Nosyon: Uluslararası Toplum ve Kültür Çalışmaları Dergisi - Nosyon: International Journal of Society and Culture Studies 2021, 7, 133-150

A possible relation between the Arabic Dhow and the European Cog

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Abstract

Unlike the other fields of science such as medicine, astronomy, mathematics and philosophy, whose transmission from the Islamic world into Europe in the medieval times have a concrete subject matter, the accomplishment of Muslims in the ship-building, especially its possible transmission into Europe, has not been seriously studied by a kind of a comparative approach. Therefore, it would be fruitful to highlight such a possibility. On the one hand, Arabic history has resources showing the significant development of ships as well as their ships' distant sailing in the open seas. On the other hand, the construction of the European Cog almost has no similarity with its precedent Viking small vessels that didn't even sail in the open sea, or with the old Roman ships. Whereas –and as this article will claim– the cog is more similar to the dhow. Before jumping into this argument, this article will at first explore the development of ship building in Mesopotamia in a very short chronological order, starting from the ancient times, pre-Islamic Era, Islamic Golden Age. Then the article will review the main characteristics of the dhow followed by those of the cog. And since scholars often find it hard for such a transmission of knowledge since the dhow used to sail in the Red Sea and the Indian Ocean while the cog was used in the north of Europe, therefore, this article will present some theories about such possible transmission. Finally, the article will show some interesting similarities between the two ships, in order to show that the Arabic Dhow could have been used as a model for the European Cog.

Araştırma makalesi

Research article

Geliş - Submitted: 07/10/2020

Kabul - Accepted: 27/06/2021

Atıf – Reference: Al-Khaffaf, E. S. M. (2021). A possible relation between the Arabic Dhow and the European Cog. *Nosyon: Uluslararası Toplum ve Kültür Çalışmaları Dergisi,* 7, 133-150.

Keywords: Ships, cog, dhow, Islamic Golden Age, medieval Europe, the transmission of knowledge

Arap Yelkenlisi ve Avrupa Teknesi arasında olası bir ilişki

Öz

Ortaçağda İslam dünyasından Avrupa'ya geçişi somut bir konusu olan tıp, astronomi, matematik ve felsefe gibi diğer bilim dallarından farklı olarak Müslümanların gemi yapımındaki başarıları, özellikle Avrupa'ya olası geçişi, bir tür karşılaştırmalı yaklaşımla ciddi şekilde incelenmemiştir. Bu nedenle, böyle bir olasılığın altını çizmek faydalı olacaktır. Arap tarihi, bir yandan gemilerin önemli gelişimini ve gemilerinin açık denizlerde uzun mesafeli seyirlerini gösteren kaynaklara sahiptir. Öte yandan Avrupa Teknesinin inşası, emsali açık denizde bile açılmamış Viking küçük gemileriyle veya eski Roma gemileriyle neredeyse hiç benzerliğe sahip değildir. Oysa -ve bu makalenin iddia edeceği gibi- tekne, Arap yelkenlisine daha çok benzemektedir. Bu argümana geçmeden önce, bu makale ilk olarak Mezopotamya'da gemi inşasının gelişimini çok kısa bir kronolojik sırayla bahsederek, antik çağlardan başlayarak, İslam öncesi Dönem'den, İslami Altın Çağ'a kadar inceleyecektir. Daha sonra makale, yelkenlinin ana özelliklerini ve ardından teknenin özelliklerini gözden geçirecektir. Bilim adamları, yelkenlilerin Kızıldeniz ve Hint Okyanusu'nda yelken açarken, teknelerin Avrupa'nın kuzeyinde kullanıldığından, bu iki tür arasında bir bilgi aktarımı zor olduğunu ifade etmektedir. Bu makale bu tür olası bilgi aktarımı hakkında bazı teoriler sunacaktır. Son olarak makale, Arap yelkenlisinin Avrupa Teknesi için bir model olarak kullanılabileceğini göstermek için iki gemi arasındaki bazı ilginç benzerlikleri gösterecektir.

Anahtar Kelimeler: Gemiler, tekne, yelkenli, İslami Altın Çağ, ortaçağ Avrupası, bilgi aktarımı

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Introduction

"The idea of a desert people [Arabs] introducing a new sail to a maritime people [Europeans] deserves sceptical scrutiny" (Campbell, 1995, p. 7). Such a stereotypical notion about Arabs can appear from time to time to anyone who studies history. Such an approach undoubtedly fails to allow for the great changes which can emerge between a people's situation in the present and people's situation in the past. Moreover, it is convincing to claim that this kind of critic or historian is looking to the past through a lens that is blurred by the dusty desert of *The Arabian Nights*[1].

However, this quotation was taken from the context in which Campbell was trying to refute Hourani's argument in which he concluded that it was the Arabs who brought the lateen sail to the Mediterranean which was later developed into the square sail[2]. And there is no doubt that Campbell has used a good argument, yet his assumption about Arabs is clear in his writing tone. It is important to clarify that the task of this paper is not to get into the argument about the sail. But this specific dissidence was presented to shed light on the fact that Arabic contribution to science (specially to ship building) wasn't seriously examined and considered until the last decades. Thus, before jumping into this essay's main topic, which is the relationship between the cog and the dhow, this essay will explore the beginning of boats emergence from its very early appearance in Mesopotamia. And then it will briefly pass by the pre-Islamic Time to a survey of the Islamic World in order to shed light on maritime technology's development during the Islamic expansions. At the end, this essay will try to show the similarities between the dhow and the cog, and this will be achieved after presenting possible ways of transforming the ship-building knowledge from the Indian Ocean to the North of Europe. In fact, to argue that the cog was built based on the Arabic Dhow will require complex discussion. Nevertheless, presenting a brief chronological and historical view about development of boats in that area can be helpful for scientifically historicizing the relationship between the dhow and the cog.

1. Mesopotamia

The fertile region of the southern part of Mesopotamia was apparently farmed from the seventh millennium BC, when crops were grown intensively, and animals herded there. And by the late 4th millennium BC, considerable grouping recognized as city states, such as Eridu, Uruk, Nippur, Kish, Ur, and Lagash, had emerged. Each one of these ancient cities was built near the river or joined to it by a canal (McGrail, 2001, p. 55). So, dykes were built in order to regulate the river flows, which were helpful and useful in fertilizing the land, as well as in preventing the rivers flooding to the inhabited areas. And because the land between the two rivers (Mesopotamia) lacked many important construction materials such as timber, stones, and metals, it was necessary to bring these things from another lands, which reciprocally helped in navigation and the development of the vessels after the needed timbers and metals that were brought to the land. In the *Epic of Gilgamesh* (3rd Millennium BC) we are told that Gilgamesh and Enkidu went to the Cedar Forest –probably Lebanon– in order to bring wood for ship building as well as in order to kill the beast, Humbaba, who lived there.[3]

[1] What I mean here is that such a view puts Arabs in the environment and time of *The Arabian Night* and freezes and keeps them there. Nevertheless, as we will see there are more interesting things–regarding facts about ship life–to consider in that work of fiction, much more than the typical romantic Victorian famous view tried to impose on Arabs.

[2] To summarize his thesis, Hourani has attempted to demonstrate that the lateen–he argued that it was used from very early times–came from the Indian Ocean to the Mediterranean around the time of the Arab expansion. That is to say in the ninth century (Hourani, 1963, p. 103-105). This is different of Bowen's argument that of the lateen derived from the square sail.

[3] One of the oldest discovered ship-like figures is that clay model which was found at Eridu which belongs to the early fifth millennium BC whose photo can be seen in illustration 1.

Boats were built of reed bundles which were then coated externally with bitumen, a mineral tar available in Iraq. This material was also used to waterproof reeds for house building by 4000 BC (Clark & Piggott, 1976, p. 180). The oldest documented usage of bitumen dated to 2300 BC when Sargon of Akkad claimed to have been placed in a river as a baby in a basket of rushes sealed with bitumen[4]. In any case, a considerable development in the utilization of the maritime equipment is further seen in the reliefs demonstrating the Assyrians' invention (first Millennium BC) of floats which were used to float downstream or as a source of additional buoyancy for the swimmer[5]. Along with these inventions we later see the paddles, oared propulsion, sail, steering, expanding the size of the boat, using timbers and making a better hull structure.

On the other hand, the river life inspired the people of the land between the two rivers to move into other branches of science which are nonetheless important to the maritime life. Hornell believed that "the necessity to forecast the seasonal flood of the Euphrates and Tigris led to the study of astronomy and mathematics as an aid to the compilation of a calendar. This, in turn, appears to have led to the use of stars for navigation on land and sea" (Hornell, 1970, p. 231-233). However, these Mesopotamian sciences will later migrate to Greece and other places in the world, yet they will rebound and return more heatedly to Arabia –more specifically to Baghdad– in the 9th century after the Greek, Indian, Persian works were translated into Arabic. That is why –as we will see later in this essay– in the 10th century, Arabs were easily sailing to all parts of the Indian Ocean and the Red Sea and in the East African coast, where the using of maps, quadrant, astrolabe, compass and other sophisticated technologies and nautical inventions flourished[6].

In short, Mesopotamia's geographic and strategic position from ancient time made it a crossroad on the overland and sea trade routes. And the Arabic navigation in the Indian Sea had its memories in the dusty age because "in about 2520 BCE, we learn that ships came from Dilmun bringing timber from a foreign land (presumably India). Maritime trade seemed to be at its height around 2300 BCE, at the reign of Sargon of Akkad" (Agius, 2008, p. 39).

2. Pre-Islamic Times

Before we resume our journey, we must take a quick look at Arabia in the pre-Islamic Age in order not to miss any important chain–nor any timber–in the ship image through the various times of that area. Knowing that this view will be limited to the Arabic Poetry of that time which is often considered to be the best access to the pre-Islamic Arab lives, an age which hugely depended on the oral culture[7]. That is why poetry was the most fundamental thing in

[4] In fact, Bitumen is an important substance in boatbuilding, was used in ancient Mesopotamia for caulking, we have it recorded in *The Epic of Gilgamesh* (Pedersen, 2004, p. 231).

5 Such Assyrian reliefs can be seen in illustration 2.

[6] Such development in all branches of science at that area could have been ignored by many scholars but not by a 'free spirit' like Nietzsche. I will quote what Nietzsche said, for the sake of his recognition of the Abbassid Golden Age but not for his criticising of Christianity –there is no need to mention that most religions at some point in history are hijacked by a group of people and misused– Nietzsche upstreamly wrote: "Christianity destroyed for us the whole harvest of ancient civilization, and later it also destroyed for us the whole harvest of Mohammedan civilization. The wonderful culture of the Moors in Spain, which was fundamentally nearer to us and appealed more to our senses and tastes than that of Rome and Greece, was trampled down (I do not say by what sort of feet) Why? Because it had to thank noble and manly instincts for its origin -because it said yes to life, even to the rare and refined luxuriousness of Moorish life!... The crusaders later made war on something before which it would have been more fitting for them to have grovelled in the dust- a civilization beside which even that of our nineteenth century seems very poor and very "senile." What they wanted, of course, was booty: the orient was rich.... Let us put aside our prejudices!" (Nietzsche, 2006, p. 60).

[7] The pre-Islamic Poetry was orally transformed through the generations, but it was compiled and written in the Islamic Golden Age. That is, the Abbasid Era.

life of Arabs at that time. And likewise, through this window of poetry we can look at the details of people's life at that era.

In fact, the pre-Islamic Poetry is very rich with odes that refer to the maritime object. The most famous one is the metaphor of camel as the ship of the desert. Or poems compare the desert with the sea. Moreover, the Arabic qasida "ode" is built based on the eight Buhur "oceans", and that of course is not coincidental.

For example, Al-Akhtal (7th century) seems very familiar with one of the practices made in the ship during the construction, he said: "...beating the tar and the firm timber" (Agius, 2008, p. 150). Thus, it is clear that this poetic image deals with caulking the ship by fish oil. While Labid ibn Rabi'a (7th century) says: "Like the ship of the Hindi [the Indian Ocean] who has repaired its leaks with broad timbers and oil" (Agius, 2008, p. 151). The pre-Islamic Arabic word 'mallah'[8] means the helmsman who conducts a vessel from one place to another safely, as the poet al-Nabigha I-Dhubyani (6th century) says: "Out of fear, the helmsman constantly grips his rudder, after exhaustion and exertion" (Agius, 2008, p. 172). Gales and storms were a recurrent topic at the time, one storm captured by Zuhayr ibn Abi Salma (6th century) whose poem reads as follows: "When you come to him, you come to the depths of a sea on the humped waves of which the ships are tossed about" (Agius, 2008, p. 231). Any student of literature analysis can easily realize that such lively sensual imagery can never be expressed in such powerful way without a real self-experience of such a moment in the terror of the sea by the poet himself[9].

These are a few samples from a prolific collection of poems of that time, which can help us to realize that those 'desert people' were more familiar with the nautical life than they were thought to be.

That is why the Quran uses language in which God addressed 'the people according to their own knowledge' was full of direct and metaphorical sentences referring to the sea, ships, seafaring, etc., which explains the importance of such themes for the people of that area from comparatively early times. It goes without question that nautical vocabularies found in those poets' language is clear evidence of their strong knowledge and practice of the sea life. Though they had expressed it poetically rather than reasonably, their grandsons will documentarily express it in real life, as we will see in the next topic.

3. Islamic Golden Age

Prophet Muhammad grew up in an environment where the Arabians were familiar with the religious symbols that were typical in the Eastern beliefs. One of these was the 'ship', which was a powerful symbol of man's journey (life and death, and resurrection) an allegory which was not limited to Arabs, but it was found in Egypt as well as in Christianity and Buddhism.

In fact, the emergence of Islam played a vital role in pushing ship development forward. According to the fifth pillar of Islam, every Muslim must make a pilgrimage to Mecca. That simply means that people from the four corners of the world must come and go back home by using the speediest available method, a thing that also accelerated sea trade as thousands of pilgrims and merchant-pilgrims made their way to Mecca and Medina by sea.

At all events, the word that stands for vessel was mentioned more than 30 times in the Quran. For example, one of the interesting references to a ship with a sewn construction –which is as we will see later is one of the famous characteristics of the dhow of the Indian Ocean– is found in the Quran: "We bore him [Noah] on an ark made of broad planks and cord of palm"

[8] Next to the Arabic term 'mallah', there is Aramaic and Hebrew 'malah' which ultimately came from Akkadian 'malahu' meaning "seaman or boatman".

[9] There are Chinese documents that show the relationship between China and the Arabs from the first century. And there is no space here to enter to that discussion. However, those mentioned poems demonstrate the ship life among the pre-Islamic Arabs.

(Surah the Moon, 13). Elsewhere in the Quran we see another reference to Noah's ship: "And construct the ship under Our observation and Our inspiration and do not address Me concerning those who have wronged; indeed, they are [to be] drowned. And he [Noah] constructed the ship, and whenever an assembly of the eminent of his people passed by him, they ridiculed him. He said, 'If you ridicule us, then we will ridicule you just as you ridicule'" (Surah Hud, 37-38). However, the Quran also indirectly motivated the development of ships when it encouraged trade (Surah the Women, 29). The merchandizing strengthened the existing bonds between the Arabians and the other people such as Persians and Indians, reaching as far as China. And during the ninth and tenth centuries, Muslims' ships were dominating the Mediterranean and the Indian Ocean. In fact, references to ships sailing to China are found in the *Arabian Nights*. Sindbad the Sailor recounted his seventh voyage adventure which led him to China. And the interesting thing about this fictional voyage is that we find its parallel narrative in the reports made by some famous travellers where they described their experiences on the open sea.

As for Islamic and Chinese ships sailing to and from China, we have a number of sources to consider, such as Sulayman al-Tajir, meaning Sulayman the merchant, (9th century), he was a sailor whose voyages got him to India and China where apparently some navigational treatises were available to him. This sailor was the first to record Chinese ships trading with Siraf at his book, *Akhbar al-Sin wa'l-Hind* (An Account of China and India).

Later we have Al-Masudi (10th century) he wrote in his *Meadows of Gold and Mines of Gems* about mariners and merchants of Siraf as well as Basra and Oman crossing the Sea of China. Later we have Buzurg ibn Shahriyar (10th-11th century) in his *Marvels of Wonders of India* told stories of Siraf seamen sailing as far as China. And he gave the report of captain Abhara's hard and deathly journey in the Indian Ocean to China. Agius mentioned that from a relative early age "Hormuz was not only the commercial outlet of Fars and Kirman but an international trading centre reaching out to Europe" (Agius, 2008, p. 84). And such multi-cultural point could help exchanging knowledge from and to distant regions.

However, Ibn Battuta (14th century) described the big ships in China which had the capacity to include a thousand of men and hundreds of workers and soldiers. He also mentioned that each one of those big ships (junks) was followed by another three small ships. Furthermore, they kept garden of herbs and ginger in the ship. So, to make an imaginary reconstruction of that vessel based on Ibn Battuta's description one would think that it was a movable city (Ibn Battuta, 1968, p. 172-173).

We may accuse Ibn Battuta of exaggeration and irrationality, until we read that Marco Polo described –before him– much the same (Polo, 1926, p. 321). It is only then we will start to reflect on Ibn Battuta's story. Anyhow, the important mutual issue regarding Ibn Battuta's and Marco Polo's report is that they can help us imagine the similarities between the dhow and the junk. Some scholars believed that what were described by Marco Polo and Ibn Battuta was nothing but a dhow–and not actually a junk.[10] And that makes sense, because the dhow at the 14th and 15th centuries was so developed that Niccolò de' Conti (d. 1469), a Venetian nobleman, noted about 1420, that "some of the Indian ships were larger than European vessels" (Agius, 2008, p. 219).

Such a mistake of not recognizing the type of a ship can often occur with the geographers who try to describe something far from their field of domain of knowledge which is geography. This can be applied on Ibn Battuta since he was not a real sailor. But it is hard to say the same about Marco Polo. But there are some reasons to suspect what he mentioned; firstly, he was much criticized by his own fellowmen in Venice for his giving untrue reports. Secondly, and as we will see, he has made a dramatic mistake regarding his judgment of the sewn method of

[10] Footnote in Marco Polo (1926, p. 321).

the dhow. Thirdly, there is a possibility that Marco Polo didn't himself write that book, but it was his assistant who did based on Marco Polo's notes.

A long time passed until history affirmed that what were mentioned in these Arabic sources was correct. The Belitung shipwreck is one of the greatest maritime finds. It threw light on the nature of maritime trade during the 9th century between the Middle East and China. This wreck is the first physical proof that the Arabian dhow was the vehicle for transporting of goods from China to the Middle East.

4. The dhow

'Dhow' or 'Daw' is the general name given to different types of sailing vessels with one or sometimes more masts and typically with lateen sails. The dhow sailed in the regions of the Red Sea and the Indian Ocean. It was constructed to bear vigorous winds and strong waves and was typically used to carry heavy items, such as: Fruits, fresh water, spices, and the like. The origin of the dhow is not easy to trace back. However, scholars speculatively date its emergence to 600 BC-600 AC.

All the same, Hourani said that "the outstanding features of the medieval Arab ship of the Indian Ocean are two: The manner in which the planks of the hull were sewn together, not nailed; and the fore-and-aft set of the sails" (Hourani, 1995, p. 88). Knowing that *The Epic of Gilgamesh* gave a sizable detail about building a sewn ship[11]. The eleventh tablet of the epic which told the story of the deluge puts its finger on some characteristics of the process of constructing a sewn ship which as Pedersen claims, "reinforces the connection between the vulnerable dhow and the watercraft of the world's first civilizations" (Pedersen, 2004, p. 138-139). So, this makes the reason behind mentioning the sewn ship in the Quran more clearly.

Arabs' ships were made of teak wood or coconut wood. Teak wood is very strong, and it grows well in the hills of Southern India. This wood was brought to Persia and Babylon from a very ancient time. It is proved to be very effective against decay. "It lasts more than 200 years if it is kept under water, while, if it is kept out of water, it decays sooner, though not for some time" (Hourani, 1995, p. 90).

Scholars presented different explanations regarding the reason of using the sewn method instead of the nails in those ships. Some of these views suggested that nails do not last because the seawater corrodes the iron nails, and the nails grow soft and weak in the sea. Thus, Al-Mas'udi asserted that the nails technique was used by ships in Mediterranean in ships by Arabs, but he explained the reason of using the other method, "and therefore the people on its shores have taken to threading cords of fibre instead, and these are coasted with grease and tar" (Hourani, 1995, p. 90). Others brought a less scientific reason which claimed that people of that time believed in the existence of under-sea creatures which had the ability to draw the nails causing the ship to sink. However, another interesting reason suggested the existence of magnetic rock under the sea. It seems that this belief in the destruction of the nailed ships by magnetic rocks was taken seriously by some people at the time. In *The Arabian Nights*, one of the tales recounted how a mountain with magnetic properties attracted a ship with iron-fastened planks: "We drew near to the mountain which is composed of black stone called 'magnet-stone'; the current carried us towards it with violence, and when the ships were almost close to it, they fell asunder, and all the nails got stuck to it (Agius, 2008, p. 161). In another tale from *The Arabian Nights*, apparently compiled before the twelfth century, suggested that ship builders in Mesopotamia and the Persian Gulf were actually using iron nails for shipbuilding. "Although the setting of most of these tales is Baghdad and Basra, yet we do not know where

[11] In the Epic, it is Utnapishtim who built the huge vessel but in the Old Testament, it is Noah. However, the mutual idea in the two stories is that ship was used in saving humanity. So, it would be normal to expect the people of Mesopotamia to always pay attention to developing the ships, it is a knowledge that connects ship with salvation which–whether orally or graphically–transformed from a generation to the next.

the narrator came from; he could be narrating about customs and practices that were not eastern at all but rather referring to Mediterranean iron-fastened planks" (Agius, 2008, p. 166).

However, Hourani affirmed that the reason behind preferring sewn method on nails was the cheapness and safety of the sewning, he commented: "It is not that iron was not available. It has always been mined and worked in many regions of India, in Iran, in Sudan (but inland); and it could be obtained in Egypt. But it seems that the processes of mining, smelting, and manufacturing the nails was expensive in India, and in the other regions the iron industry was on a small scale. Iron-fastening could not compete in cheapness with stitching, the raw material for which was ready to hand" (Hourani, 1995, p. 96-97).

Some medieval European travellers to Indian Ocean countries negatively criticized the Arab sewn-plank boats that they saw. Among them is Marco Polo who reported that these Arabs vessels were very bad, and that many were wrecked because of their sewn construction, and that it was "no little peril to sail in these ships" (McGrail, 2001, p. 76). And there is no need to say that such opinion was untestably copied and echoed later. However, Marco Polo tried to theorize two reasons for such use, firstly, he claimed, the wood they used was so hard and brittle that nails split and shattered it. Secondly, that the Arabs had no iron. All such criticisms are generally ill-founded. Teak and other Indian woods can easily be nailed, and iron was available in India. The sewn fastings in planks were also used by many Mediterranean and Scandinavian countries through different ages. Now we know for sure that "sewn boats are found to perform better on the open coast than any nailed boat" (McGrail, 2001, p. 77). However, ibn Battuta and other Arab sailor's assertions about the flexibility of such vessels in surf are proved to be true notably when we hear the opinions of the 20th century owners of sewn boats. So, the criticism of Arabic sewn boats by some medieval European travellers was not correct, because those vessels demonstrated more capability in the difficult ocean voyages where European boats at the time would not venture.

All the same, later the dhow was developed to have more than 20 different shapes. And there is no space for mentioning their style and names here. There is a debate regarding the features by the means of which one can classify the dhow. However, Hawkins tries to find the reason behind this ambiguity: "The impression is gained that the Arab does not classify his craft as we do and, what is more, he cares little about our refinements of nomenclature. When there are variations in build it is almost impossible to classify a dhow as belonging to a particular group" (Hawkins, 1977, p. 78).

5. The cog

A Cog is a type of ship that was widely used between the tenth and the twelfth centuries. These vessels were made of oak which was largely available in the Baltic region. There are three well known characteristics of the cog; the single square mast, the clinker construction in which the timbers overlapped and nailed, and finally the typical straight and long shape of the stem and stern posts which are connected to the keel plank through the hooks. However, some scholars believe that 'cog' was a term given to any type of cargo ships. Those vessels were used in seagoing trade between northern Europe and the Scandinavian countries in the medieval times. Documents show that the Hanseatics used to sail by cogs near the coasts depending on maps and specific geographical places rather than depending on the compass. Thus, there is a long debate whether those vessels went on the open sea, the way the dhows did.

The Germans used to call the Cog ship the "Hanse Cog" because they thought that only the Hanseatics used it. But it turned out that this theory was not correct because the English had used it too, specifically between Britain and Ireland.

The cog gradually replaced the Viking age types of ships in northern Europe. The cog was developed in the process of time and around the 14th century; it reached its structural limits. It is not easy to describe exactly how the cog looked like. The oldest preserved cog is the

Bremen Cog where the hull is preserved but not the rig. And in 2016 another cog was also found which is the Kampen Cog.[12]

Undoubtedly, there is much more to say about the cog which will be seen in the coming topic where we will look at the similarities between the cog and the dhow along with the presentation of some hypotheses of a possible way of shipbuilding knowledge travelling across continents at the time.

6. Theories regarding the travel of knowledge

As soon as the notion of the similarity between the dhow and cog is presented, a question will quickly arise: "How could this knowledge travel at that time from Arabia to northern Europe?" Thus, before launching we must present some suggestions about that issue.

We will firstly start with that weakest one which discusses an access between the Mediterranean and the Red Sea. It is obvious that when we hear about the Suez Canal which connected the two seas, we immediately remember the 19th century project which was carried out by De Lesseps and the French in Egypt.

It is not my intention to fill up this essay with extra information. However, a summary of Cooper's essay (Link Med to Red) about that matter is necessary. As Cooper mentioned, the earliest reference to a canal somehow connecting the Nile to the Red Sea was mentioned by Aristotle. Aristotle mentioned that it was Pharaoh Senwosret III in the mid-19th century BC, who ordered that construction. Moreover, there are archaeological evidence show that the Persian king Darius the Great (5th century BC) opened the first canal there.

And we also have a mentioning about a canal built at the time of Umar, the second caliph of Muslims (7th century), a story which is well known in the Arabic sources. In fact, Umar's idea was not as extraordinary as it first sounds, it was based on the memory that such a canal had in fact existed when Egypt was under the Roman rule. However, the canal had fallen out of use and was blocked with sand and debris. Such stories become more logic when we remember that Egypt had once been the breadbasket of Rome and Byzantium, likewise it became such for Muslims too[13] (Cooper, 2012).

Thus, if this theory was correct then we can assume that the knowledge was transferred to the Mediterranean and from there it reached Spain to which the Hanseatics had arrived. Knowing that there are some remarkable Arabic references to the issue of connection[14], Al-Sirafi wrote: "Among the discoveries of this age of ours, unknown to our predecessors, is the previously unsuspected fact that the ocean onto which the Sea of China and India opens is connected to the Mediterranean Sea. This is something people would not have credited until

[12] "Unlike the Baltic and Mediterranean, the Indian Ocean lacks archaeological finds of shipwrecks" (Green, 2014, p. 55).

[13] The inspiration of opening the tunnel in the time of Umar was the famous catastrophe of starvation which hit the people of Makkah and Madinah at 638 "Year of Ashes" where Umar asked his general in Egypt to send support of food as soon as possible. However, the reader may ask and what happened of that canal later? It operated for about 114 years, carrying agricultural produce to Arabia, until, in 754 and 755; there was an uprising in Madinah against the new Abbasid caliphate in Baghdad. The caliph, al-Mansur, ordered the canal to be blocked to cut the supply of food to the Holy Cities and choke off the rebellion. Thus, it disappeared, and its traces have been almost entirely obliterated by agricultural and urban development.

[14] The connection of these canals is debateable, but some studies try to explain that ship coming from the Red Sea through the canal to Nile and at some points–after reaching the canal's end–the ship was dragged on land arriving then to the Mediterranean Sea. And there is something interesting worth quoting mentioned by a 15th century Mamluk Egyptian historian, Al-Maqrizi: "We are told that the Amir Yalbulgha Atabeg took an interest in the construction of galleys which were to be used against the Franks in 767/1365. It was a huge enterprise which the vizier took charge of 100 warships of the ghurab and tarida-type were built and the amir bestowed grants to all those who wanted to enrol themselves on the sea. Ghurabs were built in Bulaq in 828/1424 and some of them were destined to strengthen the Red Sea and Indian Ocean Mamul navy, so ship planks were transported on camels to Suez where they were assembled to sail in the Red Sea (Agius, 2008, p. 356).

our own time, in which news reached us of the discovery in the Mediterranean Sea of planks from the sewn ships of the Arabs. These ships had broken up and their crews had been lost; the waves had pounded their hulls to pieces, and these were then driven by the winds and currents which cast the planks into the Sea of the Khazars[15]. From there, the timbers floated through the Gulf of al-Rum, finally emerging into the Mediterranean Sea" (Al-Sirafi nd., p. 87).

There is another important report which implies a different route of knowledge transferring. Al-Yaqubi's report (9th century) on the Arab circumnavigation of Africa coming from China to the Bahlul Mosque below Agadir (south of Morocco) is very interesting in this context. Al-Yaqubi told us that the ship departs from Agadir passing on the western coast of Africa until it reaches the tip of Africa and crossing the Indian Ocean, it stops in India and from there traces the regular route to China (Al-Yaqubi, 2001, p. 198). So, that would make sense if the historians agreed that the Hanseatics arrived at Spain which is very close to Morocco[16].

But in this context, it is important to reflect on the ship, which looks like a dhow drawn on the plate which belongs to the 14th century Andalusia in Pergamon Museum (the Islamic arts section) which can be seen at the appendices section; illustration 3. This could imply an early possible use of the Dhow in Spain.

There are evidence showing that the cog was used as a warship by Crusaders and as a transporting vehicle for the pilgrims going from northern Europe to the Mediterranean. And the existence of the castle might support the idea that the cog was used in the war times in order to defend the ship from enemies using archers (Runyan, 1991, p. 197-209). The thing that strengthens the point of view suggested regarding the travel of knowledge.

And it is worth remembering that at the 9th century, silver dirham coins brought from the Islamic Caliphates were well known throughout the Indian Ocean, Mediterranean and in the Northern Europe and those coins "were carried north to the Baltic by Scandinavian and local traders" (Horsnaes, 2014, p. 65). So, it would be logical to combine with them some oral or graphical knowledge which demonstrates Arabic's mastery in the nautical world.[17]

7. Similarities between the cog and the dhow

There is no strong evidence for asserting that cog was used in the open sea. Sailing in the open sea was introduced most probably by the Indian Ocean sailors, from thence the compass and the other nautical instruments may have reached the Mediterranean.

The design of the dhow was adapted to the rough sea of the Atlantic and so was the cog, developed later. And if the cog was not built based on the dhow, then it should have been built according to its preceding ones. That is, the Viking vessels. But if we look at the 'long and small' Viking and even the Roman ships, they are quite different.[18] Even the setups used on the cog are comparable with those on the dhow. And the cog's commercial uses included the transport of cloth, salt, beer, wood, and dried fish. The dhow's included salted fish, beads, and dated, woven rugs. And the construction style, the using of tar and the caulking are also comparable. For instance, there is no need for engineering knowledge in order to recognize the similarity in the hull shape. However, we can also look at the similarities in the sailing properties.

[15] Thus, the Black Sea is another possible route of connection.

[16] The dhow might have gone from Egypt to Venice at the time of Mamluk, who had a good relationship with Venice (13th and 14th centuries). The Hanseatics have arrived in Venice and the Vikings before them had further relationship even with Baghdad.

[17] 14000 dirhams were discovered in Sweden which were brought from Baghdad, by the Vikings between the 9th-12th centuries.

[18] Look at illustrations number five, six, and seven.

The Arab seafarers were great in compass using and in mapping and it is not a coincidence that the Hanseatic League ships used to navigate near the shore according to maps, where they used to update their knowledge from time to time based on what they see on land.

One of the clearer similarities between the two ships is undoubtedly the rudder put on the stern post. In fact, for many years the rudder was thought to be a north European's invention. But later we knew that the dhow –many years before the cog– had the same rudder. One of the earliest known stern rudders is found in *The Book of the Constellations of Fixed Stars*, dating to the beginning of the 12th century. This predates the discovery of stern rudders engraved on the 13th century seals of the Hanseatic League ports previously thought to be the earliest examples of their use. The stern rudder caught the attention of Friar John Montecorvino (d. 1328) during his voyage in the Indian Ocean, and he described the Malabar ships as having "a frail and flimsy rudder" (Agius, 2008, p. 205).

In Yahya ibn Mahmud al-Wasti (a Mesopotamian scribe) in a 1237 manuscript of the *Maqamat* by al-Hariri of Basra (preserved at the Bibliotheque Nationale de France), we see an Arabic ship which has an axial rudder on the stern post (along with the twin quarter rudders) astonishingly like that of the cog. According to the photo which can be seen in the appendices section; illustration 4., we can see another similarity which is the place upon which sat a man, who seems to be the captain of the ship taking a seat on a higher place which is similar to the aftercastle of the cog, even though the place was drawn in a very small shape which is not cope with the largeness of the captain, still the point is the clear.

Instead of focusing on the technical relation between the cog and the dhow which needs a professional knowledge we can look on the similarities in the other usage of the two ships such as the law between the sailors and the captain on the board of the ship.

As soon as the ship is on the water, every sailor will behave according to specific codes. The hierarchy undoubtedly starts from the captain, whose every word and command must be respected and obeyed by every sailor. His power is not limited to his sailors, but it expands to include every tiny good on the board of the ship. So, when danger comes, it is the captain who can order throwing an amount of the goods, merchandise, foods into the sea for the sake of saving the ship from sinking. No one can refuse or dispute such an order, not even the merchants or the owners of the goods, who will realize –after the ship arrived peacefully to the port– that doing so was unavoidable. In fact, the discipline in the ship was very strict and the captain always insisted on the law. The punishment on the ship for a mistake or misbehaviour was severe. These kinds of laws can be seen in both the cog and the dhow[19].

Regarding the sudden accidents when the ship is put in danger or when it had holes, the crew of the cog used a typical way of fixing it. However, using a wooden or fabric-like plug to block a leakage of a boat is a very primitive method. In this context Caspar Balbi's description in his travels to Arabia in the sixteenth century is interesting. He mentioned how the ship's crews dive into the sea to block holes with a plug with horse hairs being sucked in (Agius, 2008, p. 139).

One of the interesting things about the dhow is that the etymological term 'dhow' was not found in the old Arabic dictionaries or in the daily language of Arabs in the seaside places. Dr. Prins, who is the best modern authority on the subject, tries to explain this paradox; he remarks "the general term dhow has been evolved amongst European laymen to denote any sea-going lateen-rigged vessel in the Indian Ocean" (Hawkins, 1977, p. 22). And though this development of the word has occurred in Europe after the 14th century still it can be argued that it started from a relatively earlier time, which likewise sheds light on the possibility of such a transfer of knowledge. The scarcity of evidence doesn't necessarily equate to an absence of evidence.

[19] Thanks to Ibn Majid, we know that there were codes of behaviour, the so-called Siyasat (policy and crew management) to which captain and crew were bound to adhere. It fully covered all aspects of the voyage.

Conclusion

The cog seems to have no common characteristics with the Viking ship which was used in the same area before the emergence of the cog. It also has little similarity with the old Roman ship. Therefore, such a sudden change in the ship building in north of Europe without some external inspiration, so to speak, seems unconvincing. Needless to say, that Arabs sailed in very far places, yet –and as this essay tried to demonstrate– there are some historical indications showing that there could have been some points of meeting between the two cultures. For example, Spain could be a strong possibility, that is, a place in which the transmission of knowledge could have taken place.

There is no doubt that exploring such historical questions is not an easy task nor can it be accomplished by one single short essay. But what this essay arguably achieved so far is presenting some relevant information about that issue which seems not even widely discussed. After this brief view of ship building in the Arabian areas from very ancient times passing through the pre-Islamic and then through the Islamic Ages, and presenting evidence strengthened by museum artifacts and further strengthened by some Western sources as well as by many Arabic relevant sources, which have not yet received sufficient attention, we can hope that this essay will provide an impulse for future study of the relationship between the cog and the dhow. More findings from old shipwrecks hopefully could draw scholars' attention to this topic. If this happens, and if the Arabic resources were re-examined more seriously in terms of their relationship with the discussed topic, then –and only then– can we ask the question of "how could that knowledge transfer from Arabia to northern Europe at that time?".

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Appendices:

Illustration 1. The oldest ship-like figure found in Eridu

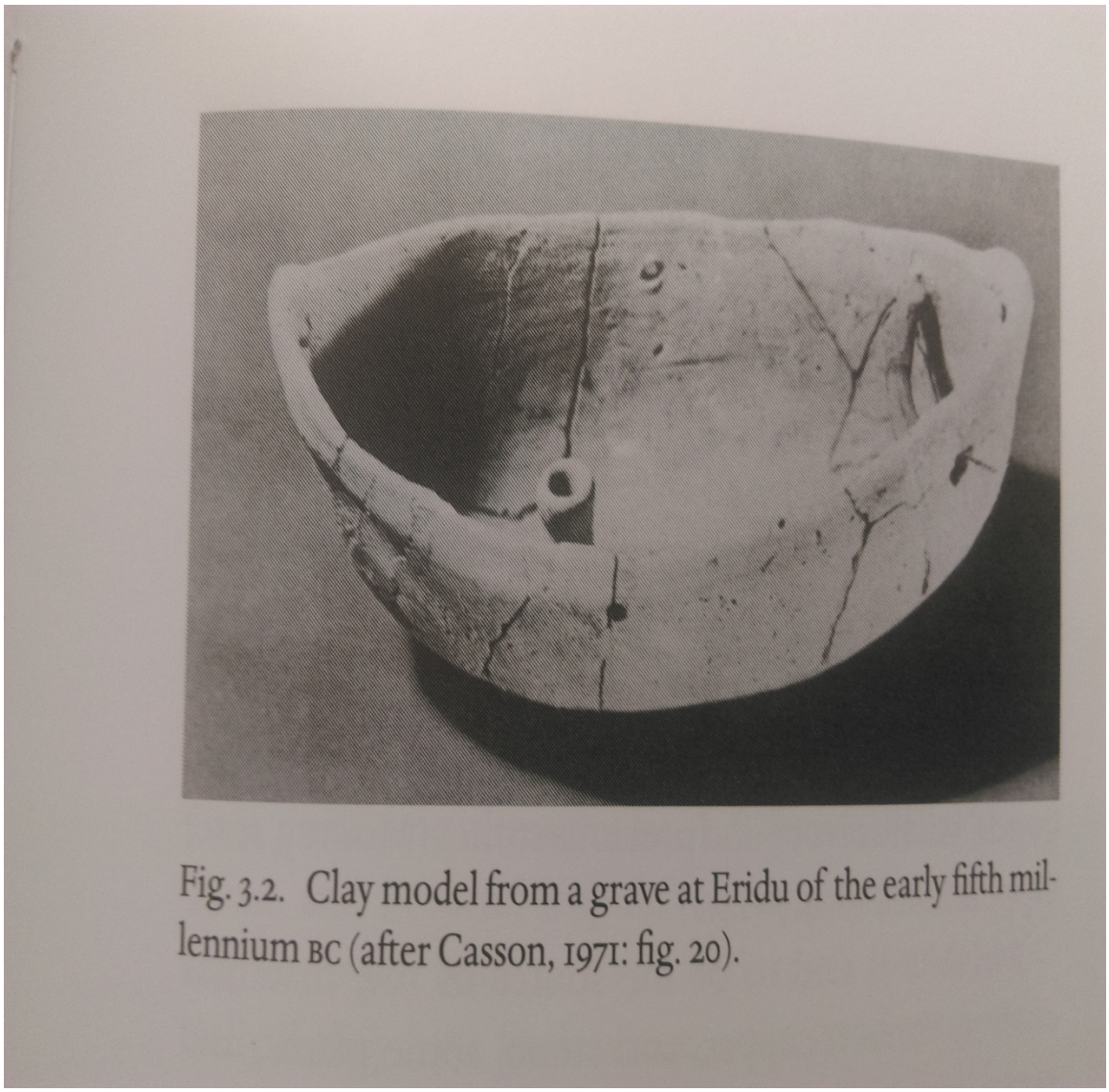

Fig. 3.2. Clay model from a grave at Eridu of the early fifth millennium BC (after Casson, 1971: fig. 20).

Illustration 2. Assyrians' invention of floats

Fig. 3.11. A possible bundle boat on the left, and swimmers using pot floats as an aid to flotation. On the mid-ninth century BC Balawat gates (Louvre, Paris).

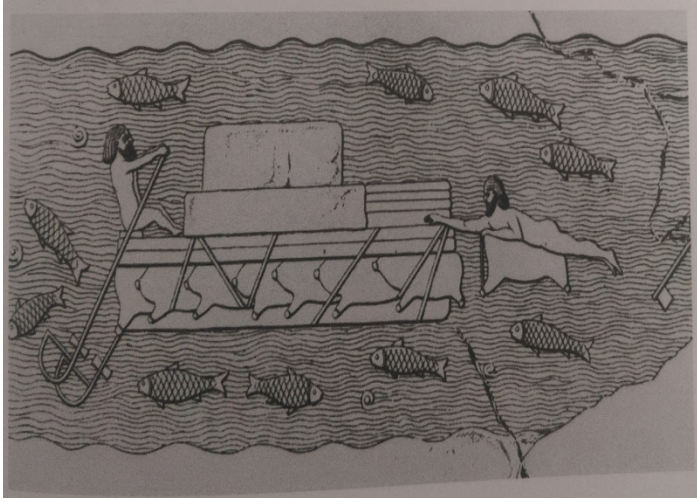

Fig. 3.12. A float raft under oars being guided by a man using a hide float. From the palace of Sennacherib *c.* 700 BC (after Casson, 1971: fig. 1).

Illustration 3. 14th century Andalusian plate in Pergamon Museum

Illustration 4. Dhow

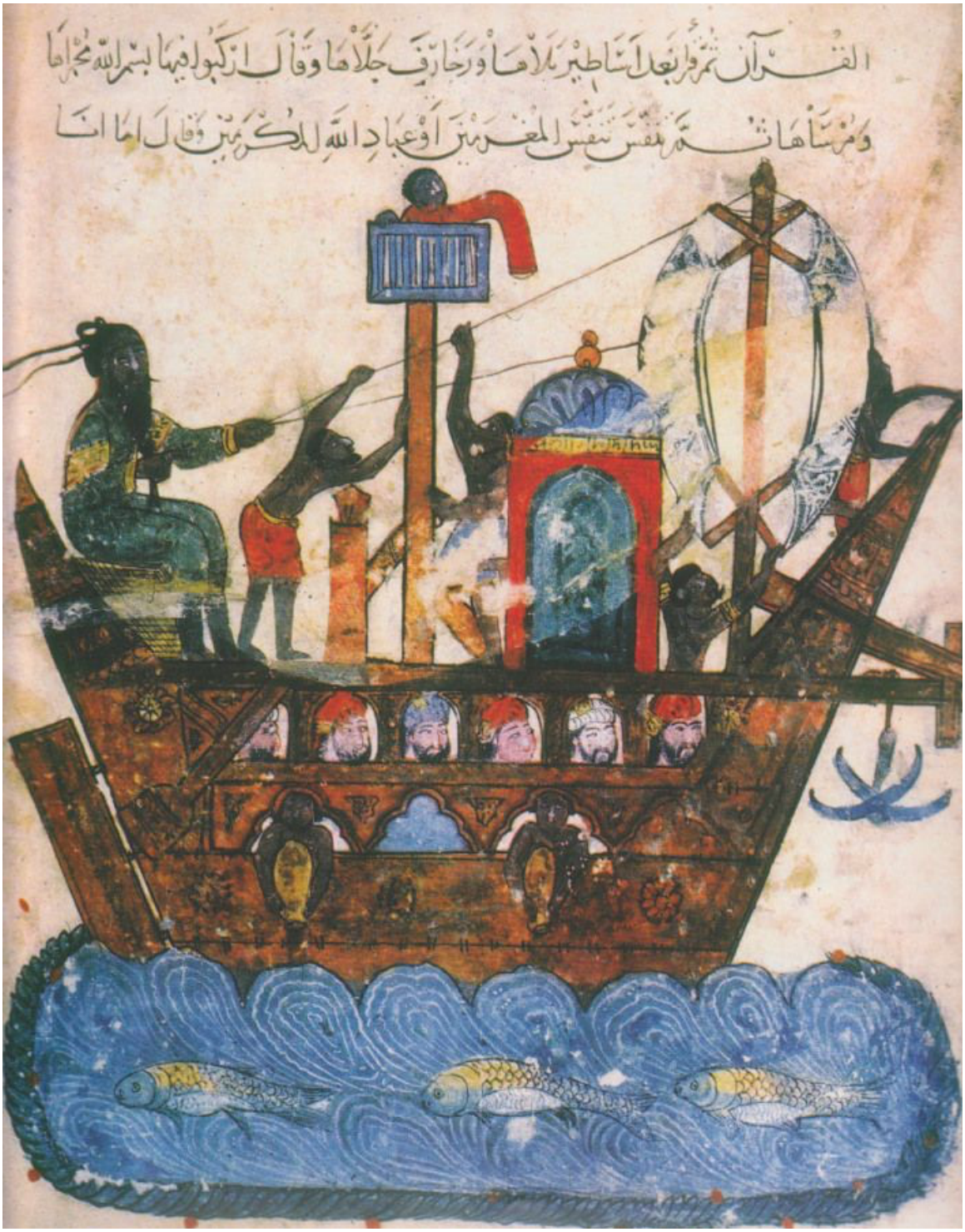

Illustration 5. Cog

Illustration 6. Roman ship

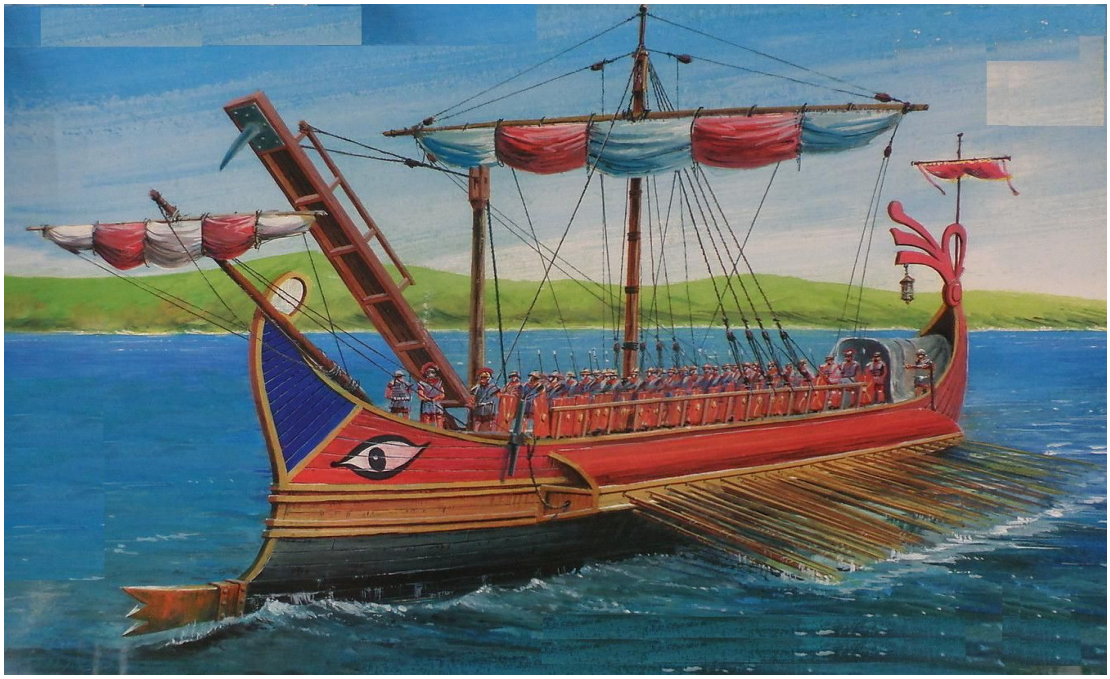

Illustration 7. Viking Vessel