**Possible Anglo-Saxon Navigational Practices**

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**Abstract**

There is no evidence in the archaeological or historical record to show how, during the first millennium AD, Saxon seafarers found their way along the shallows of rivers and coastlines of the Baltic and North Seas, much less how, out of sight of land, they navigated their way across deeper waters between Britain and northern Europe. However, there is evidence within classical texts to show commercial mariners of the Graeco-Roman period were practised navigators well used to finding their way across and around the Mediterranean Sea, eventually to progress into the Channel and North Sea. Even earlier, Egyptian sailors on the Nile used techniques of depth-finding that would be recognised by seafarers along a timeline that extends from the Bronze Age to the early 20th century. The mariner`s requirement for safe navigation along the centuries of this timeline has remained the same: where am I; how deep is the water over which my vessel floats; what course do I need to steer to get to where I need to be?

**Keywords:** depth finding, way finding, sun compass, wind compass, astronavigation, tides, tidal streams, wind, waves.

**1. Introduction**

The building of the replica Anglo-Saxon longship whose impression was first found in the soil of Mound 1 at Sutton Hoo in 1939, has posed the question of how this vessel may have been operated – either by oars or sail, or a combination of both. Whichever way it was driven, it is equally important to discover how it, and others like it, would have been navigated in the rivers of the region, around the coastline of what is now East Anglia and during passages across the sea in the great migration from what was the Saxon`s original home in northern Europe. This research attempts to identify how Saxon seafarers found their way and the navigational practices they may have used.

There is evidence of maritime raiding by the Germanic tribes along the North Sea and Channel coasts long before the Roman grip on its empire became seriously weakened. Such was the extent of the piracy during the 3rd and 4th centuries AD, the Romans established a defensive system of fortifications along the coasts on both sides of the North Sea and Channel, commanded by a military *Comes Litoris Saxonici* – Count of the Saxon Coast. By the mid 5th century AD, the extent of the piracy and plunder carried out by these Germanic tribes, amongst whom were Saxons, Angles and Jutes, demonstrated a collective familiarity with the coastlines, rivers and hinterlands, and the sea passages between (Haywood 2006: 2, 57-68). It was a familiarity that enabled an eventual migration of these tribes through many voyages across the North Sea to settle in what is now East Anglia, and along the North Sea and Channel coasts, to become Anglo-Saxons. In the days before any form of navigational aid such as a compass, the obvious question arises; how did these seafarers find their way out of sight of land, their ships pressed by wind, weather and tidal streams, by day and by night?

In the early medieval period between the end of the Roman occupation and the appearance of the Vikings, there is no written evidence that signals how Saxon seafarers achieved these feats of seamanship. In terms of its absence, it is a dark age for written evidence. There is, however, evidence to support a continuity in use of certain navigational practices; a continuity that extends in time from the ancient Egyptians to mariners of the 21st century. It ought to be safe to assume that along this timeline the Saxon seafarer was part of this continuity and used the same types of navigation. This research examines that assumption.

**2. Depth Finding**

**2.1 The Sounding Rod**

In their article, (Kemp-D`Olier 2016: 69) describe how the ancient Egyptians` navigation of the river Nile and the shoals of its delta with the Mediterranean was problematic. The annual inundations that occurred on the Nile meant that users of vessels of even shallow draughts met with variable depths and shifting sandbanks throughout the year. Whilst local familiarity was part of safe river navigation in the absence of charts, determination of any actual depth of water was essential in building this local knowledge and to establish any change in the river`s characteristics. Safe passage, therefore, relied on probing the seabed ahead of the vessel with a hand-held sounding rod, as the vessel moved (see Fig 1).

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Fig 1

Ancient papyrus showing figure in bow of vessel using sounding rod

An explanation of this technique for finding navigable waterways in shallow water was demonstrated by Erskine Childers (Childers 1978: XII, 108-117) in his book published in 1903. It was a technique familiar to any mariner of the time, professional or recreational. The setting of the novel is the shallow seas around the German Frisian Islands, coincidentally an area with which the Saxons would have been familiar. With a continuity of use between the ancient Egyptians of 3000 BC, through Duke William of Normandy`s invasion of England in 1066 (see Fig 2) to Erskine Childers in 1903, the dark age Saxon seafarer was almost certain to have used a sounding rod when navigating unknown river and coastal waters until it could be replaced by a mental map that comprised local knowledge.

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Fig 2

Figure in bow of right-hand vessel using sounding pole

**2.2 The Lead Line**

As Egyptian, Greek and then Roman trade expanded across the deeper waters of the Mediterranean, sounding rods were of little use and another method of establishing the depth of water under a ship`s keel was necessary. This method (Kemp-D`Olier 2016: 69), involved a lead weight attached to a long, light line of rope (see Fig 3).

The weight attached to the line would have been thrown forward of the vessel`s bow as it moved, and the line released until the weight touched bottom. The length of line released being the measure of the depth of water beneath the vessel`s keel. It appears a simple technique but requires skill to achieve an accurate and timely result.

Marine archaeological surveys have recovered many such weights found on the seabeds around Mediterranean coastlines. Although the rope lines that would have been attached to the weights have perished, the weights themselves survive and show cupped bottom surfaces likely to have contained tallow, or other animal fat, to allow a sample of the seabed surface to be obtained. The depth of water indicated by the length of line and the sample obtained – sand, seashells or small pebbles etc. – give an important clue as to the coastal location of the vessel, perhaps for a return visit.



Fig 3

Ancient lead weights with hollowed bottoms for tallow or another animal fat

**3. Way Finding**

**3.1 Seamarks**

Notwithstanding the navigational practices the Saxon seafarer may have used to arrive at a landfall, without the advantage of local knowledge finding a safe anchorage or harbour would have been difficult. Christer Westerdahl`s study of ancient seamarks erected around the coastlines of northern Europe begs the question of how they may have been used by the Anglo-Saxons (Westerdahl 2010: Deutsches Schiffahrtsarchiv 33). Westerdahl argues that the primary purpose of a seamark is to show the way to a harbour (or safe anchorage) and that a harbour, however big or small, would have been at the centre of the local economy. Identifying such a harbour or anchorage for the stranger would have been important, especially for purposes of trade. For the non-local seafarer, without a mental map of the sea/river area, a seamark or a combination of them would show the way to a strange harbour`s location.

As part of the social history of seamarks, Westerdahl also examines the local hierarchy(ies) whose authority may have been used for the positioning and maintenance of seamarks; an important factor for local economies engaged in trade offshore. By their nature, seamarks would probably have been temporary structures; certainly in archaeological terms (see Figs 4 and 5).

Not covered by Westerdahl`s research is a seamark called a “withy” (See Fig 6). Simply comprising a tall sapling stuck in shoaling mud or sand, the withies, of which there should be two in number, indicate the deeper channel that can be passed at low water between them and sand or mudbanks on which they are placed. Withies are considered to be an ancient type of seamark to have been used since pre-Roman times.



Fig 4

Cone-shaped log beacon (possibly intended to be burned in bad visibility?)

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Fig 5

Stone cairn of more permanent status than the cone-shaped log beacon

**A fishing pole in the water

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Fig 6

A single river Alde withy - there should be two with the deeper passage between.

**4. Astronavigation**

**4.1** Whilst there is historical continuity in the use of the sounding rod and lead line for coastal and river navigation both were of little use in passage-making across open seas, out of sight of land. Ocean navigators needed a different method of finding their way.

Although seafarers had used the sun and stars for finding their way at sea centuries before the Saxons came to Britain, there is little evidence within Greek and Roman classical texts to explain exactly how it was done. Similarly, there is no evidence other than folklore to describe how the Saxons used the sun and the stars to find their way. The night sky of 600 AD would appear little different to that of today. Significant change would occur over a period of 10,000 years, not 1500. Greeks, Romans and Saxons would see the same night sky but name and apply meaning to the constellations and planets, differently. The Saxons did not use the Graeco-Roman Zodiac. Otto Reuter`s record of Germanic folklore (Otto Sigfrid Reuter 2004: 1-24) tells that they had a different interpretation of the constellations in the night sky to that of classical Graeco-Roman times.

The Greeks and Romans had little use for the sun in finding their way, other than marking sunrise, mid-day and sunset. Instead, they made greater use of the seasonal and diurnal winds of the Mediterranean (see Wind Compass below). The night sky changed along with the seasons and the rise and fall of constellations within each sign of the Zodiac marked the passage of time (Danny Lee Davis 2009: 8, 238-242). The most important constellation to the mariner was Ursa Minor (Lesser Bear) which did not rise or fall and whose stars in its tail indicated the position of the circumpolar pole star (now called Polaris). Although neither the Greeks nor the Romans had a concept of North as a bearing, the polar star represented a constant direction with daily sunrise and sunset providing two other cardinal points. Its elevation above the horizon also gave the mariner what today we would call a position line – an east/west line of latitude, and an added sense of direction for parallel sailing to maintain the star`s elevation. In the Mediterranean, latitudes vary 350 to 450 North.

Unlike the classical texts of the Graeco-Roman period, there are no corresponding clues to navigational practices from within Anglo-Saxon folklore. Between the 5th and 8th centuries their pagan myths, legends and beliefs were transferred orally, not written down. The poem Beowulf is an outlying example of this as is the continuing debate over placing its origin, before or after the Christianisation of the Anglo-Saxons.

**4.2** There has, however, been one attempt to bring together the myths, legends and beliefs of the Germanic people in Otto Sigfrid Reuter`s book Skylore of the North. This book, amongst other things, seeks to predate the Saxon`s grasp of astronomy before that of the Vikings and their journeys of exploration across the North Atlantic. In his interpretation, the polar star became the lode star.

Reuter presents little evidence to support his research other than the epic poetry of the Norse and Icelandic sagas. Disturbingly, there is reasonable evidence that by 1934 Reuter was a member of the NSDAP (Nazi Party) whose ideology was fed by the mythical origins of the Germanic people and their paganism. His research therefore needs to be treated with considerable caution. One aspect of Saxon seafaring for which Reuter may have been right was that open sea passages may have been undertaken during early Spring and Autumn when the night sky was darker than that of summer. Moreover, the manpower that would otherwise have been at sea was required for the summer harvest.

**4.3** Dismissing Reuter`s research leaves an alternative to the question of how Anglo-Saxon seafarers found their way across the open sea - a continuity in use of Roman techniques. In his book Haywood (Haywood 2006: explains that the Saxons were familiar with the practices of Roman seafaring – over the time of Roman occupation of Britain and Gaul they had worked with, plundered and hijacked Roman ships. This was a relationship in which seafaring practices may have been copied. The Romans, of necessity, would have needed to change the practices that worked in the Mediterranean for those that suited the Channel and North Sea. Although these details are not known, the constants would have been the sun at sunrise, mid-day and sunset, the constellations and the polar star.

**5. Ground Tackle**

**5.1 Anchors**

Even today, an anchor is not so much an aid to navigation but more of an aid to mariners whose mistake, or perhaps deliberate act of navigation, may have found their vessel aground or possibly stemming a tide against which they could neither row nor sail. In both cases an anchor would be useful; in the first case, “kedging” the vessel off a sandbank and the second, anchoring the vessel to the seabed to avoid losing position due to an opposing tidal stream or current. An anchor would also be used to secure a vessel to a beach for loading/unloading cargo or people. A primitive but effective anchor is at Fig 7 (Shaw 2016: Autumn, 20).



Fig 7

Example of wooden anchor some 3ft across

weighted with a large rock

**6. Other Navigational Techniques**

Archaeological research and discovery within classical texts has revealed that other navigational practices were probably in use before and after the early-modern Saxon period. However, none of these can be identified as used by Saxon seafarers.

**6.1 Graeco-Roman period – Wind Compass**

In his PhD thesis on commercial navigation by commercial mariners in the Greek and Roman world Danny Lee Davis examines classical texts for, amongst other things, the use of wind compasses (Danny Lee Davis 2009: 4 107-119). These ancient mariners used seasonal and diurnal winds to establish direction - four Greek winds: Boreas-from North, Euros-from East, Notos-from South, Zephyros-from West. These were later increased to twelve winds from different cardinal points. Over time this familiarity led to the development of a circular wind compass: the horizon divided by the direction of regular winds with a datum of sunrise that orientated the circle to east each day. The regular seasonal and diurnal winds of the Mediterranean Sea between continental Europe and Africa would have given the Greeks and Romans an advantage not available to Saxon seafarers who operated in the changeable, maritime climate of the North Sea and Channel.

**6.2 Viking Period – Sun Compass**

Writing in the Journal of Navigation (RIN 1993: 46, 33-48) Thirsland has described the operation of a hand-held bearing dial (sun compass) believed to have been used by Viking navigators, the remains of which were discovered in southern Greenland in 1948. (See Fig 7).



Fig 7

Remains of Viking hand-held bearing dial, circa 10th century, discovered in southern Greenland in 1948

He described its reproduction and operation below:

*Place a circular wooden disc, about 200 mm in diameter, horizontally in a*

*place where the Sun can shine on it during the whole day. The gnomon should*

*be set upright in the centre. This could be a nail of 10 to 20 mm in length but,*

*even better, is a cone of about the same height. When, in the morning, the Sun*

*starts casting a shadow from the gnomon, mark the end of the shadow and*

*continue doing so throughout the whole day. The shadow will shorten during the*

*morning, and at noon, when the Sun is at its highest, the shadow will be shortest,*

*and in our latitudes will point exactly to the north. In the afternoon, the shadow*

*will again become longer until it disappears in the evening. If the marks are*

*placed at every full hour, the disc can be used as a Sundial from which the local*

*time can be read. In the evening, the marks should be connected, and this curve*

*is the gnomon curve for that particular day, but in practice, because the Sun's*

*declination changes slowly, also for some days ahead. It is also the gnomon curve for other places on the same latitude on that particular day.*

*To divide the compass, mark the point in the gnomon curve which is closest*

*to the centre and draw a line through the mark and the centre. This is the*

*north/south line from which the compass card can be divided into compass points*

*or degrees.*

*During the following few days, the disc can be used as a bearing-dial; that is,*

*as a compass. To operate it, the disc should be kept level and turned until the*

*point of the shadow is directly on the curve. Then the compass is reading true*

*directions. It is quite easily kept level by means of a stick with a weight at the*

*lower end. On the top of the stick is set a small circular platform, on which the*

*compass card can be placed, with the gnomon on it. Hold the stick with two*

*fingers near the top and turn it until the point of the shadow is on the curve, in*

*the morning over the western half and in the afternoon over the eastern half.*

*Then the compass is reading true.*

The design of this sun compass was ideally suited for the latitude that the Vikings explored from Norway to North America via Iceland and Greenland (610 N). A vessel could be steered by keeping the gnomon`s shadow on the gnomon curve.

**6.3 Viking Period Sunstone**

Much has been written in academic journals about the Viking use of a “sunstone”, probably a calcite crystal (Iceland spar) that polarises light from the sun, even under a cloudy or overcast sky. There is no archaeological evidence to show Viking use of such a crystal although such a crystal was found amongst the remains of a 16th century shipwreck off the island of Alderney. Experimental voyages using a “sunstone” have shown that it may work with a reasonable degree of accuracy, but its use by Viking (or Saxon) navigators remains unproven.

**7. The Behaviour of the Sea**

**7.1** Whilst depth and way finding at sea were important navigational skills to be acquired by the Anglo-Saxon mariner, equally important was an appreciation of how the sea behaved and what affect it would have on a vessel. Going to sea is a risky business even now. The Anglo-Saxon mariner may have accepted the risk as part of what Robert Van de Noort calls their daily practice of seafaring (Van de Noort 2011: 178-179). The dangers were known, and Van de Noort explains the importance of ritual in support of the safe completion of a journey each time a boat was launched; a practice that he believes survived through folklore from the Bronze Age to pre-modern times.

There is no evidence that the Anglo-Saxon mariner understood the behaviour of tides and currents although it is likely that appreciation of them grew over time. It is another continuity in the timeline of seafaring that has not changed. The question of whether the tidal waters over which the vessel is rowed or sailed assists or resists its movement, or drives it in an unwanted direction, puzzles yachtsmen today. Unknown to the early medieval mariner, one of the reasons the sea behaved the way it did is described in today`s study of the oceans as tidal streams.

**8. The Effects of Tides and Tidal Streams**

**8.1** Tides are little more than the vertical movement of water, its rise and fall. It was behaviour that would have been recognised by the Anglo-Saxon mariner, the difference between the Baltic and North Seas perhaps acknowledged and accepted. Because the entrance to the Baltic Sea in constricted around the northern tip of the Danish peninsular, the major inflow of North Atlantic water along the Norwegian coast diverts to a southerly flow along the North Sea coast of Denmark and the Low Countries. Tidal outflow follows the reverse. Whilst the Baltic Sea experiences a tidal range measured in centimetres the North Sea has a much larger tidal range measured in metres.

**8.2** Tidal streams are caused by the horizontal movement of water as it moves from a rise to a fall (an ebb tide), or from a fall to a rise (a flood tide). It is unknown how a seafarer of any of the Germanic tribes would have been influenced by the familiarity of rowing or sailing their vessels on the relatively tideless Baltic Sea to that of the North Sea where tidal streams were fast, the tides large in range and both shaped by coastlines and shallow sea bottoms.

**8.3** As happens now, and during the early medieval period, salt water from the North Atlantic enters the North Sea via the northwest tip of Scotland. To a lesser extent, warmer salt water enters in the opposite direction, via the narrows of the English Channel. This inflow, outflow and mixture of waters at different temperatures twice a day, with a consequent rise and fall of tides, generates a complex tidal stream pattern in the North Sea that would have had a significant effect on the navigation of an Anglo-Saxon vessel. The rate at which tidal streams flow can vary significantly within the same sea area. Variations of several nautical miles per hour are not unusual. Although the Anglo-Saxons may have observed the rise and fall of sea levels it is unlikely that they knew its cause even as they accepted its dangers. The epic poem *Beowulf* relates a heroic tale that takes place in the Baltic Sea. It makes no mention of the sea`s behaviour.

**8.4** It was much the same for seafarers from the Mediterranean used to a tideless Mediterranean Sea. There is no reference to the cause of tides in the classical texts. However, in his treatise, *De temporum ratione (trans: The Reckoning of Time)*, Bede approached a remarkably modern explanation for their cause in its content entitled *The Harmony of the Moon and Sea* (Faith Wallis 1999: 82-86). But at the time of the Sutton Hoo burial in Mound 1 the cause of tides in the river Deben would have been a mystery to the Anglo-Saxons.

**9. The Effects of Wind**

**9.1** Tides and tidal streams aside, the Anglo-Saxon seafarer would have been aware of the effects of wind on their vessel, be it rowed or sailed. At sea, the feel of the wind on the mariner`s face offers a good indication of the effect it has on the vessel, if it is making leeway sufficient to change the direction travelled.

An unseen effect on the vessel`s direction of travel would have been the wind-driven current. Caused by the friction of the wind on the surface of the sea it could affect the vessel`s passage by flowing in the same direction as the tidal stream or in opposition to it, or across it, as the tidal stream itself changed throughout the cycle of the tides.

**9.2** This friction also generates waves whose height is related to the strength of the wind and the distance across the open sea the wind has travelled. Depending on its strength, the wind in opposition to the tidal stream produces a very confused sea state that can be difficult for the vessel to accommodate as well as being physically uncomfortable for the sailor. Vessels with low freeboards would be particularly endangered. It begs the question whether an appreciation of the sea`s behaviour may have influenced the design of vessels similar to the Sutton Hoo longship. Was the double-ended design of the longship with its large, upturned stem and stern intended to counter contrary sea conditions?

**10. Conclusion**

**10.1** In the absence of evidence to show how the Saxon seafarers may have navigated their way along rivers, coastlines and across the open seas, an assumption has been made in this research that there was a continuity in the concept and use of basic navigational practices.

It is a continuity of application implicit in Kemp and D`Olier` s article on early navigational practice. True for the master of an ancient Egyptian, Greek or Roman vessel, all of whom used a sounding rod or lead line to establish the depth of water over which their vessel was floating, for safe navigation this was just as true for the Saxon seafarer. It was a technique described by Erskine Childers in his novel, much later in 1903.

Equally, through an understanding of the heavens, Lee Davis has argued principles derived from classical texts that, from how the sun moved and a certain stars did not, there evolved a unique sense of direction which allowed seafarers to establish a course along which their vessels could be steered. It is possible that Saxons, from their long association with and against the Roman mariners in Britain, adopted the same techniques.

Other navigational practices have been examined that sit astride the early modern Saxon/Anglo-Saxon period, the wind compass described by Lee Davis for the Greek and Roman seafarers, Thirsland`s sun compass and, maybe, the sunstone for the Vikings. However functional and accurate these might have been, there is no archaeological or written evidence to support their use by the Saxons.

As Westerdahl has argued, seamarks are essential to the safe pilotage of a vessel, especially in the absence of local knowledge about tides and deep channels along rivers and coastlines. His link to social history and the authority from which seamarks are built, positioned and maintained illustrates the importance of trade to local maritime economies.

At the heart of navigational practice of any age is the requirement for safe navigation and its ingredients: depth of water, vessel position and course direction. Of equal importance is an appreciation how the sea`s behaviour in terms of tides and winds can have significant effect on the passage of a vessel, be it along the coast or across the open sea. In the daily practice of seafaring, danger was ever present and the rituals to which Van de Noort refers in support of a safe journey was an essential part of seafaring life, and not just for the Anglo-Saxon.

This research proposed a timeline of navigational practice of hundreds if not thousands of years, a continuity along which the question of the need for sound practice remained the same. How deep is the water on which my vessel floats, where am I and what course do I need to steer to where I am going? These questions and the physical risks of tides and weather are the same for seafarers today as they were for the Anglo-Saxon, although modern seafarers have technology to help. Its use today, however, simply lays bare the extraordinary achievements of the premodern mariner and the navigational skills they developed to find their way across the North Sea and along its difficult coastlines, without a compass or a chart of any kind.

**10.2** In September 1942, 32 young Dutchmen set off by kayak to paddle across the North Sea to reach Britain. Of the 32, only 8 reached the coast, at Sizewell beach. These young men were presented with the same seafaring risks that the Saxons faced some 1500 years earlier.

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Memorial at Sizewell Beach

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