

The Use of the Lead and Line by Early Navigators in the North Sea?

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ABSTRACT: This paper draws attention to the lack of information as to how early North Sea sailors navigated, particularly during the one thousand year period that followed Roman times. The lead and line was the only navigational aid available for most of this period, but there is little recorded as to whether it was used simply for ensuring a ship or boat had enough water to proceed or whether, together with the knowledge it provided of the nature of the sea bed, it was used as a more positive position fixing device. The author would appreciate any information relating to navigation techniques used during this period.

1 INTRODUCTION

Every sailor, at the back of his or her mind, is aware that the nearest land is likely to be directly beneath the ship's keel and, as a result, he or she is interested to know just how near. This information has been readily available to mariners for many years. It can be found by plotting a position on a chart where depths are recorded or by direct measurement using an echo sounder.

In ancient times, charts were virtually non-existent but the depth of water could be measured by a sounding lead and line or, in shallow water, by sounding rods. See figures 1 and 2.

Somewhat later, the base of the weight was made hollow to accept a plug of tallow or a similar material so that a sample of the river or sea-bed could be recovered. A sounding in deep water has a more general use than simply avoiding stranding. Together with knowledge of the nature of the sea-bed, it

provides clues to a ship's position and, it therefore, has real navigational significance.

The first record of this use was by Herodotus in the Fourth Century BC who wrote that, when approaching the Nile estuary from seaward, a depth of eleven fathoms, with a bottom sample of yellow mud, indicated that the ship would be a day's sail from Alexandria.

The lead and line were certainly used in the Mediterranean Sea during Roman times, as described in the Biblical account of St Paul's shipwreck which took place in about 60 AD. When the sailors sensed that land was near, they dropped a line and measured 20 fathoms. A little further on, they dropped the line again and found 15 fathoms. They then threw out anchors from the stern to prevent stranding on the lee shore. In the morning, they cut the anchor ropes and the ship was blown towards the shore where it grounded on a sand-bank.



Figure 1. Use of a sounding rod on an Egyptian ship, c. 1250 BC



Figure 2. A tomb model of an Egyptian boat from c. 2000 BC

2 EARLY NORTH SEA NAVIGATORS

There is no doubt that the lead and line was a useful navigation tool for Mediterranean sailors (see Oleson¹). It might well have been developed independently by sailors in the North Sea but, in any case, it would surely have been introduced in that area as the Roman empire expanded towards the North-West and, eventually included Britain. Strabo² describes ships used by the Veneti, a tribe which lived in what is now North-West France. These ships had sails and were built of oak, and they had anchor cables of iron chain. The Veneti regularly sailed to Britain and, although there is no record as to whether they used lead and line, it seems unlikely that they did not, especially after their contact with the Romans.

If the lead and line were useful to the Mediterranean sailors where much of the coastline is steep-to, with deep water close to the land, and visibility is generally good, then how much more useful it must have been to early sailors in the Southern North Sea. There, the coastlines are generally low, with few distinguishing features. There

are many offshore shoals and visibility is often poor. Finally, there are the tides which, not only change the depth of water, but also generate tidal streams whose rate is similar to the speed at which ancient boats could be sailed or rowed.

In this context, it should be noted that anchors had additional uses in the North Sea as compared with the Mediterranean so that boats could ride out the six hours of an adverse tide rather than attempting the fruitless task of rowing or sailing against it. Anchors were also needed to safely kedge off a beach or sand-bank on a rising tide after a boat had deliberately taken the ground to load or discharge passengers or cargo.

Even before the Romans left North-West Europe, there were movements of the northern European tribes towards the west, and some as far as Britain. For example, Pye³ tells us that the Romans in Britain appointed a Count of the Saxon Shore. As the Roman grip weakened, the North Sea became the route by which Saxons (from what is now Northern Germany), Angles (from what is now Southern Denmark) and Jutes (from what is now Northern Denmark) migrated

towards the west, with many reaching as far as Britain. However, it was the Frisians who became the most important traders in the North Sea (Pye³) as their base expanded from the Rhine Delta as far east as the Weser. By 600 AD they had achieved a near monopoly of trading in the area and they maintained this until the coming of the Vikings in around 800 AD.

Amongst historians, there is some disagreement between those who believe the early Southern North Sea mariners followed the coastline and others who believe some, at least, struck out more directly across the open sea. For example, Crumlin-Pedersen⁴ suggests that "Rowing techniques did not change the fact that navigation was still based on landing or mooring offshore every night: except for the crossing of straits. Thus, all movements from Jutland to Britain were bound to be along the coastal regions of Lower Saxony and the Netherlands" He also notes that "It was possible to row in sheltered waters almost all the way from the West Coast of Jutland at Esbjerg to the entrance to the channel, East of Calais." Other historians, e.g. Pye³ suggest that it was actually safer to make the crossings in the open sea, away from shoals and strong tidal streams, a view which the author believes most sailors would agree with.

Whatever the case, the lead and line would, by default, have been the most valuable aid to navigation available to those early North Sea navigators.

From around 800 AD, the Vikings became the dominant force on the North Sea, due, in large part, to the superior design of their ships and the fighting prowess of their warriors. Their home waters in the Northern part of the North Sea, where coastlines were steep and offshore depths of water much greater, meant that they needed navigation methods in addition to the lead and line. They almost certainly used the Sun and the Pole Star for estimating latitude as well as for indicating direction. It is likely that the Southern North Sea sailors would also have used the sun and stars for setting and holding an approximate course, but the Vikings appear to have also developed a sun-compass for more precise measurement of direction (see Thirlund⁵). Prior to this development, the lead and line had been the only navigation aid that had been recorded anywhere in the world.

Although the Vikings possessed considerable expertise in deep-sea navigation, they would also have had to rely on the lead and line when approaching the wide, shallow and shoal strewn estuaries of the Southern North Sea. However, as with the Frisians before them the author has been able to find little record of their actual techniques. The introduction of the magnetic compass in the 13th Century made life easier for sailors, but it provided information that complemented the lead and line without replacing it.

Following the Viking period, the ships of the Hanseatic League became the principal actors in the North Sea and Baltic Sea trades. The League remained in business from the 14th Century until 17th Century. It was formed by the getting together of the commercial maritime interests of a diverse group of cities. It developed rules and regulations for the greater good of its members and, in some cases, despite many internal disputes, it wielded greater power than sovereign states of the time. Clearly, in the interests of

profitable trade, it was necessary for ships to navigate safely on their voyages. However, the author has found no records of how the pre-eminent navigation aid, the log and line, was used in practice.

3 CONCLUSIONS

From the 17th Century, onwards, seamen became more literate and navigation became more scientific although it has to be said that the lead and line continued to receive less attention in the literature than was its due. Sounding and finding one's way by measuring the depth of water and sampling the nature of the sea bed was something that sailors did as a matter of routine and it was not thought to be worth writing about. In 1883, Mark Twain, belatedly attempted to put this right in his book "Life on the Mississippi." More to the point, for the purposes of this paper, was an illuminating article in the UK *Journal of Navigation*, in which Lt. Cdr Cooper⁶ described how, in 1937, as a young boy, he accompanied his fishing-skipper father as he took his trawler to a North Sea fishing ground, fished for two days, and returned to port. During this time he consulted no charts and navigated exclusively by lead and line, although echo sounders had been available from the nineteen twenties. Courses were set by magnetic compass, reading points and quarter-points. The lead was cast at half-hourly intervals and the sea bed sample was examined visually and by taste.

The lead and line has never had the glamour of the astrolabe and sextant but, in the grey, misty North Sea, with dangerous shoals off low lying and featureless estuaries, the lead and line must have once been king, aided by the prodigious memories of the seamen. In an area with significant tidal range, the nature of the sea bed, and even its taste, was often considered to be more important navigational information than the depth of water.

The author has in mind to produce a more definitive paper on the navigational use of the lead and line through the ages, and especially in medieval times from around 400 to 1400 AD, but records are relatively few. If any readers can point him towards useful sources, he would be most grateful.

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