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The Shipmaster at Sea – Seamanship

At the end of the fourteenth or early in the fifteenth century, the design and construction of ships in northern waters benefited from technical ideas seen in ships from the Mediterranean. Carvel construction, in which the smooth hull is planked with edge-butted timbers, largely replaced traditional clinker construction in which the planking overlapped; the sail area was split over several masts and so could be increased in total area; and a fore-and-aft lateen sail was rigged on the new mizzen mast to improve the ship's performance to windward. The late medieval ship, the most complex of contemporary machinery, has attracted much scholarly attention. Its design and development, as seen in contemporary illustrations, port town seals and archaeological finds, and as described in inventories, accounts and contemporary literature, have been thoroughly examined.[1]

Less scholarly attention has been paid to medieval seamanship. The earliest surviving works on 'good marinership' date from early in the sixteenth century and tend to be didactic rather than informative in the same way as contemporary works preached 'good husbandry'. The problems presented to a ship and her crew by wind and current, at sea or at anchor, do not change, and while the development of new materials has led to very considerable improvements in the design and construction of ships and their equipment, it may safely be assumed that most basic manoeuvres were conducted in a manner similar to current practice. Being of poorer quality materials throughout, however, the medieval ship was more at the mercy of the elements; often working with little safety margin, her operational parameters were considerably narrower. Evidence of early ship and sail handling techniques is available in contemporary literature, occasional court cases, letters, and illustrations. Conclusions may also be drawn from surviving equipment lists and from ships' accounts. In some areas, educated guesses or reasonable assump-

[1] Landström, *Sailing Ships*, pp. 72–89; Richard W. Unger, ed., *Cogs, Caravels and Galleons* (London, 1994), pp. 29–59; Hutchinson, *Medieval Ships*, *passim*; Friel, *The Good Ship*, pp. 68–180; *Middle English Sea Terms*, ed. Bertil Sandahl, 3 vols (Uppsala, 1951–82); R.M. Ward, 'An Elucidation of Certain Maritime Passages in English Alliterative Poetry of the Fourteenth Century', unpublished MA thesis, Keele University, 1991.

tions have to be made, to reach a plausible account of the medieval shipmaster's methods.

Cargo handling

Although many of the goods freighted in medieval ships were loaded in small units, manhandling barrels of 252 gallons (*c.*1,147 litres) of wine weighing over one ton, and sarplars of wool weighing *c.*730lbs. (*c.*331kg) in and out of the hold, must have been a considerable challenge. Cargo might be handled in three different situations: with the ship tied-up against a dock as in Bordeaux, on a drying beach as on the Norfolk coast, or swinging to an anchor where there was neither wharf nor sand. Ships lying alongside usually had to use dockside cranes with local labour, paying dues to the local authority, but in the absence of such facilities the ship's crew (with payment of 'primage' or overtime) and her equipment were employed. When a ship was beached for handling cargo in and out of carts, or at anchor and using lighters, the men and equipment available on board had necessarily to be used. One method of hoisting cargo on board may be discerned in a detail from a painting by Hans Memling in which a horse is being lifted onto a ship from a boat alongside. The hoisting line, attached to a wide sling under the horse, passes through a block on one end of the yard, thence to another block hanging by a pendant from the mast-head, and then down the mast, to be led to the ship's windlass or capstan. A guy is attached to the other end of the yard with which it is swung to a position above the hatch by crew members on deck. The gunwales of ships must have been subjected to considerable wear and tear during cargo handling; removable wash-boards were probably unshipped when handling cargo.[2]

When the ship's equipment was to be used for cargo handling, the shipmaster had to obtain the shipping merchants' approval of his cordage and machinery and, as discussed in chapter 5, if he did not have their approval and goods were damaged due to equipment failure, he and the crew were liable. *Oleron* suggests that such compensation should be taken out of the 'guindage' or craneage charge, with additional personal contributions by the shipmaster and crew if necessary. Guindage was around 2d. per tun in the mid- and late fourteenth century, varying from port to port. If shore labour was not available, or was not obligatory, by tradition the crew were offered by the merchant shippers 'first refusal' to unload the cargo, for the payment of primage. This was generally between 1d. and 2d. per tun, a rate sometimes agreed in the charter-party. It is not known if guindage

[2] The 'wine gallon' of Edward III was 8lbs; a 'sarplar' was two sacks each of 364lbs of wool, a 'sack' being only a unit of account. Hans Memling, *The Seven Joys of Mary* in the Munich Pinakothek.

included primage or was a further charge on the merchants for the use of the ship's derricks.[3]

The internal arrangement of ships may have been modified to suit the requirements of the owner. A dedicated wine ship, for example, would have had removable deck planking so that the barrels could be lowered directly onto dunnage anywhere in the hold, the ship being moved along the quay to be under the shore-side crane. When using the ship's own lifting equipment, cargo must have been rolled, or otherwise moved, to or from the lifting fall suspended from the yard. Commodities such as salt or grain would have been loaded in sacks by crane, or in barrows by hand, probably involving every man in the crew. 'Lasts' loaded with hides or fish may have been similar to modern pallets and could have been hoisted by crane in and out of the hold. When removable deck planking (known by variations of the word *hacchis*, which evolved into the current English 'hatches'), was replaced before departure, it required nailing down and caulking to prevent sea- and rainwater spoiling the cargo. This procedure is described in the poem *Morte Arthure* in which the crew of a ship preparing to depart 'bettrede hatches' (improved the hatches). Moisture-sensitive bulk cargoes, for example salt, alum and grain, and bolts, bails and lasts of cloth and furs, would require further protection from water leaking through the deck or swilling up from the bilges. Additional freight charges were specifically authorised in *Queenborough* when waterproof covers were supplied by the ship for a cargo of salt.[4]

As discussed in chapter 5, the shipmaster and his crew were responsible for the stowage of the cargo and were liable for compensation to the merchants if goods were damaged in the hold, as in the *Oleron* example where wine is lost from a stoved-in barrel. Because there was an ever-present risk of barrels rolling off the dunnage, the amount of loss or damage acceptable to the shipping merchants was sometimes specified in the charter-party. If the agreed loss was exceeded, the crew had to pay compensation.[5]

[3] Appendix 1, *Oleron*, article 10. *Local Customs Accounts of the Port of Exeter*, p. 6: a charge was made for the use of Topsham town crane. Harding, 'Port of London': PRO E 101/612/31, m. 1; E 101/79/5, m. 11; E 101/80/24. Reddaway, *Accounts of John Balsall*, p. 23. Appendix 3, *Coutumier*, chapters 76, 95, 97. Ships were also liable assiage (stowage), planchage (landing dues) and quillage ('keelage' or pier dues). *Local Customs Accounts of the Port of Exeter*, p. 1, fn. 2: crane dues may also have been charged, in addition to wharfage charges, when a ship's equipment was used alongside a town quay; keelage in Topsham early in the fourteenth century was 2d. *Primage* is mentioned in some versions of *Oleron*, article 10. PRO, C47/37/14, mm. 19–34, fo. 5 and mm. 49–60, fo. 10; C47/37/11, mm. 22–3, fos 1–6d, etc.

[4] Tim Weski, private communication, 1996: Hanseatic merchants were organised into market groups: *Baiefahrer*, *Bergenfahrer*, *Englandfahrer*, etc.; it is probable that the layout of their ships was designed to suit their habitual cargoes; it is not known if English merchant ships were similarly specialised. *Morte Arthure*, line 3656. Appendix 2, *Queenborough*, article 6.

[5] Appendix 1, *Oleron*, article 11. Twiss, *Black Book*, III, pp. 342–2: *Customs* has 14 articles concerning damage to the cargo; ibid., I, pp. 88–131. It is just possible that some ships may

Departure

The best surviving descriptions of the departures of medieval ships are in two alliterative poems written around 1400, and in a political satire of a somewhat later date (1548). The *Morte Arthure* description, modernised, reads:

> vigorously on the ship's side they weigh their anchors with the skill of the watermen of the surging waves; men on the fore-deck coil their cables … sails tight to the top [of the mast] and the luff [of the sail] turned [from the wind] … completely without damage they haul in the boats, shipmen quickly shut their ports.

And, from *Pearl*:

> They lace on the sail, fasten ropes, men at the windlass weigh their anchors, the thin bowline is attached smartly to the bowsprit, they haul the guy ropes, the great cloth falls; they lay in [with oars] on the port side and pull up to windward; they swing the sweet ship swiftly from the haven.'[6]

The third description, again modernised, is from the prose *Complaynt of Scotland* :

> then the master whistled, and boldly the mariners laid the cable on the capstan, to wind and to weigh, then the mariners began to wind the cable with many a loud call, and as one called, all the rest called in the same tune, as if it had been an echo from a high cliff. And as it appeared to me, they called their words as follows: 'veer-a, veer-a (repeated). fine young lads (repeated). wind I see it (repeated). to the shackle (repeated). haul all and one (repeated). haul him up to us (repeated).' Then, when the anchor was hauled above the water, one mariner shouted and all the rest followed to the same tune 'haul the cable (repeated). stop the cable (repeated). cat the shackle (repeated).' then they made fast the shank of the anchor … Then the master whistled and shouted, 'Two men aloft to the main yard, cut the ribbands, and let the main sail fall, haul in the luff close aboard, haul aft the main sail sheet, haul out the mainsail bowline.' Then one of the mariners began to hail and to shout, and all the mariners answered with the same sound 'heave (repeated). pulpela (repeated). bowline (repeated). 'hands-on' (repeated). hard back (repeated). before the wind (repeated). God send (repeated). fair weather (repeated). many prizes (repeated). good fair land (repeated). stop (repeated). make fast and belay'. Then the master called, 'And quickly lace on a bonnet, veer the trusses, now hoist.' Then the mariners began to haul up the sail calling 'heave (repeated). like that (repeated). go (repeated)'. Then the master called to the helmsman, 'rudderman, sail full and by … luff

have carried 'flat-pack' barrels on the outward bound voyage to Bordeaux, to be assembled by a cooper in the crew, and filled from smaller containers in the hold.

6 *Morte Arthure*, lines 3656, 740–3, 744 and 748–9. *Pearl*: 'Patience', lines 102–6 and 108.

up … don't let her back … harden up … enough … steer straight … bear up … like that').

A description of setting the foresail has been omitted as it is exactly as for the mainsail.[7]

From all three quotations it is clear that the sequence of events is to close all open ports in the hull, stretch the sails on the yards, secure and caulk removable deck planking, and haul on board the ship's boat. The anchor is then weighed and the sail(s) dropped and set by bringing the luff (the windward edge of the sail) close inboard, hauling the sheet (the rope led from the leeward side of the sail) aft and leading a line from the luff to the bowsprit. A bonnet (an additional strip of cloth laced below the sail) is bent on, in one case while the sail is still furled and in the other after it has been dropped and has to be hoisted again. In all the extracts, the ships are on a lee shore (for dramatic effect) and have to sail off, hard on the wind; one crew having to row on the lee side to bring their ship up sufficiently to clear an obstacle. It is clear from the Scottish extract that rhythmic calling was a feature of sailors working – the forerunner to the shanties of later generations of mariners. With an on-shore breeze a shipmaster would normally postpone departure until the wind was favourable unless there was some over-riding reason not to delay. If he had to leave but was unable to sail out safely, the three possible aids available were: to warp out on the anchors, to be towed out by the ship's boat or one hired locally, or to sail out with oared assistance, as in the case of the *Pearl* ship. A ship being towed out of a haven by a boat with six oarsmen may be seen in Figure 3.

Anchors were expensive items and every effort had to be made to recover them if they became trapped in rocks. To free such an anchor, the shipmaster would try sailing back and forward across the wind to attempt to tug the anchor out. If that failed, then either from the ship or from the ship's boat, the buoy line would be pulled to try to trip the anchor, grappling with hooks if the buoy line had broken. As a last resort, the cable would have to be cut and the anchor temporarily abandoned with a marker buoy. An abandoned anchor, marked with its buoy, was inevitably a target for opportunist crews coming in later; recovering and keeping someone else's anchor was theft under criminal law, but could lead to an admiral's inquiry as a violation of maritime law.[8]

7 A. Jal, *Archéologie navale*, 2 vols (Paris, 1840), pp. 529–31. *Complaynt of Scotland*.

8 Appendix 2, *Queenborough*, articles 21 and, in a different context, 60; cutting a buoy line and so losing an anchor was also an inquiry offence, *Queenborough*, article 61.

Sails and sailing

The sails of fourteenth- and fifteenth-century northern ships were made of vertically sewn strips of cloth woven from canvas or wool, or a mixture of both, the composition of the mix being chosen to give an acceptable compromise between cost, durability and performance. Because of its organic nature, few samples of medieval sailcloth have survived and it is not possible to identify the fibre mix, cloth weight, thickness of warp and weft or alignment of weave of a typical cloth. The rough and porous sails, however made, would certainly have offered a less than ideal surface for efficient air flow. They would have stretched in use, become heavy when wet and been prone to weakening by mould growth in humid conditions when not in use. Some improvement could be made to porosity by wetting the sailcloth with buckets of water but at the expense of increased top-heaviness, but nothing could be done about the effect on the sail's aerodynamics of the cloth's hairiness, a phenomenon not then recognised. To compound the problem of poor-quality sailcloth, an incomplete understanding of a good aerofoil shape inevitably led to inefficient sail setting. Many contemporary illustrations show ships running before the wind with their courses roundly billowed and apparently almost out of control, a profile less efficient than when the sail is held firmly by sheets and tacks.[9]

The cost of replacement sails was an important item in a ship's accounts, amounting to something of the order of 5 per cent of the value of the ship, depending on the size of ship and sails. To prolong the life of the fabric for as long as possible, the cloth was frequently inspected, and repaired as necessary, probably in every harbour. Attempts would have been made to keep mildew at bay by washing the sails with fresh water and drying them as often as possible. Repairs, and even the sewing of new sails, could be effected by members of the crew; from the Celys' payments for canvas and thread and additional wages for the crew, but no payment to a sailmaker, it is apparent that the crew made and repaired their sails. In *Customs* a qualified mate has to be able to measure and cut sails, a step beyond merely sewing them, and it is quite possible that similar skills were expected of senior members of the crew on English ships. Sail-making ashore, when necessary, appears to have been supervised by shipmasters, possibly retired.[10]

9 Friel, *The Good Ship*, pp. 96–9. Canvas was imported from Brittany throughout the fourteenth and fifteenth centuries. Valerie Fenwick. ed., *The Graveney Boat* (Oxford, 1978), p. 251: Woollen sails, made from a cloth called *bever* or *belver*, were used as late as the end of the fifteenth century in Kent (not 1371 as reported by Friel).

10 Scammell, 'European Seamanship', p. 360. Billowing sails were discussed in *MM*, 3 (1913), p. 239ff; 4 (1914), p. 347ff; they may have been only artistic convention. Friel, *The Good Ship*, p. 97: sail costs from galley accounts range from £10 12s. to £17 14s. Rose, *Lancastrian Navy*, p. 250: ship costs in royal accounts range from the *Ane*, 120 tons @ *c.*£180 and the *George*, 120 tons @

The results of sailing trials with a full-size replica of a 23-m. Hansa cog loaded with 26 tons of ballast, have revealed something of the performance of a medieval cargo ship:

Beaufort wind scale	Wind speed	Ship's speed through the water
3	7–10 knots 'a gentle breeze'	*c.*3.4 knots
4	11–16 knots 'a moderate breeze'	*c.*4.0 knots
5	17–21 knots 'a fresh breeze'	*c.*5.1 knots
6	22–27 knots 'a strong breeze'	*c.*6.0 knots

The trials also showed that the closest to the wind the cog could sail was *c.*70° with leeway of 15°–20°, reducing the course made good to not much better than a right-angle to the wind. A Viking longship, on the other hand, could sail on a course of perhaps five points off the wind (*c.*56°) and make good a course of around 65°. Fully laden ships with fouled bottoms would have achieved substantially less speed and would have had a significantly poorer windward performance, which explains much of the prolonged waiting times in harbours. A ship is said to be 'close-hauled' when she sails as close to the wind as she is able; any closer to the wind, her sails will 'back' and, if the helmsman is not quick enough to ease off downwind to fill the sails again, she will stop 'in irons'. While in irons she will begin to sail astern and violent changes of tension on the shrouds and back stays, as the sail flaps wildly, may break the mast. Towards the end of the passage from the *Complaynt of Scotland* quoted above, there is a clear picture of the anxieties of a shipmaster trying to sail his ship as close to the wind as he dare. As practical evidence of the high risks to the mast, there have been found in medieval wrecks 10 or even 14 holes in the wales to take shrouds and backstays. Although allowance has to be made for mast supports set up with a purchase requiring two securing points, confirmed by the deadeyes and lanyards found in inventories and seen in contemporary illustrations, many mast supports, particularly aft of the mast, were obviously considered necessary.[11]

When close-hauled, the luff or weather edge of a sail set athwart the ship has

c.£230, to the *Nicholas*, 330 ton @ £500. Hanham, *Celys' World*, p. 366. Twiss, *Black Book*, III, pp. 90–3: *Customs*, chapter xviii.

[11] Sauer, 'Segeln mit einem Rahsegel', p. 26. Hutchinson, *Medieval Ships*, p. 5. J.T. Tinniswood, 'The English Galleys 1272–1377', *MM* 35 (1949), pp. 276–315. Friel, *The Good Ship*, p. 101: backstays accounted for up to a third of headropes in fifteenth-century inventories. *Accounts of the Clerk of the King's Ships*, PRO E 372/203/36–39 (1358–59, Thomas de Snetesham): 'iiij. hausers alb' ij. par' de dedmennesheyne vnde j. cum cathena ferri exist' in quadam naue voc' la Naw seinte Marie.'

to be held forward by tack and bowline and the leeward edge has to be held back by brace and by sheet, as may be seen in Figures 3 and 7. The luff could also have had additional lines leading forward to the bowsprit and a pole was sometimes used to hold outboard the weather clue of the sail. This 'luff pole' or *betas* was a direct descendant of the Viking *beitiáss* and appears not infrequently in poetry, for example in *Morte Arthure*: 'sails tight to the top and turn the luff [with a pole]', and 'some worked the windlass, some the luff, some the *betas*'. To change tack when close-hauled, a sailing vessel has to be either 'put about' or 'weared'. The former involves turning the bow through the wind, a manoeuvre which requires readjustment of the sheets, braces, tacks and bowlines as the weather side of the ship becomes the lee side, and vice versa. As a further complication, the tension of the lee shrouds has to be released and the new windward shrouds made up as the ship changes tack, an operation over which the shipmaster has to be extremely vigilant to avoid risk to the mast. During the whole manoeuvre the ship has to maintain steerage way to avoid being trapped 'in irons' and drifting astern, out of control. Wearing involves turning the ship's stern through the wind, a less hazardous operation since it risks neither the wind backing the sail nor the ship stopping in the water. With her slow speed and poor windward performance, particularly when laden and fouled, it would often have been extremely difficult to acquire sufficient momentum to tack a laden medieval cargo ship through an angle as wide as 180°, in which circumstances it would have been preferable to wear ship. The disadvantages of wearing are that the ship has to turn downwind during the operation and a considerable amount of windward progress is lost. On a lee shore, the risks of wearing might be as great as the risks of going about. An extract from a report by a Dutch privateer in the 1470s gives a chilling description of a ship, heavy because of a leak, trying to go about:

> and weighed our anchor and handed the foresail; then the ship would not come round; then handed the main course, then the good ship would still not come round so that we were driven towards the land. Then at last God in Heaven and the great St James helped us so that the good ship came up. Then we sailed to windward as best we could.[12]

In port town seals portraying cogs, the mast generally appears to be stepped forward of the centre of lateral resistance, a position which would drive the ship out of the wind and require constant and inefficient corrective lee helm to hold

[12] The word 'wear' derives from 'veer', hence the apparently anomalous past participle. Sandahl, *Sea Terms*, 2, pp. 60–1, quoting from the 1472 *Hanserezesse*, 2, 6, p. 500. F. Howard, *Sailing Ships of War 1400–1860* (London, 1987), pp. 31–3: even full rigged ships of the early nineteenth century, with better windward performances than the medieval cog, had difficulties going about, especially when heavily fouled: Lords St Vincent and Exmouth and Sir E. Owen issued orders to their fleets to wear rather than tack, when not inconvenient, because the accidents and wear and tear of tacking was detrimental to the sails, spars and rigging.

her up. Paradoxically, in the sailing trials mentioned above, a full-scale replica of the 1380 cog was found to require 10–15° of weather helm as she tended always to 'luff up' to windward, a result which casts doubt on the accuracy of the illustrations in the seals, or on the configuration of the replica (which seems unlikely to be wrong).

Although there is general agreement amongst maritime historians that early in the fifteenth century northern ship rigs evolved from a single mast to three masts, there has been much discussion about the order in which the foremast and mizzen were introduced. The introduction of a lateen-rigged mizzen offered an improvement in windward performance and manoeuverability, but the long yard required by the lateen sail was labour intensive and so was frequently left furled, as in Figures 3 and 7, except when the ship was attempting to claw up-wind. The ability to make up to windward was further reduced by another late fourteenth- or early fifteenth-century innovation: a sail set on the bowsprit. The downwind leverage of this spritsail must have been so considerable that it was probably set only on long downwind passages and handed before attempting to go about.[13]

Because of unreliable equipment, medieval shipmasters had to be extremely cautious at all times. All cordage, for anchor cables and for standing and running rigging, was liable to part, and only the resourceful shipmaster with an alternative plan put quickly into operation, escaped unharmed from what might easily be a serious accident. Because his ship had such a poor windward performance, the shipmaster had to allow a large margin of safety when trying to clear headlands, reefs or harbour entrances, and he had to have the patience to wait for days or even weeks for a suitable wind for his planned voyage. His respect for the weather and the sea may often have been put to the test by impatient shipping merchants prepared, in their ignorance, to take risks in order to exploit a market. The struggle between commercial forces and maritime caution may be seen in the clauses of maritime law covering jettison, general average, delays and the delegation of responsibility for cargo handling equipment.

Sail reduction

Sometime after 1350, sail reduction by slab reefing with ties was generally abandoned in favour of using a smaller sail with extensions of sail cloth called bonnets, which were laced along the foot of the sail, when wind conditions permitted. Why bonnets replaced reefs is not known; it may have been because the main course had become too large to be reduced in slabs, even when handed on deck.

How bonnets were laced and unlaced to the course is unknown. It would have been less arduous to attach them with the foot of the course on deck, but there

[13] The evidence perhaps favours the mizzen, the aftermost mast in English terminology, as the first additional mast, but the French use of *misaine* for 'foremast' and *artimon* for 'mizzen' may be significant. A discussion was conducted sporadically in the *Mariner's Mirror* from 1918 to 1933 and see also Sandahl, *Sea Terms*, II, pp. 73–8].

is evidence, in the extract already quoted from the *Morte Arthure*, that the sail was trussed up to the yard (although this was perhaps because, in this case, the ship was still at anchor). Not all ships at that time were equipped with 'lifts' on the yards, so had to rely only on the halyards to raise and lower them. In those cases there would have been no direct control of the yard's angle to the horizontal, which must have complicated the bonnet handing operations. A lowered main course is mentioned in a 1440 petition to the chancellor by William Waleys, whose ship the *George* of Welles had been deliberately rammed by Richard Walter, master of the *Christofer* of Dartmouth; Waleys claimed that his ship '. lay upon the lee wyth ther corse low sett'. The addition and removal of bonnets according to the wind conditions is illustrated in another fifteenth-century poem, *Richard Redeless*: 'they bent on a bonnet and set a topsail … and took off a bonnet before the blow came.' There is no evidence of bonnets on the lateen sails set on the mizzen mast; when the wind became too strong they would have been trussed up or dropped to the deck.[14]

Reefing points reappeared in the 1660s and bonnets became less common, again for unknown reasons, and the operation of making-up and loosing reefs was then probably very similar to that practised on square rigged ships to this day. A third and older reefing system may have persisted after the introduction of bonnets: tightening brails vertically down the belly of the sail to divide it into two sections and so destroy the aerodynamic flow. Although it put more strain on the sailcloth, the system required less physical effort from the crew. The Vikings may have used vertical brails as well as horizontal reef slabs, and a passage in the 1450 poem mentioned on pp. 160–1, appears to describe the survival of the same reefing method: 'Hoist, truss, haul in the brails! You're not hauling, by God, you fail!' From earlier in the poem, there appears to be a good breeze, the bowline and sheets having been hauled tight; the reason for now hauling tight the brails, therefore, cannot be to furl the sail but to divide it vertically. There are illustrations of ships with their courses divided by a brail in this fashion but there is no specific written evidence of the practice apart from this poem.[15]

Curiously, on none of the ships with sails set in Figures 3 and 7 can either reefing points or bonnet lacing cringles be seen, although many other details of the ships and rigging are visible and identifiable. The sail cloth in Figure 3 is clearly

[14] H.H. Brindley, 'Reefing Gear', *MM* 2 (1912), pp. 129–134. Landstrøm, *Sailing Ships*, pp. 72–85. Friel, *The Good Ship*, pp. 95–99. First inventory reference to' bonnet' is PRO E101/26/14: 'In j. velo j. bonett'. Some ships continued to use reefing ties after the introduction of bonnets, for example, in the *c.*1400 Rye town seal. Gardiner, *West Country Shipping*, citing PRO C1/43/33. Langland, *Richard Redeless* (date 1399), lines 71, 80.

[15] Sandahl, *Sea Terms*, 2, p. 89: Vikings reefed with vertical brails and horizontal slabs but Sam Svensson, *Sails Through the Centuries* (New York, 1965), p. 11 mentions only horizontal reefing with ties. Furnivall, *Pilgrims' Sea-Voyage*, p. 33.

made up of vertical strips, the usual construction, whereas in Figure 7 it appears to be sewn in horizontal lengths.

Anchoring

Before anchoring, the shipmaster would have checked the depth and the suitability of the seabed with the sounding lead and a lump of tallow. If possible, this would have been done by sailing slowly into the anchorage and making frequent soundings; if there were other ships already at anchor or space was limited, then the ship's boat would be used for the reconnaissance. When sailing in to anchor, the shipmaster had two possible options. He could either drop the anchor as the ship sailed over its chosen position, hope that it would hold, arrest the motion of the ship and swing her round into the wind. Speed was necessary to ensure that the anchor would dig well into the ground, but to sail too fast risked running up the beach, if it failed to hold. The alternative was to sail past the chosen point, come up into the wind, drop the anchor as the ship came to a standstill, and try to dig the anchor in by backing the sail and sailing astern. In both manoeuvres, if the anchor failed to hold, the shipmaster would have had to sail off to try again, and for this eventuality, the sail(s) could not be furled until the ship was secure. Anchoring in anything above a gentle breeze was therefore a potentially hazardous operation requiring both skill and a certain amount of luck; more of the former lessened the need for the latter. In order to ensure a shallow angle of pull on the anchor, the length of the cable would normally be four to five times the depth at high water; care had to be taken, therefore, that there were no dangers within the scope of the swinging ship (see also chapter 6).

A haven with confined space would normally be entered by the ship in tow, pulled by the ship's own boat or by a boat hired locally. Payment for the hire of towage, whether riverine or in harbour, was, according to *Oleron*, to be to the merchants' account; it is possible that when the ship's boat was used, the crew were given extra money, as they were when they volunteered to unload the ship. When necessary, a second anchor would be set by sending out the ship's boat with the anchor suspended over the side, to be dropped at a good angle from the first anchor; a ship lying to two anchors may be seen in Figure 3. When the ship was to dry-out on the beach on an ebbing tide, the shipmaster might send the ship's boat ashore with an anchor where it could be set manually. At high water, the ship would be brought ashore by the crew, hauling the anchor cable on the capstan or windlass. An anchor visible on the shore need not be buoyed, which explains the differentiating reference in *Oleron* to 'ancres qe ne parigent au plein'. The setting of an anchor on-shore may be seen in the Bayeux Tapestry as Harold arrives in Normandy.

Anchors had to be buoyed for three reasons: first, the cable enabled the crew

7 A ship sounding, with text describing the passage from Ouessant into the Channel. Folio 138v of Hastings MS 775, reproduced with the kind permission of the Pierpont Morgan Library, New York.

to 'upset' the anchor when it is trapped in rocks; second, to warn later arrivals where an anchor had been set and so avoid a sharp anchor fluke coming through the ship's bottom as she dried out; and finally, if an unbuoyed anchor did damage to another ship, the shipmaster who laid the anchor was held responsible for the damage. Anchoring no doubt led to a certain amount of jostling when several ships arrived more or less together, perhaps from a convoy, each seeking the best position in the haven. A somewhat confused article in *Oleron* describes the situation in a crowded anchorage as the tide ebbs. Ship 'A' finds herself in danger of drifting over the anchor of ship 'B'; the crew of A asks the crew of B either to move their anchor, or to give A's crew permission to move it. Although the text is not completely clear, the article then appears to attach responsibility to B for any subsequent damage to both ships, although she was the first ship in the haven. The decision was reached, perhaps, because it has been assumed (but not stated explicitly) that B's crew, having found a good position, refused to move their anchor, or let it be moved. The full explanation is revealed at the end of the article: B's anchor was not buoyed. The importance of anchors and their buoys is underlined by two articles in *Queenborough* which order an admiral's inquiry to be held into the removal of an anchor without permission and, significantly, into the cutting of anchor buoy lines. In the inventories of the Lancastrian navy, parcels of up to 170 pieces of cork are shown in stock for the manufacture of buoys, and several ships' lists include made-up buoys and lines, sometimes specifically for the anchor.[16]

Although no clear evidence has survived of medieval rules for the avoidance of collision at sea (see 'Rule of the road', below), in both *Oleron* and the *Coutumier* there are rules defining precisely the allocation of responsibilities for collision in an anchorage. When a ship collides with another already anchored in a haven, in *Oleron* the colliding ship is described as 'hastant de sa marree', i.e. carried down by the tide and not necessarily anchored, whereas in the *Coutumier* she is dragging down either from an anchored position or while anchoring. The *Coutumier* explains that an accident can happen to any ship in such a situation so that, in principle, each ship involved should pay half the damage, in effect, a *force majeure* clause. *Oleron* suggests that an old ship might be placed deliberately in the path of more valuable incoming ships in order to benefit from the 50:50 rule, a trailblazer for insurance scams. To avoid such fraud, the *Coutumier* allows that if the stationary ship can prove fault on the part of the dragging ship's crew or equipment, then it is not an accident and the latter has to pay the whole amount. In *Oleron* the shipmaster and crew of the moving vessel must swear that the collision was not deliberate and if they refuse to do so, they are liable for all damage. The

[16] Appendix 1, *Oleron*, articles 13, 16. Appendix 2, *Queenborough*, articles 6, 60. Rose, *Lancastrian Navy*, variously pp. 137, 152, 161, 163, 167 etc.

effect of the *Coutumier* ruling is to accept the innocence of the dragging ship until she is proved guilty whereas *Oleron* assumes her guilt until proved innocent.[17]

Although chain cables for anchors were known well before the Middle Ages, hempen cordage was generally used in the fourteenth and fifteenth centuries no doubt because it was cheaper and easy to cut in emergencies. Because it was lighter however, it did not offer the holding resistance obtained by a length of chain lying on the bottom to reduce the angle of pull on the anchor. It is possible that some anchors had a few fathoms of chain bent on below the rope cable as a compromise solution, but there is no evidence of that. It was because of the uncertainty of the strength of the cordage and of the holding power of the anchor, that ships put out two anchors, a precaution which has been mentioned above. The loss of an anchor and its cable was not uncommon and the ship inventories of the Lancastrian navy show that most ships carried several. There is no reason to doubt that merchant ships were similarly equipped with several anchors, lengths of cable, line and reserves of cork for buoys.[18]

Rule of the road

Like Sherlock Holmes' dog that didn't bark, one of the most interesting aspects of medieval maritime law is the absence of rules for the avoidance of collision at sea. In anchorages there were rules, discussed above, but on the open sea it appears to have been 'every man for himself'. The records of a few cases concerned with collision have been found. A water bailiff of a *showt* was arrested for causing damage to a ship at Queenhithe, but no other details are known. Since one or both of the ships could have been moored or sailing, the damage might have been caused by careless cargo handling, or the crews may have been involved in a fracas on board, there is little to be learned from that case. Two promising examples from the mid-fourteenth century concern ships which were 'maliciously run down' by others, allegedly causing considerable damage, but here the charges were trespass heard before a mayoral court, rather than violation of any maritime code to be heard by an admiral. There is also a record of arbitration by *aimables compositeurs* appointed by an admiral following a collision at sea, but once again the information is inadequate. In 1437 an appeal was made for the restoration of wrongly sequestered goods which had been sold following a decision by an admiralty court

[17] Appendix 1, *Oleron*, article 15. Appendix 3, *Coutumier*, chapter 82.

[18] *The Gallic War*, ed. H.J. Edwards (London, 1917), IV, 23: the Veneti tribe were said by Julius Caesar to have 'ancorae pro funibus ferreis catenis revinctae', and a Veneti anchor with chain has been found at Bulbury Camp. Rose, *Lancastrian Navy*, p. 134 and *passim*: chain was held in the naval stores but apparently only to construct defensive booms, *cf.* 'thare the false mene fletyde and one flode lengede / with chefe chaynes of chare chokkode to-gedyres': *Morte Arthure* lines 3602–3.

in a collision dispute involving *le Antony* of London, carrying merchandise from Prussia, but there is no other information. None of these cases confirms or denies the existence of a 'rule of the road' but the fact that litigation had been instigated, even as trespass, suggests that there was some regulation for the avoidance of collision. As discussed in chapter 1, pleas of merchants and sailors were tried in the Bristol courts before 1241 and the city custumal specified that actions 'between merchants and ships … or between ships and ships … whether burgers or aliens' could be heard according to the laws and counsels of the town. The phrase 'ships and ships' might well mean that collisions, or the results of collisions, were considered in court, but that can only be conjecture. As further indirect evidence of there being a recognised 'rule of the road', a phrase from the fifteenth-century Sandwich custumal indicates rather more positively that collisions at sea could be actionable, albeit in a port town rather than an admiral's court, 'quod navis aliqua alteri navi fecerit dampnum in aqua'. The paucity and imprecision of the evidence indicate that incidents at sea leading to damage, apart from acts of violence, were not sufficiently frequent in the fourteenth and fifteenth centuries to require a legally recognised rule of the road.[19]

Meteorology

Weather forecasting in north-west Europe requires an ability to foresee and assess incoming atmospheric low- and high-pressure areas. To do that without instruments, the medieval mariner could only interpret cloud formation, feel the temperature and humidity of the air, assess the size and direction of waves, note the strength and direction of the wind and observe the behaviour of insects and animals. He instinctively and continually collected and analysed this information and, in the light of his experience and with folkloric, and often faulty, meteorology, made short-term forecasts. However reliable his methods may have been, any decision to sail had, by maritime law, to be confirmed by his crew and it is likely that any sail reduction or increase also had to be discussed on board. If the shipmaster sailed on his own initiative and against the opinion of the crew, then he became personally responsible for any damage or loss to the ship and her cargo.[20]

The Coriolis effect, and high equatorial and low Arctic temperatures, ensure that north-west Europe, and particularly the British Isles, are subject to a series of meteorological depressions progressing west to east across the north Atlantic. These depressions and their associated fronts bring warm, wet south-westerly

[19] PRO C1/3/30, of unknown date. *CLB*, I, no. 54, p. 27, II, no. 42, pp. 158–9. Marsden, *Select Pleas*, pp. lxix and 90–1. *CPR*, 1436–41, p. 94. Bateson, *Customs*, 2, p. 193.
[20] Appendix 1, *Oleron*, article 2.

and westerly winds while the occasional anticyclone interrupts the sequence with cold, dry north and north-easterly winds. During the Medieval Warm Period (*c.*1000–*c.*1250) the path of the depressions may have been further north than today, while early in the fourteenth century the evidence of poor crops in northern Europe suggests a mean path of the depressions further to the south. Significantly higher salt deposition found in the layers of the Greenland ice cap laid down after *c.*1410 points to intensification of atmospheric circulation – significantly stronger winds have persisted from that time (the onset of the Little Ice Age with cold, dry windy conditions) until the present day. However, since the driving forces of the North Atlantic weather in the Middle Ages were generally as today, although at varying latitudes and with differing wind speeds, basic meteorology may safely be discussed with reference to today's conditions.[21]

The approach of weather fronts is heralded by clouds, and their formation, dissipation, shape, position, speed and direction of drift have always been recognised by mariners as important. Long parallel streaks of high cloud (now known as cirrus), particularly if they can be seen to be moving, warn of the formation of a vigorous depression with winds up to gale force from the west or north-west to be expected within a day. Winds blow anti-clockwise around a depression and clock-wise around an anticyclone so that the passage of lows and highs is accompanied by changes in wind direction. If the direction of the surface wind 'backs', i.e. moves anti-clockwise west–south–east, then a deterioration of the weather may be expected. Practically, and probably known for as long as men have sailed, if one stands with one's back to the surface wind (indicated by the movement of the lower, more solid looking cumulus clouds) and observes the upper wind (the movement of the high cirrus clouds) moving from left to right, the weather will deteriorate. Conversely, when the wind direction veers, i.e. rotates clockwise east–south–west, the upper clouds move from right to left, and conditions will improve. In the introduction to the storm passage in the alliterative poem *Patience*, a point is made of mentioning that the winds are Eurus and Aquilon which blow from the east or south-east and from the north or north-north-east respectively. They therefore appear to be backing from south-east to north-east, indicative of a depression passing to the south of the ship. The forecast was certainly correct, Jonah and the ship suffered at least a full gale. It is not known if seamen at that time realised that often a ship sailing on starboard tack, that is with the wind on

[21] K.J. Kreutz *et al.*, 'Bipolar Changes in Atmospheric Circulation During the Little Ice Age', *Science* 277 (27 Aug. 1997), pp. 1294–6. Bolton, *Medieval English Economy*, p. 182. Changing weather patterns may have affected not only harvests, disease and mortality but also sailing routes, particularly if there was a change in the prevaling wind direction. Meteorological Office, *Meteorology for Mariners* (3rd edn, London, 1978), Part III, pp. 107–31.

the starboard side, can find improving weather conditions as she sails out of the low pressure zone.[22]

Folk weather lore is a miscellany of valid conclusions drawn from generations of acute observation and from a rag-bag of wishful, or pessimistic, thinking. Cause and effect were frequently confused; for example, a hazy moon often portends rain, not because of any lunar meteorological effect but because humidity in the atmosphere reduces its transparency. At least one late medieval manual of navigation includes statements blending fact and fantasy, translated from the French: 'If the four-day old moon is red, it means high winds; if the moon is "straight up and laid-back", it means high winds: even more if it happens on the fourth day.' Although there is no scientific reason why the fourth day of lunation should have any meteorological significance, a red or copper-coloured moon may augur high winds for the same reason as a red sky in the morning, a phenomenon discussed in the next paragraph. Similarly, a Breton proverb, 'Ring round the moon, sign of rain', describes the symptons of a depression with an associated warm front marked by a procession of cloud. The phenomena move in this order: cirrus > cirrostratus (when the moon is seen to have a halo) > altostratus > nimbostratus and strato-cumulus with rain and wind from south-west to south becoming south to south-east, and strengthening within a day; in short, bad news. A maritime proverb from Picardy repeats the warning explicitly and specifically to the sailor: 'Ring round the moon, sailor, climb to the hounds [of the mast, to shorten sail].' The appearance of the moon in these folkloric previsions is, of course, symptomatic of existing atmospheric conditions, not the cause of them.[23]

Folkloric meteorology giving correct information was generally based, without understanding, on observations of the effect of the serial movement of depressions across northern Europe. There are, and were, many examples of the 'Red sky at night, shepherds' [or sailors'] delight, Red sky in the morning, shepherds' [or sailors'] warning' school. An early surviving example of this genre may be seen in Wyclif's St Matthew's Gospel of *c.*1395. Similarly, again from the French 'When the sun rises and there are some red clouds in front of it, and none of those clouds disperse towards the north or south, it means wind and heavy rain'; and 'If at the setting of the sun its face looks white, it means a storm during the night and it will be cold and it will blow.' A red sky in the evening, caused by the reflection of the sun's rays (which always appear to be red at sunset because of refraction) from the upper cloud layer following a receding cold or occluded front, indicates that there are no low-level clouds to the west and therefore no immediate threat

[22] Andrew, *Pearl*, 'Patience', lines 133–4. The poet's vocabulary and knowledge suggest a maritime background.

[23] Nicolai, *L'Art de navigver*, p. 19: Pierre de Medine suggested that this folk meteorology existed prior to Pliny's *Natural History*, book 18, chapter 45. Albert Simon, ed., *Les Dictons météorologiques de nos campagnes* (Delarge, 1978), 'Bretagne' and 'Picardy'. Lunar meteorological (and medical) myths persists to this day.

of an incoming depression with, probably, a clear night and falling temperatures. A red sky in the morning is the reverse of that situation; the sun is 'downwind' and the red refracted rays shining over a clear horizon are reflected from the face of an approaching warm front, announcing the advance of another depression. Of interest to the early wine shippers was a Gascon proverb based simply on local observation: 'Bordeaux clear, mountain hidden – the weather is stable'. Lore based on false premises survived if it was thought often enough to be valid; the prognostication for St Swithin's Day, for example, was established by the twelfth century but merely reflects the chances of a wet or dry English summer. Proverbs may survive by ambiguity, for example a Breton *dicton* warns that 'Wind during the day doubles at night, wind in the evening will drop during the day'; if that is simply a statement of the time required for a depression to pass, it is acceptable but if it refers to the diurnal effect, it would be more accurate to say that the 'wind during the day will be calm in the evening'. Also ambiguous because it does not define the direction of the horizon or the time of day is another Gascon proverb, 'Red horizon, sign of wind or rain'.[24]

Mariners have always recognised the significance of changes in animal behaviour: swallows fly high before the arrival of good weather (because they are chasing insects rising in the low humidity), and cattle and horses become restless before the onset of a thunderstorm (because atmospheric static electricity passes to earth through their hair). Similar gifts of prognostication have been attributed to bees, frogs, porpoises, seabirds and fish and natural hygrometers, such as wet seaweed and soggy biscuits, give warnings of high humidity. There are many such observed phenomena and associated conclusions collected over generations in seafaring regions from which the medieval seaman derived his weather forecast.

Many ships were lost after encountering weather beyond their capabilities. Fleet losses, as opposed to individual disasters, almost certainly occurred when the weather pattern was deceptive or fast changing and caused a collective misprognostication. Most ships were not overcome by the weather however; the recurring names in port customs accounts over periods of years indicate that most survived to continue trading. Their longevity may be attributed to the shipmasters' caution rather than their meteorological acumen; when they had any doubt about the strength or direction of the wind – and acting under the scrutiny of their crews – they did not set out.[25]

[24] Matthew, xvi, 2: 'The eeuenynge maad, ye seien, It shal be cleer, for the heuene is lijk to reed; and the morwe, To day tempest, for heuen shyneth heuy, or sorwful'. Nicolai, *L'Art de navigver*, pp. 18–19. Simon, *Dictons*, 'Bretagne', 'Gascogne' and 'Picardy'.

[25] Some ships in the Exeter customs accounts sailed for ten years or more, mostly on the Bordeaux run. Harding, 'Port of London', pp. 269–70: 16 shipmasters working from London in 1325–6 were still working in 1332 including two from 1312–13. Appendix 1, *Oleron*, article 2.

Pilots

Pace Chaucer's claim for his Shipman to know 'alle the havenes / as they were / Fro Gotland to Fynystere / And every cryke in Britaigne and in Spayne', it is unlikely that shipmasters were able to navigate over the whole of the North Sea, Baltic and eastern Atlantic coasts, entering any harbour they wished, without help. Without an accurate compass, charts and sailing directions, each could be confident only on the routes he knew well. As late as 1537, when navigational aids were more freely available, an Admiralty inquisition investigating the skills of the 'sayling men' in the east coast ports of England found that out of 140 men, 15 could navigate to Iceland, five to France, Bayonne and Zealand and a further 14 could handle coastal work – evidence of a high degree of specialisation.[26]

Pilots had to be taken on board, therefore, for routes and harbours not well known to the shipmaster, the costs of whom, according to *Oleron*, were to be borne by the ship for deep-sea pilotage and by the shipping merchants for local pilotage. To that rule the *Coutumier* adds a rider that when the ship has her full complement of crew and a sea pilot, any further mariners or pilots required by the merchants are to be on their account. In *Queenborough*, the relevant article is equivocal, the jurors saying that they knew of no better advice than that in *Oleron* but not defining whether they referred to responsibility *of* or *for* the pilots. What constituted local pilotage has been extracted with reasonable certainty from the confused text of *Oleron*:

after the island of Batz on ships bound for Breton ports (presumably ships from the north and east);
after Guernsey on ships bound for Normandy or England (presumably for ships from the west and south);
after Calais on ships bound for Flanders (presumably for ships from the west);
after Yarmouth on ships bound for north-east England and Scotland (presumably for ships from the south).

The question of who paid the pilots is discussed in chapter 4, pp. 89–90. The responsibility of a pilot was to conduct the ship from where he had been picked up, perhaps at the entrance to a harbour, to wherever had been stipulated. *Oleron* is particulary precise in the pilot's job description: 'And the pilot has done his duty well when he has guided the ship to safety up to the berth because up to there was where he was to guide her'. The translation of the word berth (*fourme*) is discussed in Appendix 1.[27]

[26] Burwash, *Medieval Shiping*, p. 28.
[27] Appendix 1, *Oleron*, article 13 and 24. Appendix 2, *Queenborough*, article 16. Appendix 3, *Coutumier*, chapters 88 and 95. Timothy J. Runyan, 'The Relationship of Northern and Southern

On sanctions against unsatisfactory pilots, *Queenborough*, largely similar to *Oleron*, deals with unskilled pilots whose actions have led to loss or death, but rules that an admiral's inquiry should be held, a more equitable rule than the summary punishment by execution advocated by *Customs*. Litigation against pilots in the fourteenth and fifteenth centuries appears to have been unusual and sporadic – or not recorded. John of Colchester, 'lodmannus' (pilot) found himself incarcerated in Dublin castle in 1307 because he maliciously and traitorously guided a ship upon Lambeye, and another anonymous pilot of Margate, hired by merchant shippers for the local pilotage to London of the *S. Juan* of Bilbao with 80 tuns of white wine, lost her off the Isle of Sheppey in the 1360s; his fate is not recorded.[28]

The necessity of a pilot on a route unknown to the shipmaster, is demonstrated by several incidents. In 1387, a shipmaster refused to sail around the North Foreland without a pilot so the Gascon merchants on board, who were freighting wine from Southampton to Sandwich, agreed to hire one. Pilotage around the North Foreland as defined in *Oleron* was 'petty', or local, and was therefore correctly a charge on the merchants, which they accepted. As it happened, the pilot defaulted and the merchants, anxious to sell their wine quickly, ordered the ship's helmsman to take the ship himself. Unfortunately he ran the ship aground off Seaford whereupon the merchants seized the shipmaster's goods in retribution, perhaps as a pre-emptive measure, and the shipmaster had to sue to recover his ship and belongings, with an unknown result. It is clear that the failure of a shipmaster to hire a deep-sea pilot could be seen as negligence. A ship carrying a group of Irish merchants shipping goods from Dublin to Flanders came to grief off Plymouth in 1382 for lack of 'good ruling' and by the negligence of the shipmaster, because no pilot had been taken on board. The merchants had expected that at least the south coast of England would be known by a competent English shipmaster and had not insisted on a pilot at the beginning of the voyage. A change of route could require a change of pilot: in 1467 the merchants on board the *Trinity* of Southampton, with a Bristol pilot aboard, set out for Iceland but were held up for four weeks by bad weather in the Scilly Isles. They changed their plans and took on a pilot in Mount's Bay to go to Ireland. Similarly, in 1387, three Hansa merchants in a German ship on passage from La Rochelle to Ireland, by lack of skill of the 'lodesman', dared not steer the ship on the high seas and so went to Falmouth to arrange a pilot who knew Irish waters; unfortunately they were attacked and robbed while doing so. In some areas, particularly for estuarine entrances to up-

Seafaring Traditions in Late Medieval Europe', in C. Villain-Gandossi, S. Busutil and P. Adams, eds, *Medieval Ships and the Birth of Technological Societies*, vol. 2, *The Mediterranean Area and European Integration* (Malta, 1991), p. 201.

[28] Appendix 1, *Oleron*, article 24. Appendix 2, *Queenborough*, article 47. Twiss, *Black Book*, III, pp. 428–37. *Customs*, chapter ccv: 'perdre lo cap encontinent sens tot remey' but also suggests a gratuity for the pilot. O'Neill, *Merchants and Mariners*, p. 116, citing PROI, 1A/53/27, fo. 213. *CPR, 1361–1364*, p. 151. *Das Seebuch*, MS B, fo. 19r.

river ports, pilots had to be taken obligatorily. An example from the *Seebuch* prior to a passage up the River Gualdiquivir to Seville reads: 'one may anchor in 6 fathoms and then by law the pilot comes on board.' Unfortunately there is insufficient evidence to establish the general practice in the fourteenth and fifteenth centuries.[29]

Little is known of the men who worked as pilots. Deep-sea pilots presumably had experience of the passages for which they offered their services implying that they were either shipmasters currently without ships of their own, or men who had retired from a full-time life at sea to take up casual work. One would expect local pilots to have been experienced shipmasters who wanted to work closer to home and their small-holding, but from the introductory description in *Oleron*, 'un bacheler est lodman dune nef', they appear to have been young men rather than old sea-dogs.[30]

The forerunner of the Trinity House Corporation of Deptford, the Guild of the Holy Trinity, is believed to have been established in the twelfth century with the aim of caring for distressed mariners and their families and, significantly, to assist in pilotage, teach navigation and provide seamarks. Pilotage on the Thames was unsatisfactory however, as in 1513 mercantile and naval shipmasters petitioned the king to incorporate the guild in order to regulate it. Young men without experience, they claimed, were imperilling lives and ships, making no effort to learn the art of pilotage, depriving men retired from the sea of work, and allowing foreigners to learn the secrets of the approaches to the Port of London. Their complaint indicates that even local pilotage was considered to be work for retired shipmasters and that younger men with less experience had rather taken over. Earlier, but less certainly, the Trinity Guild of Kingston-upon-Hull, founded in 1369, was largely devoted to religious observances and charitable work amongst seafaring folk but its full name, according to Naish, was 'The Guild or Fraternity of Masters, Pilots and Seamen of the Trinity House' suggesting that in the mid-fourteenth century, Humber pilots belonged to a recognised branch of the maritime profession.[31]

Conclusion

The introduction in the early fifteenth century of new ship design and construction methods, and the distribution of an increased sail area over several masts,

[29] PRO C1/3/4: Martin van Mere, shipmaster of the *Marieknyght* sued the shipping merchants for the loss of his ship. *CCR, 1381–1385*, p. 72. Burwash, *Merchant Shipping*, p. 28 from C1/43/275–8: John Richeman, London fishmonger, sued the widow of John Payn, the quondam shipmaster and Edmund Kervile, grocer, who may have been the widow's second husband, for taking the ship to Cork. It is curious that a Bristol pilot did not know Irish waters. *CCR, 1385–1389*, p. 364.

[30] Appendix 1, *Oleron*, articles 13 and 24. Appendix 3, *Coutumier*, chapter 88.

[31] Harris, *Trinity House*, p. 19 and *passim*. Naish, *Seamarks*, pp. 41–2.

improved substantially the performance of late medieval ships. The basic tenets of seamanship have remained the same until today, although with the more resilient materials now used for the sails, rigging, hull and mast, mistakes are more easily forgiven. The most obvious difference between square-rigged ships then and now is in their windward performance; a fifteenth-century ship could achieve little better than a right angle to the wind whereas a modern ship can sail within four points of the wind. This difference restricted the options open to the shipmaster in a haven or picking his way through a narrow channel, but fundamental aspects of seamanship, such as preparing for sea, anchoring and recovering a trapped anchor, presented the same problems as today. There appear to have been no rules for the avoidance of collision at sea but behaviour in anchorages, particularly where there was a drying-out beach, was meticulously defined. Meteorology enjoyed no advances and would continue to be empirical and mythic until the introduction of thermometers, hygrometers and barometers three centuries later.