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Niklas Eriksson

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How Large Was *Mars*? An investigation of the dimensions of a legendary Swedish warship, 1563–1564

Niklas Eriksson

The Swedish warship *Mars* was considered to have been one of the largest ships in the world when it exploded and sank in 1564. The problem is that no written accounts clearly reveal its dimensions. This article reviews how different researchers have discussed the size of *Mars* in the past. It also aims to shed new light on this topic by using information from the archaeological survey carried out at the wreck site since 2011. Even if the result is approximate it clearly shows that *Mars* was indeed an impressively large ship by sixteenth century standards, but not as large as many previous researchers have thought.

Key words: naval architecture, Swedish navy, warship, historical archaeology, carvel construction, early modern, Baltic Sea, Sweden

When the Swedish warship *Mars* exploded and sank during a battle against the allied Danish–Lübeckian fleet in 1564, it might have been one of the largest warships in the world. The problem is that no written documentary sources clearly reveal just how large this ship really was. As a consequence the number of guns as well as the ship's tonnage, its displacement and length, have been subject to various interpretations, calculations and speculations over the past 450 years.

In 1939 the commodore, historian and pioneering maritime archaeologist Carl Ekman published a short but well-formulated paper entitled 'The Swedish Ship *Mars* or *Makalös*' in *The Mariner's Mirror*.¹ In the text Ekman critically reviews what it was possible to know regarding the size of *Mars* from the sources available at that time. In 2011 the wreck of *Mars* was rediscovered on the seabed off the island of Öland in the Baltic Sea, making it possible to pick up the discussion where Ekman left off, and examine the question from an archaeological point of view.²

The aim of this article is to show how the archaeological information gathered from the wreck since 2011 can be used to reveal the length of *Mars* between stem and sternpost. However, as the ship turned out to be somewhat smaller than many previous chroniclers, researchers and writers have thought, the aim is also to review critically how the myth of this gigantic ship was created.

1 Ekman, 'The Swedish Ship *Mars*', 5–10.

2 For an overview, see Eriksson and Rönby, '*Mars* (1564)' and Eriksson, 'The Architecture of a Great 16th Century Warship', 824–36.

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**Ein Nie Liedt/
van dem Scharmügel/so nie-
lick / van dem Könige tho Dennes
marck/vnd den Heren van Lübeck/yegen
den Köninck tho Sweden/ gescheen/
den 30. vñ 31. Maÿ/ Anno. 1564.
In Störtebekers Tone/ edder
als men singt van Jun/
Der Baltzer. etc.**



Figure 1 The sinking of 'Mars' was a spectacular victory for the Danish–Lübeckian fleet. This is the title page of a ballad, written in Low German, describing the battle. (After Ekman and Unger, 'Svenska flottans sjötåg', 177)

Larger than a church

The keel of *Mars* was laid at Björkenäs shipyard, just north of the Swedish city of Kalmar, in 1561 and the ship was launched two years later. It was built under the supervision of Master Shipwright Holgerd Olsson, who built several large ships for the Swedish navy, including *Elefanten* (*Elephant*).³ When *Mars* was completed it was the largest ship in the navy, while *Elefanten* was the second-largest. There is reason to return to *Elefanten* in a moment, as the size of this ship is important when trying

3 Ekman, 'Stora kraveln Elefanten', 89–99.

to understand the dimensions of *Mars*. Both ships served in the Nordic Seven Years War (1563–70) against Denmark and the Hanseatic city of Lübeck.

Towards the end of May 1564 the Swedish navy encountered the allied navy outside Öland. In a violent battle fire broke out aboard *Mars*, which blew up and sank.⁴ The sinking of the brand new ship was a celebrated triumph for the allied forces, which used the event for propaganda purposes. It was at this moment that the myth of the gigantic ship was created (figure 1).

A Lübeckian chronicle, *Die Herren von Hövel*, states that *Mars* was 10 feet longer than the church of St Peter in Lübeck. Carl Ekman measured the church and ascertained that it was 49.5 metres long. Adding 10 German feet, which are equal to 3.14 metres, gave a length of 52.6 metres, equivalent to 172 English or 177 Swedish feet.⁵

There are several ways to measure a ship's length. Ekman understood the chronicle's account to mean the length between stem and sternpost, not including the beakhead in the bow or the counter in the stern. A ship that measures 52.6 metres between stem and sternpost is huge. The hypothesis was accepted and reproduced by naval historian and former *Mariner's Mirror* editor R. C. Anderson when he discussed *Mars*' size in relation to the near contemporary Lübeckian ship the *Adler*.⁶

The number of guns

A common way to ascertain the size of a fighting ship is to specify the number of guns the ship had. Just as with the dimensions of the *Mars*' hull, several contradictory numbers exist, from just above 100 guns to more than 200. It is important to note that the sixteenth century was a period of transition in terms of naval warfare, involving a change from boarding tactics to an increasing dependence on artillery. This means that *Mars* would probably have carried several huge cannon, but that the majority of its guns consisted of smaller-calibre weapons intended for close combat. One hundred guns aboard a sixteenth century ship cannot be compared to a similar number some 100 or 200 years later.⁷

Among the earliest published works that mention the number of guns on *Mars* is a chronicle written by Erik Johansson Tegel (1563–1636) under instruction from the Swedish King Karl IX (1550–1611). The chronicle contains detailed accounts of the war at sea and the loss of *Mars*. Tegel concludes that *Mars* was large, but does not say how large, and that the ship carried 125 bronze guns 'and other firearms'.⁸ The same number appears in one of the earliest works focusing more solely on the history of the Swedish navy, published in 1734 by the clergyman Carl Bechstadius (1690–1739).⁹ Unfortunately neither Tegel nor Bechstadius reveal the source from which this number derives.

An important and frequently cited source concerning the battle outside Öland and the size of *Mars*' armament is the letters from the Danish Admiral Herulf Trolle to the Danish king. In 1745 these letters were published in the journal *Danske*

4 Ibid.

5 Ekman, 'The Swedish Ship *Mars*', 5.

6 Anderson, 'The *Mars* and the *Adler*', 296–9.

7 For a more thorough discussion, see, for instance, Rodger, 'The Development of Broadside Gunnery' and Hildred, *Weapons of Warre*.

8 Tegel, *Konung Eric's den XIV*, 120, author's translation.

9 Bechstadius, *Then Adelige, och lärde swenske siö-man*, 134, author's translation.

Magazin, which made the letters easily accessible for scholars. According to Herulf Trolles's letters, *Mars* had 169 bronze guns and four of iron, giving a total of 173 guns.¹⁰

But obviously the *Danske Magazin* was not read by all historians at the time. The nobleman, poet and historian Olov von Dalin (1708–63) mentions, without reference to the source of his information, that *Mars* had more than 200 cannon. He goes on to say that the ship was so huge that its like had never before sailed the Baltic Sea.¹¹ This number of guns was reproduced by the bishop Olof Celsius (1712–94) in his book about the Swedish King Erik XIV. This is rather surprising as he gives full reference to Herulf Trolles's letter published in *Danske Magazin*, which claims *Mars* had 173 guns.¹² This exaggeration was in fact observed and commented on in a publication in 1783.¹³ But spectacular histories are difficult to erase once established, and the idea that *Mars* carried more than 200 bronze guns was soon distributed in far wider circles.

The spread of literacy in the nineteenth century and the increased production of books, allowed the wider echelons of society to read history. One of the most influential Swedish history writers in the early nineteenth century was Anders Fryxell (1795–1881). His *Berättelser ur den svenska historien* (*Narratives From Swedish History*), were published in 49 volumes between 1828 and 1893 and found their way into many Swedish homes. An account of the impressive *Mars* was reproduced in these books, along with the idea that the ship carried 200 bronze guns.¹⁴

Calculating the dimensions of the hull

On 25 July 1770 the famous naval architect Fredrik Henrik af Chapman (1721–1808) (figure 2) gave a speech to the Royal Swedish Academy of Sciences. The topic was 'the changes, which naval ships have undergone, since cannons were introduced aboard them'.¹⁵ In the historical background to his narrative he mentions that the legendary *Mars* was equipped with '125 cast bronze cannon and some smaller pieces, in all more than 200'.¹⁶ He continues by mentioning a French ship that was larger than *Mars* but did not carry as many guns, called *La Couronne*, measuring 179 Swedish feet (53 metres) between the posts. Chapman does not mention the size of *Mars* in metres or tons, but sums up his discussion by concluding that the *Mars* was 'as large as our 70-cannon ships used today'.¹⁷ In order to get an idea of what Chapman meant, one could mention that the Swedish 72-gun ship *Göta Lejon*, launched in 1746, measured 167 Swedish feet (50 metres) between the posts, whereas the ship *Adolf Fredrik*, built by Chapman in 1775, measured 51.7 metres.¹⁸

In 1783 the Swedish theologian, politician and historian Jacob Tengström

10 Trolle, 'Flere Herlov Trolles egenhændige Breve', 217.

11 Dalin, *Svea rikets historia*, 583.

12 Celsius, *Konung Erik*, 150.

13 Tengström, *Historisk afhandling*, 179–80.

14 Fryxell, *Berättelser ur svenska historien*, 236.

15 Chapman, *Tal, om de förändringar*, author's translation.

16 *Ibid.*, 4.

17 *Ibid.*, 6.

18 Dimensions from Lybeck, *Svenska flottans historia* 2, 545, 548.

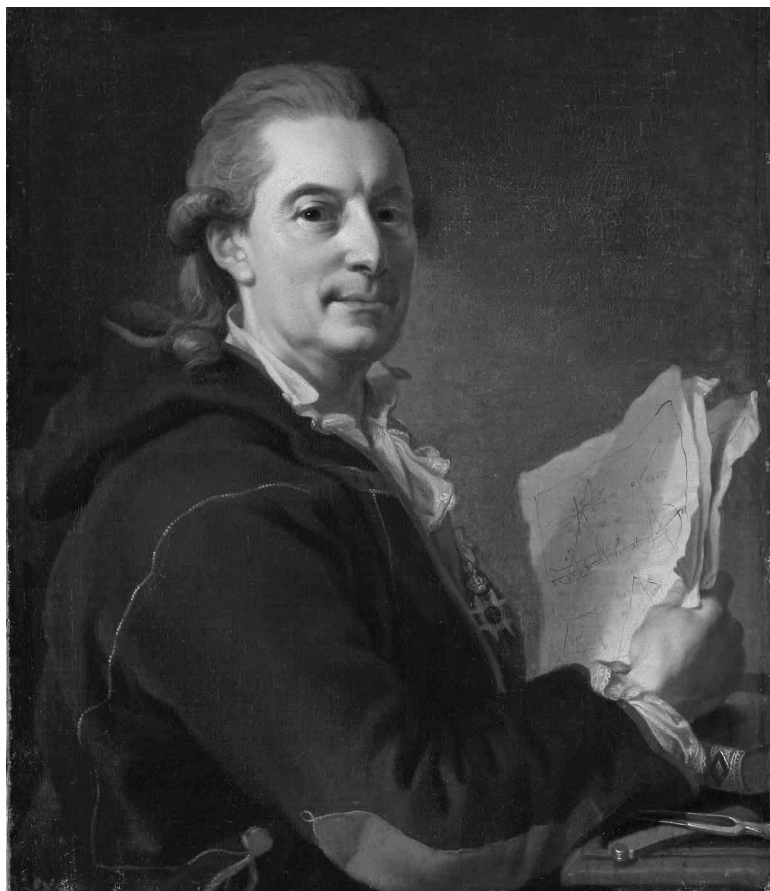


Figure 2 The famous naval architect Fredrik Henrik af Chapman calculated the dimensions of 'Mars' in the early nineteenth century, here he is depicted by Lorens Pasch the Younger (Nationalmuseum, Stockholm, Sweden, NMGrh 1701).

(1755–1832) published *Historisk afhandling om svenska sjömagten i äldre tider och i synnerhet under konung Erich XIV* (*Historical Dissertation on Swedish Seagoing powers in earlier times and especially under King Erich XIV*).¹⁹ Tengström has carefully read Trolles's letters published in *Danske Magazin* and his conclusions regarding the size of *Mars* were slightly more modest than Chapman's. He wrote that the ship must have been about the size of contemporary 'ships of 60 or 70 cannon'.²⁰ As a comparison Chapman built several ships designed to carry 62 guns, which measured 49.6 metres between the posts.²¹

Throughout his life Chapman wrote several books and treatises on naval architecture.²² One of his last major works was *Försök till en theoretisk afhandling*

19 Author's translation.

20 Tengström, *Historisk afhandling om svenska sjömagten i äldre tider*, 179.

21 Lybeck, *Svenska flottans historia* 2, 548.

22 See Harris, *F. H. Chapman*, for a biography.

att gifwa åt linie-skepp deras rätta storlek och form likaledes för fregatter och bevärade mindre fartyg (*Attempt at a Theoretical Dissertation to Give Ships of the Line Their Correct Size and Shape Likewise for Frigates and Smaller Armed Vessels*).²³ The aim was to create a formula from which it would be possible to calculate the ideal dimensions of warships from the weight of a suggested armament. In order to demonstrate these formulae he used several famous historical ships as examples. *Mars* was one of these. From his formulae Chapman concluded that *Mars* should have been 164 feet (48.7 metres) between the posts and 42 feet (12.5 metres) wide in order to carry the weight of the armament as given in Tengström's dissertation and Lieutenant Carl Gustav Tornqvist's (1757–1808) *Utkast till svenska flottans sjö-tåg* (*Draft of the Swedish Navy's Campaigns*).²⁴

A tendency in Chapman's calculations was that historical ships in general were built too small. They should either have been built longer and wider, or they should have carried a smaller number of guns. He was thus aware that the dimensions that he suggested for *Mars* were wrong, and much greater than those of the actual historical ship. Chapman concluded that it was not until the late eighteenth century that sailing warships were built in a size that corresponded to the size of their artillery.²⁵

The discussion about *Kronan*, another famous Swedish ship, is revealing for the tendency in Chapman's calculations. Armed with 126 guns this ship capsized and blew up in battle in 1676.²⁶ Many preserved documents reveal the size and weight of the armament as well as the principal dimensions of the ship. *Kronan* measured 178½ Swedish feet (53 metres) between the posts and was 43½ Swedish feet (12.9 metres) wide. According to Chapman the ship should have been built much larger: 197.4 feet (58.6 metres) long and 51.7 feet (15.4 metres) wide, in order to carry the same armament.

Needless to say this tendency disqualifies Chapman's calculations as historical reconstructions and it is important to remember that they were never meant to be used in this way. Chapman was a naval architect, not a historian or a nautical archaeologist. The reason he discussed historical ships was to illustrate his formulae and to show that ships were built too small in the past, not to reconstruct their original dimensions.

There are further problems with Chapman's calculations. Not only was the formula created for eighteenth- and early nineteenth-century ships, but as Carl Ekman so correctly observes, Chapman wrote that *Mars* was armed with 173 guns, which means that he based his calculations on a weight of armament about one-third too great. A Lübeckian report, *Der hansische Syndikus*, written some three weeks after the battle outside Öland, reveals that *Mars* had 106 guns.²⁷ This is actually fairly near the truth, but as Jan Glete makes clear, *Mars* actually had 107 guns:

23 Chapman, *Försök till en Theoretisk afhandling*.

24 Tornqvist, *Utkast till svenska flottans sjö-tåg*; Chapman, *Försök till en Theoretisk afhandlin*, 10.

25 Chapman, *Försök till en Theoretisk afhandling*, 9.

26 Einarsson, 'Kronan', 279–97.

27 Ekman, 'The Swedish Ship *Mars*', 6; Ennen, 'Der hansische Syndikus', 56.

two *hela kartoger* (40-pounders), two *tre kvarts kartoger* (30-pounders), two *notslangor* (long 20-pounders), seven *halva kartoger* (20-pounders), 10 *fältslangor* (10-pounders), four *tre kvarts slangor* (7-pounders) 20 *halva slangor* (3-pounders), six *dubbla falkonetter* (2-pounders) and 50 *falkonetter* (½-pounders) of bronze and four stone guns, two of 8, one of 7, and one of 5 inches.²⁸

Ten of the 50 *falkonetter* were at the time of the ship's loss on its large boat.

Unfortunately, Chapman's calculations have been reproduced ever since. Among the most important works to do so is the very influential *Svenska Flottans historia åren 1522-1634* (*The History of the Swedish Navy, 1522-1634*) written by archivist and historian Axel Zettersten (1839-1909). The use of Chapman's calculations actually created a strange anomaly in the history of the development of Swedish naval architecture that gives the impression that the ships built in the sixteenth century were much larger than the ones built in the seventeenth century. Zettersten reflects on this and concludes that 'Gustaf Adolf built ships that were equal in size to Erik XIV's *Mars*, which was considered to be the largest ship that had ever existed in any navy'.²⁹

Tonnage and displacement

One could suppose that Ekman's and Glete's observations that *Mars* had a smaller armament, than for instance Chapman thought, would have caused them to discard Chapman's calculations, and think that *Mars* was slightly smaller than previously thought. But instead of focusing on the ship's length or number of guns, they discussed tonnage and displacement. There is an important difference between the two units as tonnage refers to the amount of cargo that it is possible to load into the hull, whereas displacement refers to the amount of water that the hull displaces, which corresponds to the total weight of the ship.

The written sources that describe the *Mars*' tonnage are perhaps even more ambiguous than the ones that reveal the ship's armament or length. In late medieval and early modern Europe there were at least three different measurement zones for shipping in use. In Italy and other parts of the Mediterranean the measure was usually *botte*, whereas the term *ton* (derived from the French word for wine barrel) was used in western and south-western Europe. The capacity of a ship was thus expressed in terms of the number of barrels they could carry.³⁰ In northern Europe the measurement was a *last*. Most scholars agree that this term means a cartload, roughly equivalent to 12 barrels. But a *last* could sometimes mean 18 or up to 24 barrels as well. The *last* thus refers to volume and it is therefore dubious to convert it into other units such as weight. It is not possible to use the *last* to calculate displacement accurately.³¹

The *last*, *ton* and *botte* are usually found in relation to cargo vessels and merchant shipping, but are also used in connection with warships.³² A document in the Swedish National Archive mentions that *Mars* was of 700 *lasts* and the second

28 Glete, *Swedish Naval Administration*, 534, n. 49.

29 Zettersten, *Svenska flottans historia*, 331.

30 Salisbury, 'Early Tonnage Measurement', 41-52; Glete, *Navies and Nations*, 66-76.

31 Jansson, 'Om läst och lästetal', 29-47; Jansson, *Måttordbok*, 46-8.

32 Glete, 'Svenska örlogsfartyg 1521-1560', 28.

largest Swedish ship, *Elefanten*, was of 400 *lasts*.³³ At first glance these numbers appear to indicate that *Mars* was nearly twice as large as *Elefanten*. This however is not the case. A possible interpretation is that the difference in numbers between the two ships derives from the fact that *Mars* had two *överlopp* decks, which is the early modern Swedish denomination for a complete gun deck, whereas *Elefanten* only had one. *Elefanten* could load 400 cartloads of barrels on the one single deck, whereas *Mars* could load 700 on the two decks.

Even if Ekman realized that it was futile to attempt to come up with accurate numbers, he still calculated the displacement of *Mars* from the number of *lasts*. He writes that 1 *skeppsläst* (ship *last*) is equal to 18 *skeppspund* (1 *skeppspund* = about 170 kilogrammes). If this was the case, Ekman continues, *Mars* would have had a capacity, apart from normal equipment, of about 1,000 tons, a figure which does not in fact equate with his proposed calculation.³⁴ In a footnote in a later article he calculated the displacement of *Mars* displacement to be 2,100 tons.³⁵

In his many different works about the Swedish navy, Jan Glete estimates the displacement of *Mars*, *Elefanten* and many other Swedish warships. He used the same sources as Ekman but sets out to adjust the measurements using several other parameters such as the circumference of the anchor cables, the size of the crew and the weight of the armament to calculate the displacement of the ship. Unfortunately, Glete does not reveal the formulas used to reach his conclusions.³⁶ In a working paper, published online, Glete writes that it would require too much space to give a thorough account of how he came up with the displacement numbers for the different ships.³⁷ The impression is that it is a matter of estimations drawing from a variety of parameters rather than calculations. All the same, he is careful to point out that his displacement figures are approximate. According to Glete the displacement of *Mars* would have been around 1,800 tons.³⁸

To give a sense of proportion, one could mention that the Swedish *Vasa*, with 64 guns, launched in 1628 as one of the largest vessels of its day, displaced 1,210 tons. If the displacement presented by Ekman and later Glete is correct, *Mars* would have been much larger and heavier than *Vasa*. In fact, if their numbers are correct, it would take until the late seventeenth century before the largest Swedish ships could compare to the ones built under the reign of Erik XIV.³⁹ Can this really be the case?

Archaeology

Evidence from the wreck site can finally provide some lucidity regarding *Mars*' size. But as the foremost part of the hull was nearly annihilated due to the explosion that sank the ship, the archaeological evidence requires some reconstruction before it can reveal the dimensions.

33 Ekman, 'The Swedish Ship *Mars*' 215–16; 700 *lasts* are also mentioned in Ennen, 'Der hansische Syndikus', 56.

34 Ekman, 'Stora kraveln Elefanten', 63.

35 Ekman, 'Skeppstyperna under Gustav Vasas och Erik XIV's tid', 215–16, n. 1.

36 Glete, J., 'Svenska örlogsfartyg 1561–1570', 8, working paper published online (2006): https://www2.historia.su.se/personal/jan_glete/Glete-SvenskaOrlogsfartyg1561-1570.pdf

37 Ibid.

38 Glete, *Swedish Naval Administration*, 358, 679–83.

39 Rönby and Sjöblom, 'Havsguden från Västervik', 21.

When the ship sank, the hull broke up below the waterline into three more or less intact portions. When the vessel reached the seabed, the starboard side fell out on to the seabed and the portside fell on top of the hull (figure 3). In its preserved length, the keel measures around 30 metres. The forward end is broken and two loose parts of the keel have been observed on the seabed abaft of the hull.⁴⁰ It would likely be possible to raise these fragments and piece them together in order to learn more about the ship's dimensions. In the meantime there are other features that can be used to calculate the length from already gathered data.

Even if it is not possible to measure the length of the keel or between the posts, it is possible to establish the length between the top of the sternpost and the mainmast. Using proportions from other large ships it is possible to calculate how much of the bow is missing and thus get an idea of the original length.

The mainmast itself has not been found. On contemporary images of large warships, the mainmast is usually placed forward of the foremost shroud and slightly forward of the break of the sterncastle. It is possible to pinpoint this position on the preserved hull structure. The foremost top timber of the sterncastle is preserved along the starboard side and thus clearly reveals its forward extension (see figure 3).

The channel, which gave greater spread to the shrouds, is attached to the hull with standing brackets placed just abaft of the gun ports of the lower gun deck.⁴¹ On the starboard side this entire structure is intact, albeit hidden in sediment. On the port side the original position of the channel and its attachment to the hull-side is revealed by a notch in the wale. The shrouds were anchored to the hull with chains; incrustations of rust located on the portside further reveal the location of the shrouds. The mainmast was thus placed between lower gun ports four and five, counting from the stern (figure 4).

The sternpost's position in relation to the portside is not complicated to determine. *Mars'* stern is round tucked with the bottom planking ending towards a rabbet in the sternpost and towards the wing transom. The wing transom was placed on the upper end of the sternpost and ended against the wale (figure 5). The upper end of the sternpost was placed longitudinally just aft of the wales.

Measurements from the *Mars* wreck site have been collected by divers using measuring tape as well as multibeam, blueview and photogrammetry, which have all provided concordant numbers.⁴² Rounded to whole metres the centre of *Mars'* mainmast ran through the lower gun deck 19 metres from the outer end of the sternpost. Now, what does this distance tell us about the length of the hull between stem and sternpost?

Comparative sources for the architecture of sixteenth-century ships are limited, but there are some images, wrecks and drawings that can be used. In the sixteenth and early seventeenth centuries the largest ships had either three or four masts. In 1589 the German engraver Franz Hogenberg (1535–90) depicted *Mars* with four masts but written sources reveal that the ship actually only had three.⁴³ This is of some importance

40 Eriksson and Rönby, '*Mars* (1564)', 94.

41 *Ibid.*, 100–1.

42 *Ibid.*

43 *Ibid.*

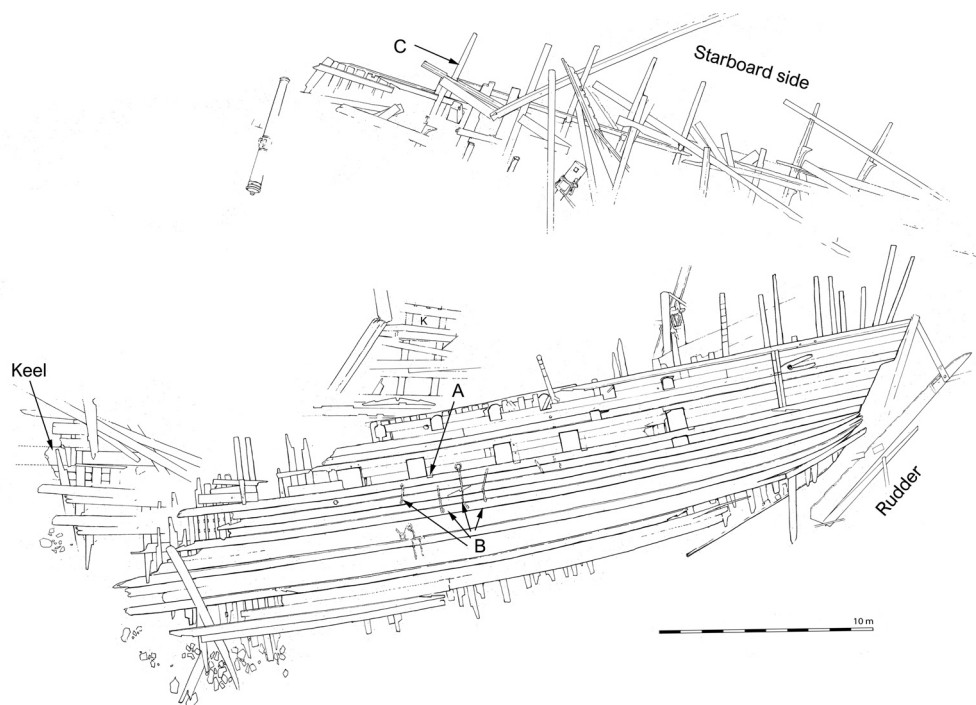


Figure 3 Preliminary site plan. The exploded bow is to the left and the remaining hull has broken into three more or less intact parts. A notch in the wale for the bracket that supported the channel, B chains from the shrouds, C the foremost top timber from the stern castle. (Author's drawing)

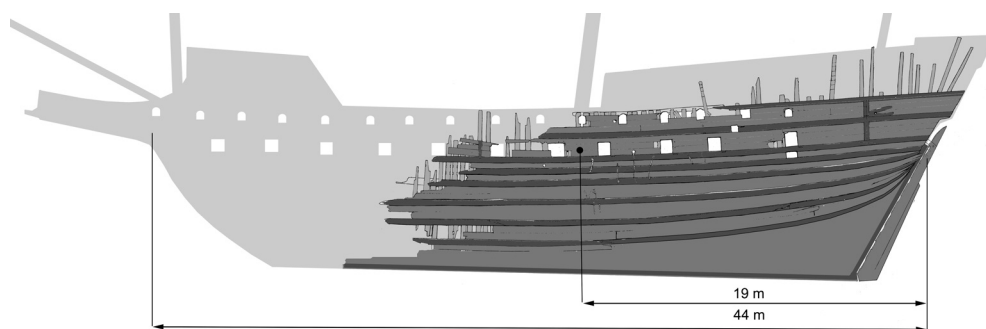


Figure 4 Reconstructed side view of 'Mars'. The grey shadow provides an idea of how much of the hull is missing. The original length between the posts has been calculated to be 43–45 metres between stem and sternpost. The reconstruction is drawn as if this distance was 44 metres. (Author's drawing)

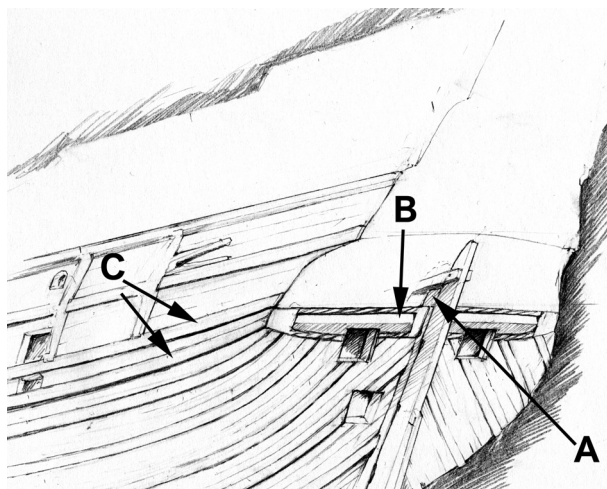


Figure 5 Reconstruction of the stern revealing how the different parts were originally attached to each other. A stem post, B wing transom, C wales. (Author's drawing)

as four-masted ships sometimes have their mainmast more or less amidships. If *Mars* had the mainmast in the same position as for instance the four-masted *Mary Rose*, then *Mars* would have only measured 39.3 metres between stem and sternpost.⁴⁴ Using the location of the mainmast of a four-masted ship depicted in one of Mathew Baker's 'Fragments of ancient shipwrigthery' gives a length of 38.86 metres.⁴⁵

A ship often mentioned in connection with *Mars* is the *Adler* from Lübeck as they were nearly contemporary. The *Adler* was launched in 1566 and is commonly argued to have been slightly larger than *Mars*.⁴⁶ There is a contemporary painting of the *Adler*. Despite its level of detail the proportions are naïve and the ship is not depicted exactly side-on, which does not make it suitable for calculations. The same may be said regarding an epitaph for the ship's priest Sweder Hoyer in St Jacobi church in Lübeck. Both the four-masted *Adler* and the three-masted ship depicted on Hoyer's epitaph have their mainmasts placed aft of amidships (figure 6).⁴⁷

An image that has more worth as a comparison with *Mars* derives from a Danish manuscript and is signed Rudolf van Deventer, 1585. It shows a Danish ship in action with a Swedish vessel. The latter has many similarities to *Mars*, such as the rounded stern, the two gun decks and the three masts. What is also worth noting is the location of the mainmast in relation to the stern castle, the channel and the shrouds. It is placed astern of amidships and is inclined slightly abaft, which means that the length between the posts is larger than simply double the distance between the sternpost and the mainmast. Using the proportions of Deventer's image, even if the result is far from exact, indicates a length between posts of nearly 43 metres (figure 7).

44 Measured from drawings in McElvogue and Marsden, *Mary Rose*.

45 Measured after Kirsch, *The Galleon*, 21.

46 Anderson, 'The *Mars* and the *Adler*', 297.

47 Reproduced in Mortensøn, *Renæssancens fartøjer*, 86.



Figure 6 A large ship depicted on the epitaph of chaplain Sweder Hoyer of the Hanseatic navy who died in the war against Sweden. (after Mortensøn, 'Renæssancens fartøjer', 86)

Even if it was built and finished more than 60 years later, the Swedish ship *Vasa* is comparable to *Mars*. On *Vasa*, the distance between the outer end of the top of the sternpost and the centre of the mainmast as it passes through the deck is 20.3 metres, compared to 19 metres on *Mars*. By using the proportions of *Vasa* this would give *Mars* a length between the posts of 44.45 metres.

It would be possible to continue with more examples but the results would be very similar, ranging from just below 40 metres to around 44.5 metres. The lowest numbers result from using proportions from ships with four masts and the greater lengths derive from using proportions from ships from around the Baltic Sea, not least Deventer's image and *Vasa*. This author believes that the latter calculations are the most relevant and that *Mars* originally measured somewhere between 43 and 45 metres between stem and sternpost.

There is reason to return here to the second largest ship, *Elefanten*. In contrast

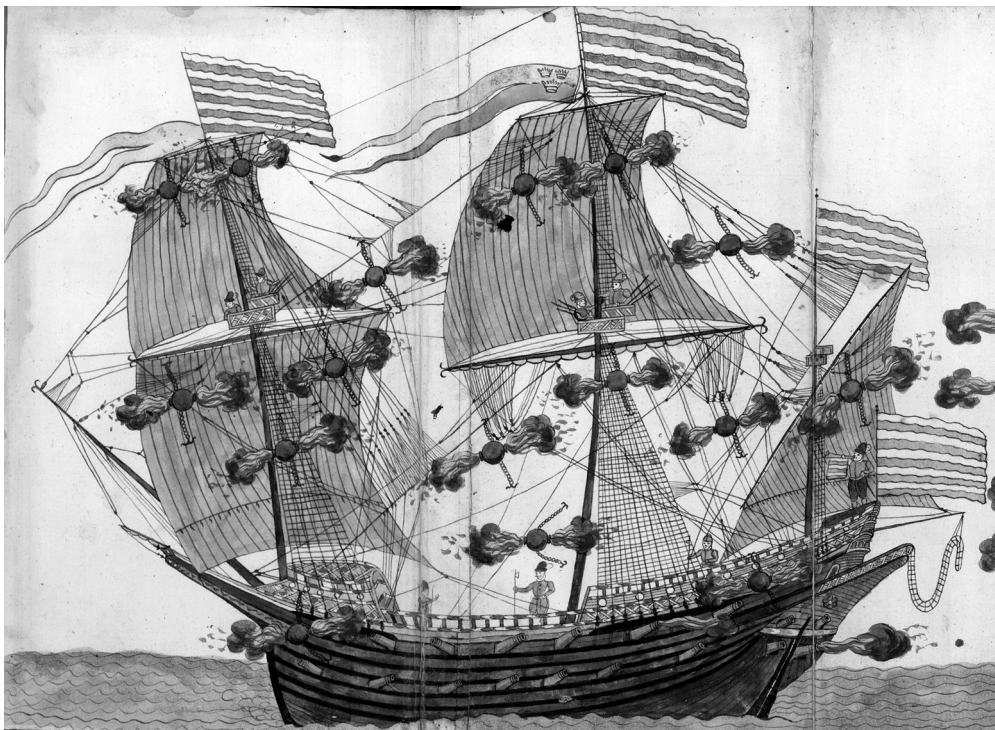


Figure 7 Detail of an illustration of a Swedish ship in a Danish manuscript, signed 1585. Note that the mainmast is placed abaft of amidships. (Det Kongelige Bibliotek, København)

to *Mars*, *Elefanten* sank in shallow water. The lowest parts of the hull are preserved, including the entire length of the keel. Between the years 1933 and 1939 the wreck was subject to a pioneering underwater archaeological survey under the supervision of Carl Ekman.⁴⁸ Ekman salvaged a large portion of the stern construction and estimated that *Elefanten* measured around 145 feet (43 metres) from stem to sternpost.⁴⁹ Thus *Mars* was perhaps not much longer than *Elefanten*, but probably higher, considering the fact that *Mars* had two more or less complete gun decks.

Conclusion

Ekman suggests that *Mars* measured 52.6 metres between stem and sternpost, whereas Chapman gives a value of 48.7 metres, drawing on calculations using numbers found in preserved documents. Comparing these values with the length revealed by the archaeological survey has revealed an interesting discrepancy. Even if we know that the 107 guns aboard *Mars* cannot be compared with a similar number aboard warships in the following centuries, the notion that these were crammed into a ship that only measured around 44 metres between stem and sternpost adds something to our understanding of sixteenth century naval warfare. *Mars* was one of the last ships to be built boarding tactics ships, with high fore- and sterncastles, but at the same time it was equipped with a large number of brand new

⁴⁸ Adams, *A Maritime Archaeology of Ships*, 237–45.

⁴⁹ Ekman, 'The Swedish Ship *Mars*', 7.

muzzle-loading cannon. The ship is thus almost a prototype of the sailing warships that were built in the century that followed. In conclusion it can be said that *Mars* was an impressively large ship by sixteenth-century standards, but perhaps not as large as many previous researchers have thought.

Niklas Eriksson is associate professor in archaeology and connected to CEMAS Centre for Maritime Studies at Stockholm University. He was awarded a PhD on the archaeology of fluit ships in early modern everyday life in 2014 and has published a number of books and articles on Swedish naval history and archaeology.

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