaeology was still developing as a science.

In the report de Morgan mapped the boats and noted that he sent two to the museum in Cairo, where the boats remain on display as they have for over 100 years.



## Recording & Research



In December 2003, I wrote to the Director of the Cairo Museum and requested permission to record the boats in their care.



A short time later I received a favorable response, but even on short notice several organizations found ways to support this incredible opportunity the following May.

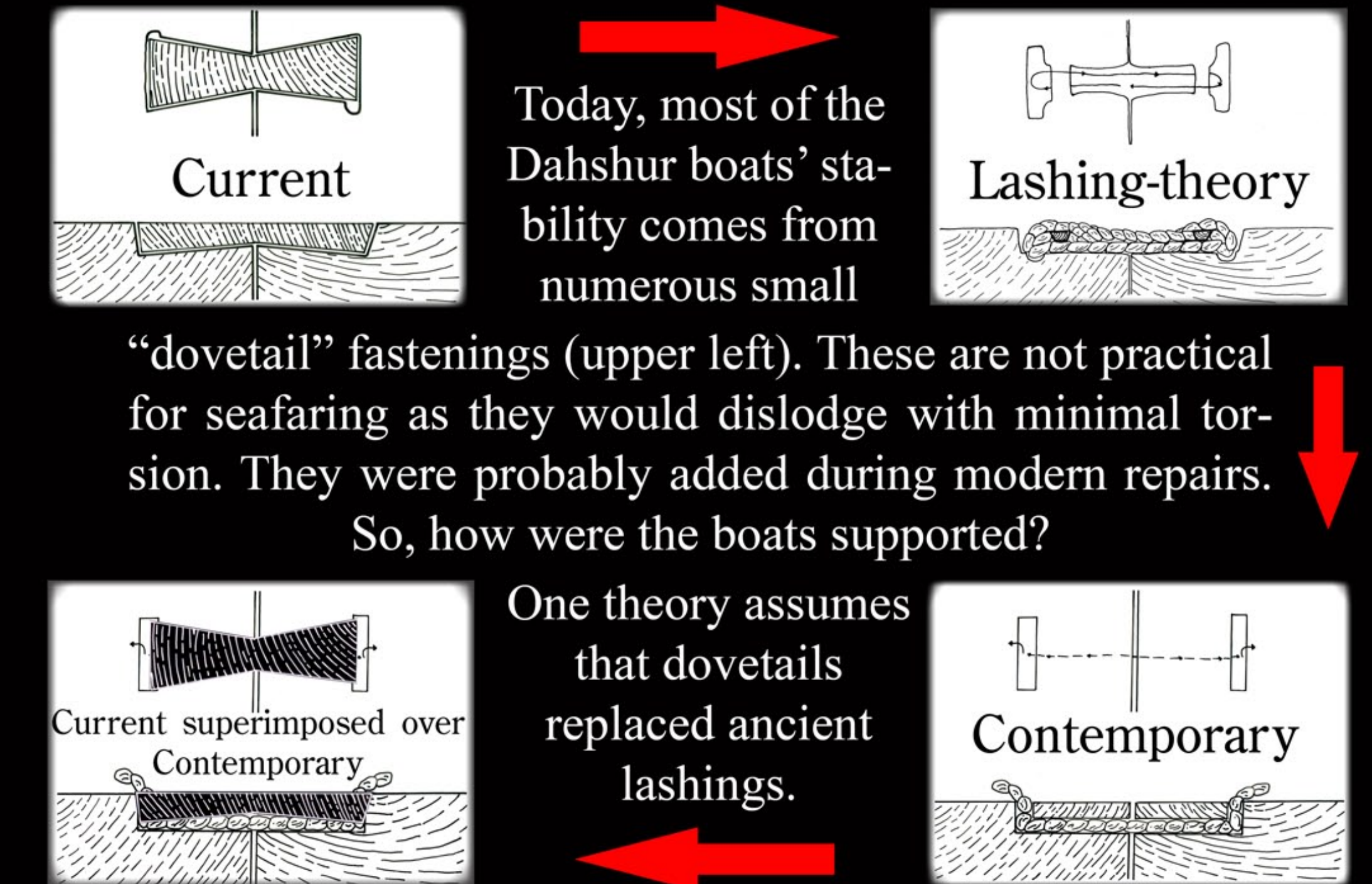
Over the last four years, five fellow Texas A&M graduate students have accompanied me to Egypt. We have invested more than 5000 man-hours in recording and reconstructing these long forgotten boats.



Each season proved more successful than the previous. The first season educated us on the proper method of conducting research in Egypt while the second was incredibly productive and resulted in detailed drawings, complete scantling lists, 3-D reconstructions. The experience of working in the Egyptian Museum was great and memorable for all of us.

## Interpretations

In the 1980s, the two Dahshur boats in the US were thoroughly studied, while the two in Cairo remained obscure. Consequently, for the last 25 years all interpretations and conclusions regarding ancient Egyptian shipbuilding trends were developed accordingly, neglecting critical information. Evidence from my research in Cairo supports a reinterpretation of ship construction methods during ancient Egypt's Middle Kingdom.

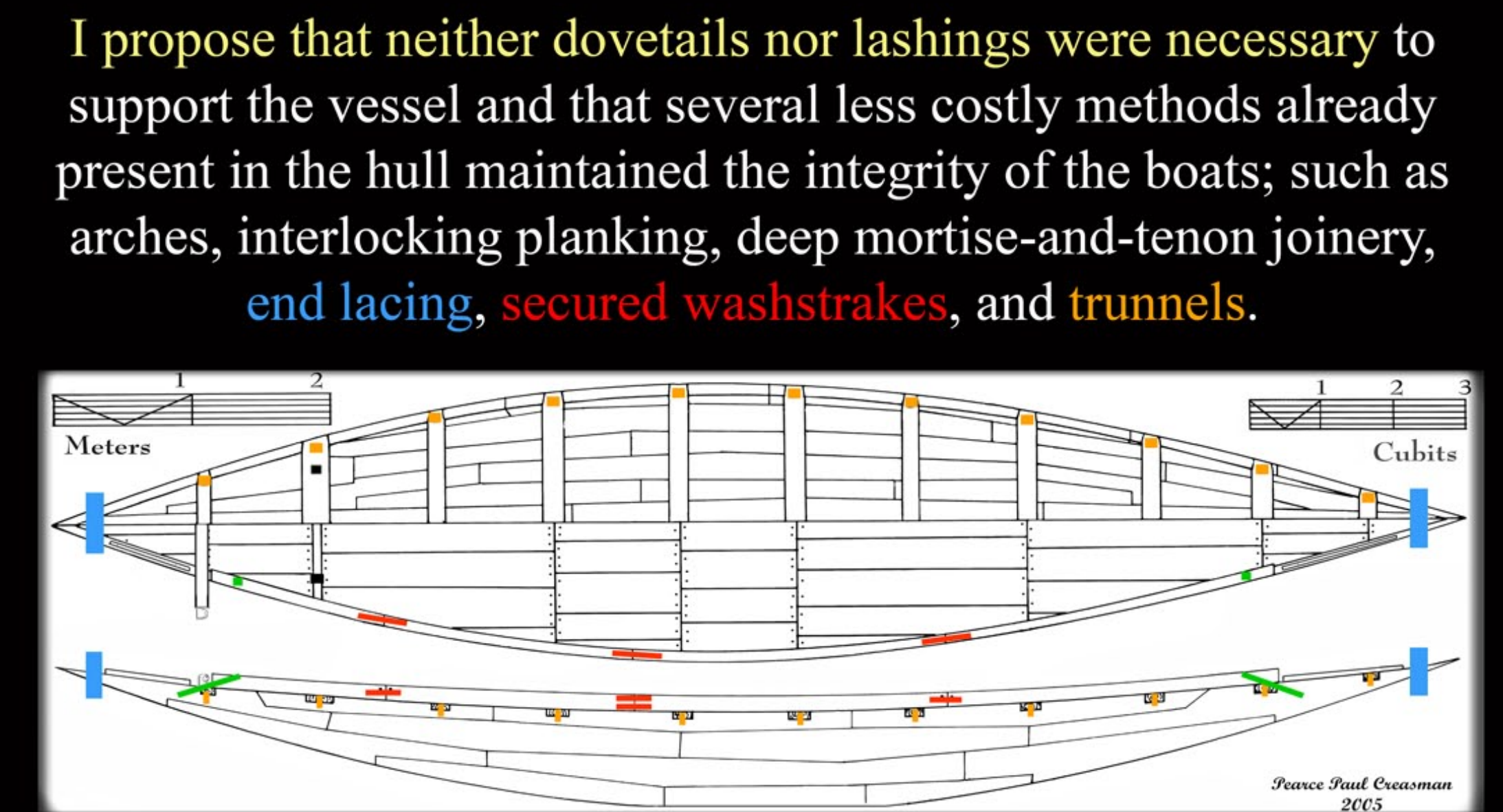


Today, most of the Dahshur boats' stability comes from numerous small "dovetail" fastenings (upper left). These are not practical for seafaring as they would dislodge with minimal torsion. They were probably added during modern repairs. So, how were the boats supported?

One theory assumes that dovetails replaced ancient lashings. The "lashing-theory" is congruent with earlier Egyptian construction practices; however, it neglects contemporary evidence (above- lower right) and offers a structurally weak joint. If lashings existed on the Dahshur boats, they more likely resembled the archaeologically confirmed style.

Other techniques found only on the Cairo boats suggest the above methods are not practical. On one of the Cairo boats the deck planks are pegged to the throughbeams; philosophically, a permanent attachment. As lashings have to be changed (maybe as often as every 3 months) and dovetails would need similar attention, it is logical that neither lashings nor dovetails were originally present. If neither method was employed, transverse stability must be accounted for in another way.

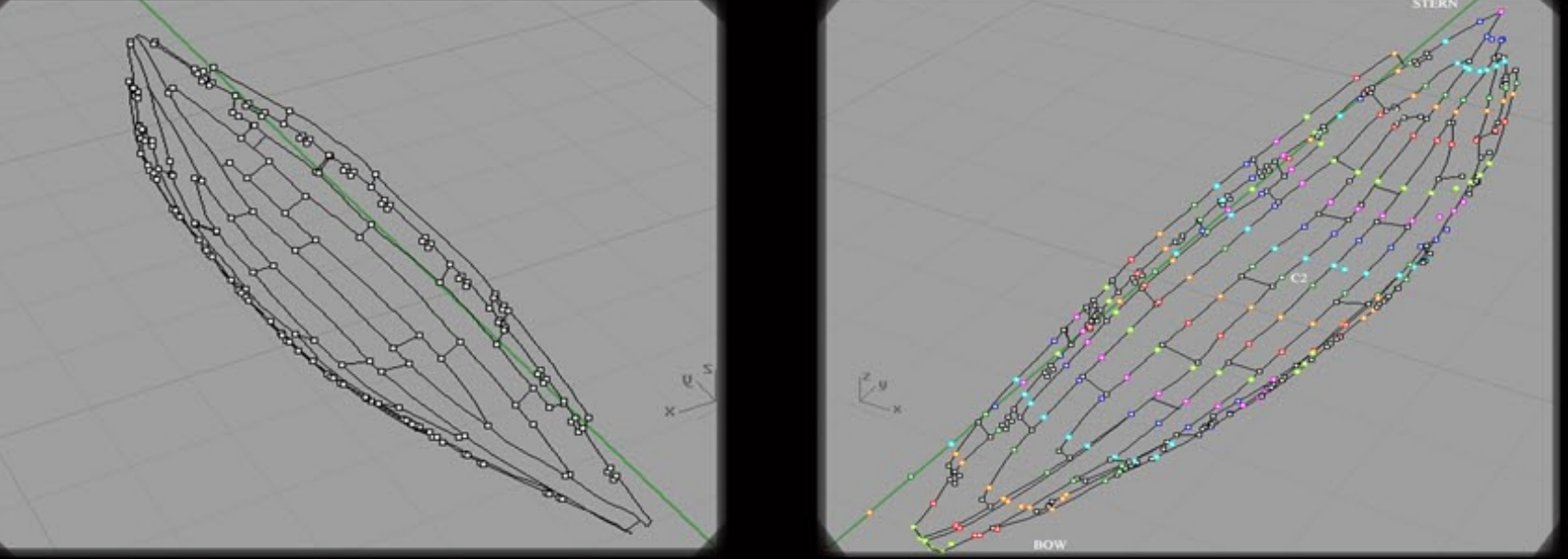
I propose that neither dovetails nor lashings were necessary to support the vessel and that several less costly methods already present in the hull maintained the integrity of the boats; such as arches, interlocking planking, deep mortise-and-tenon joinery, end lacing, secured washstrakes, and trunnels.



## How To Prove It...

It is virtually impossible to prove a negative (e.g. that neither lashings nor dovetails originally existed), but the methods below may help resolve the ambiguity regarding the Dahshur boats' construction.

### Testing in "3-D" Space



Measurements taken (as off-sets) from the Cairo boats were transferred into a 3-D construction program and then subjected to a number of simulations without either lashings or dovetails present. The experiments indicated that neither technology was critical to the integrity of the hull.

Therefore, structurally it is *possible* that neither dovetails nor lashings existed and the boats could have withstood the stress of use on the Nile. However, such experiments are purely hypothetical and alone, cannot be interpreted as fact.

### Find the Missing Boat

De Morgan's 19th century excavations recorded *five* boats, only *four* of which can be accounted for today. Several scholars have posited that the missing fifth boat remains in the sands at Dahshur. If the boat could be located and excavated, it would likely resolve the question: lashings, dovetails, or neither (or other)?

After consultation with several geophysicists, I believe that a remote sensing survey including Ground Penetrating Radar, Magnetometry, Gravi-metrics, and Conductivity would be the most practical, efficient, and useful method to investigate the assumption that the missing boat remains at Dahshur.



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