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THE FOURTEENTH-CENTURY MERCHANT SHIP FROM SANDWICH: A STUDY IN MEDIEVAL MARITIME ARCHAEOLOGY

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with contributions by

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Sandwich was once one of the principal medieval towns in Kent and a leading member of the *Cinque Ports* federation, although much of its ancient harbour is now silted up. During the re-laying of a main sewer here in 1973, a quantity of ship's timbers was uncovered by a mechanical excavator in the bed of a former inlet. The timbers were clearly of late medieval date, and were recovered over a distance of c.30m, arguably giving a general indication of the length of the vessel represented. Study of the material recovered has shown that it is a clinker-built ship that had been abandoned in a creek known to have silted up in or by the late fifteenth century.

The discovery of such a large, medieval merchantman is of considerable significance for British and European archaeologists, but surprisingly this neglected find has not been researched or published in any detail. This report therefore provides a summary of the circumstances of the vessel's discovery, and a description of the surviving elements initially recorded by Joe Trussler and William Honey at the Deal Maritime Museum in 1973-4. In conclusion, an evaluation of the vessel is provided, based largely on research conducted by a team from University College London in 1997-2000.

The remains in Sandwich were disturbed at least three times in the twentieth century, during sewer trench excavations in 1930, 1973 and 1980. This account of the circumstances of the discovery and excavation of the Sandwich Ship has been compiled from the interim article published in *Kent Archaeological Review* (Trussler 1974) together with other reports, letters and diaries written by William Honey (Deal Maritime Museum), Joe Trussler (Sandwich Historical

Society) and Reg Varrell (National Maritime Museum). Access to the unpublished material was kindly provided by Jon Iveson (Dover Museum) and Gillian Hutchinson (National Maritime Museum). The account of the later 1980 excavations is taken from the summaries published in *Medieval Archaeology* 25 (1981, 209) and by Brian Philp (2002, 136).

It now seems that the remains of the ship were first encountered in the mid-1930s, when the first sewer trench was dug out by hand. Joe Trussler who recorded many of the timbers in 1973, was familiar with the layout of the sewerage system in the area, and was puzzled why the line of the main sewer laid in the 1930s made an arc when it should have followed a straight path to the eastern outfall. The watching brief on the renewal of the system 40 years later answered the question, showing that the original trench had been dug around an obstruction, the mass of timbers representing the port side of an abandoned ship.

In June 1973 work began on a new sewer (Fig. 1). The location of the trench was in the Parish of St Clements in an area known as the Bulwarks (Bragard *et al* 1999, 42-45), a reference to the medieval defensive earthworks around the north-eastern corner of the town

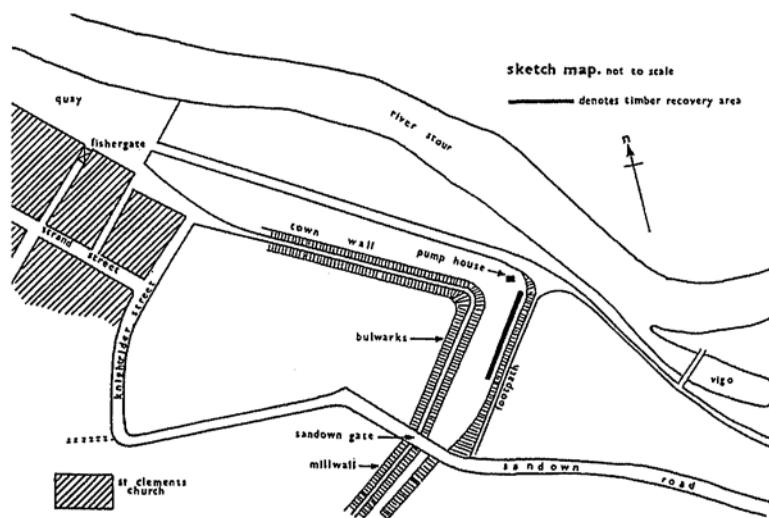


Fig. 1 Medieval Sandwich Ship: plan showing general location of the trench from which the timbers were recovered in 1973 (after Trussler 1974).

(NGR TR 335/581). At that point both the town wall and its ditch are approximately 50m from the present-day course of the River Stour and run at right angles to it. The sewer trench broadly followed the line of the old defensive ditch and, at the outer or eastern side of it, was some 1.5m wide and 3-3.5m deep. It was not anticipated that the remains of a medieval ship would be uncovered, but as the excavation of the trench progressed into July, the machine hit timberwork between 60 to 70m south of the modern river bank. The largest elements proved difficult for the machine to remove within the confines of the narrow trench, and the excavators had to resort to the use of axes and chain saws to clear impediments, which were piled up on both sides of the cutting. It was these piles of discarded wood which were spotted by Joe Trussler, perhaps as much as a week after they had been exposed. It was not at first clear what the timber represented, but it was subsequently identified as the remains of a clinker built ship, and tentatively dated to the early fifteenth century by William Honey. He was then the Director of the Deal Maritime Museum, a new institution that had opened in 1972. An inspector from the Department of Environment also visited the site in Sandwich, but seemed more interested in potential damage to the historic town wall than in the ship remains, according to comments made in a contemporary diary compiled by Reg Varrel.

None of the timber was observed or recorded by archaeologists *in situ* in the closely-shuttered trench. Indeed, given the relatively small quantity of timber recovered and its disjointed condition, it seemed debatable whether it would be possible to gain any clear conception of the original form and construction of the ship. Nevertheless the apparent age and construction of the vessel represented rendered the remains of considerable importance and consequently a programme of recovery and recording was established.

The decision was therefore taken to transport the discarded remains to the museum yard in Deal where archaeological recording could be undertaken more easily than on the spoil heaps at Sandwich. However, there were further delays in obtaining permission to remove the timber, since the quantity of woodwork had first to be assessed by the surveyors, as its excavation had substantially delayed the sewer installation programme, and thus increased its cost. By the time the timbers were lifted and transported to Deal they had been exposed for nearly a month of hot dry weather, which resulted in some deterioration in their condition.

The excavations at Sandwich were also visited by Reg Varrel, from the National Maritime Museum. He recorded that the charge hand showed him the approximate position of the wreck on the ground. This he describes as some 33m long (109ft) with its stern pointing

towards the river at a position where new and old town meet in a straight line some 18-19m from the wall. One floor timber, presumably one of the elements seated over the rising deadwood at the stern of the vessel, apparently lay only 0.6m (2ft) from the surface. However a substantial part of the vessel must still survive on the site, since the new pipe had been laid for at least part of its length over 'deck beams' (*sic*), presumably floor timbers lying at a depth of 3-4m (10-13ft)

This locational information is broadly corroborated by data tabulated by Mr Crouch the site agent. His table, which records the frequency with which timbers were found over a *c.*60m-length of the sewer trench excavation, was not compiled for the benefit of the archaeologists but to provide an indication of how the excavation's progress was impeded by the discovery and removal of timberwork. It thus only notes the larger members that could only be removed by the mechanical excavator after the timbers had been manually axed or sawn through. Between the old manhole no. 64a and the new manhole no. 181, a distance of some 44m, over forty timbers were listed. Of these, twelve seem to have been located in the first 24m of trench, apparently before the rudder was exposed. The latter seems to have appeared between the 28m and 30m mark, according to marginal note added to the list. Given that the so-called 'Sandwich Ship' was orientated with its stern (i.e. its rudder) towards the present-day course of the river, this suggests that another structure (perhaps a second ship?) had been disturbed during the previous 20m of the sewer excavation. Following the exposure of the rudder, many more timbers were encountered, of which some thirty-six were listed on the agent's table as having been recovered from the trench up to the 43.5m mark. Beyond that point, a further 16.5m beyond the new manhole no. 181, at least six more timbers are listed. In sum, over thirty-six substantial timbers were noted as having been sawn or axed from a 32m-length of the sewer trench following the discovery of the rudder. Many more fragmentary pieces were no doubt removed during the work, but are not listed by Mr Crouch since they did not unduly delay the progress of the excavations.

To minimise further deterioration of wood at the museum, a rudimentary soaking tank was constructed by covering the floor of a brick shed with a thick layer of soft sand over which some sheets of hardboard were laid. A sheet of heavy polythene covered the hardboard and was fastened to the wall. By this means all the timbers could be immersed and allowed sufficient room for manoeuvring, albeit very carefully.

Thereafter, the majority of the recording was undertaken by William Honey and Joe Trussler. There were few analogous projects

or recording manuals available in 1973 to provide guidance for the Sandwich Ship team. Although the Graveney Boat had been successfully recovered in Kent just two years earlier for example (Fenwick 1978), that was a far more coherent and much smaller vessel than the ship represented by the eighty disparate fragments which now filled the museum yard at Deal. A closer parallel was probably the site at Rye in neighbouring Sussex, where a major sewer trench excavation had cut through two hulks in May 1963: the battered remains of the enigmatic vessels were admirably and promptly assessed by Captain Lovegrove (1964, 115-122). However, the detailed and thorough publication of the vessel fragment studies and methodologies compiled by Arne Emil Christensen from Bergen (1985), Sean McGrail from Dublin (1993) and from London (Goodburn 1994; Marsden 1996) lay far in the future; even the recovery of *Mary Rose* from the Solent seabed was a further decade away (Rule 1982; Marsden 2003). For Honey and Trussler, the most appropriate benchmarks were the Burlesdon wreck project, a massive and somewhat idiosyncratic late medieval hulk abandoned on the foreshore of the River Hamble in Hampshire (Friel *et al.* 1993), the medieval finds from the silted up harbour at Kalmar in Sweden (Delgado 1997, 219-221), and the rather later Woolwich Ship which had been recorded in London in 1912 (Garrod & Philp 1983). There were other projects such as the enigmatic ship excavated in 1822 from an infilled channel of the River Rother on the southern border of Kent: this remarkable project saw the complete excavation and lifting of a late medieval merchantmen (Rice 1824; Fenwick 1978, 258-260; Rosa 1982) but no fragments had survived or had been recorded in sufficient detail to inform the team assembled at Deal in 1973. Advice was thus taken from other quarters, including the National Maritime Museum who dispatched one of its conservators to the site. Reg Varrel spent a fortnight with them discussing recording systems amongst many other matters, as his diary shows.

In the event, a programme of scale drawing was abandoned owing to the time the timbers would have been kept out of the tank. Instead, a system of direct tracing on to polythene sheeting was resorted to but the roll of polythene tracings was misplaced and cannot now be found. However, Honey did make extensive notes, measurements and very precise, insightful observations and those most useful records have survived, together with his photographic catalogue. That part of the project archive is now held by the Dover Museum.

The ultimate fate of those timbers is not precisely recorded, and only a proportion of them were still visible in the yard of the maritime museum at Deal a quarter of a century later. Some timbers presumably dried out and were discarded; some may have been loaned or

otherwise donated to other museums. *The Shipwreck Rescue & Heritage Centre* in Charlestown, Devon, for example, has plank and futtock fragments from a late medieval clinker-built ship on display reportedly 'excavated at Sandwich, Kent' (*pers comm.* D. Goodburn), although the Museum Director has been unwilling to confirm the provenance.

Third sewer trench excavation: Sandwich 1980

In 1980, the *Kent Archaeological Rescue Unit* (KARU) conducted a watching brief during the excavation of another pipe-laying project just to the east of the Bulwarks. The main trench began close to the Sandown Gate, passing through the area in which the vessel was thought to lie. Although the trench reached a depth of 5m, cutting through waterlogged estuarine silts, there was no evidence of the keel and only small pieces of wood were found. However, a subsidiary trench did cut through a feature thought to represent the 'eastern side' (possibly the port side?) of the vessel, which was recorded as still standing some 2 to 4m tall. Although working conditions precluded detailed recording, two substantial futtocks and some associated hull planking were observed *in situ*, together with evidence of trenails and seam-waterproofing (Philp 2002, 136).

UCL recording project: Deal Maritime Museum 1996-7

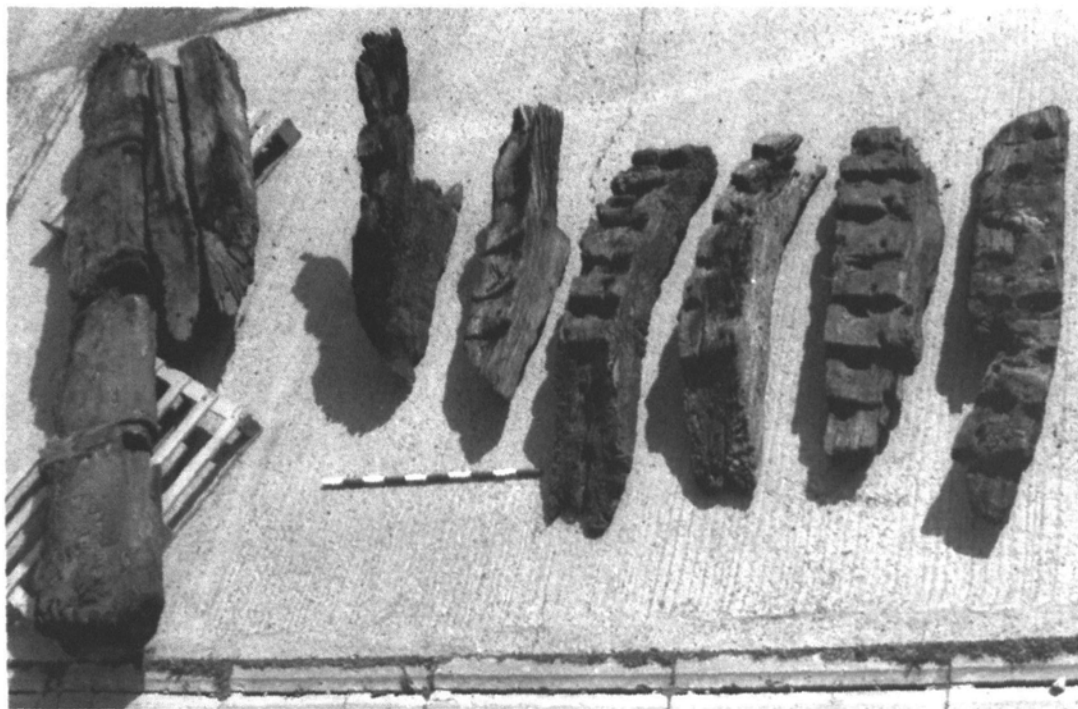
Prompted by an enigmatic reference to the Sandwich Ship in Gillian Hutchinson's *Medieval Ships & Shipping* (1994, 196) a student studying maritime archaeology at University College London was despatched to Deal Maritime Museum to assess whatever remains survived of the vessel for his undergraduate dissertation. James Cole discovered that a number of major timbers had survived, and were still being stored there, over twenty years after their initial exposure. His report (Cole 1997) renewed interest in the timbers and Dover Museum took responsibility for them, subsequently moving them to their own store in Deal.

UCL recording project: Dover Museum store, Deal 1999-2000 (Plates I and II)

In 1999 a larger UCL team assessed the timbers at Deal for the Dover Museum, and recorded the better-preserved, more diagnostic elements by scale drawings and photography. The timber was sampled for species identification and for dendrochronological dating, while



Medieval Sandwich Ship: showing rudder and sternpost being recorded in 1999 (photo S. Miller)



Medieval Sandwich Ship: recorded in 1999, showing rudder, stern post, floor timber and futtocks set out in what may have been their general positions within the ship structure (photo S. Miller)

parent-log and parent-tree studies were also conducted. As a consequence of this phase of study, the date, general character and details of the structure of the stern of the vessel became clearer.

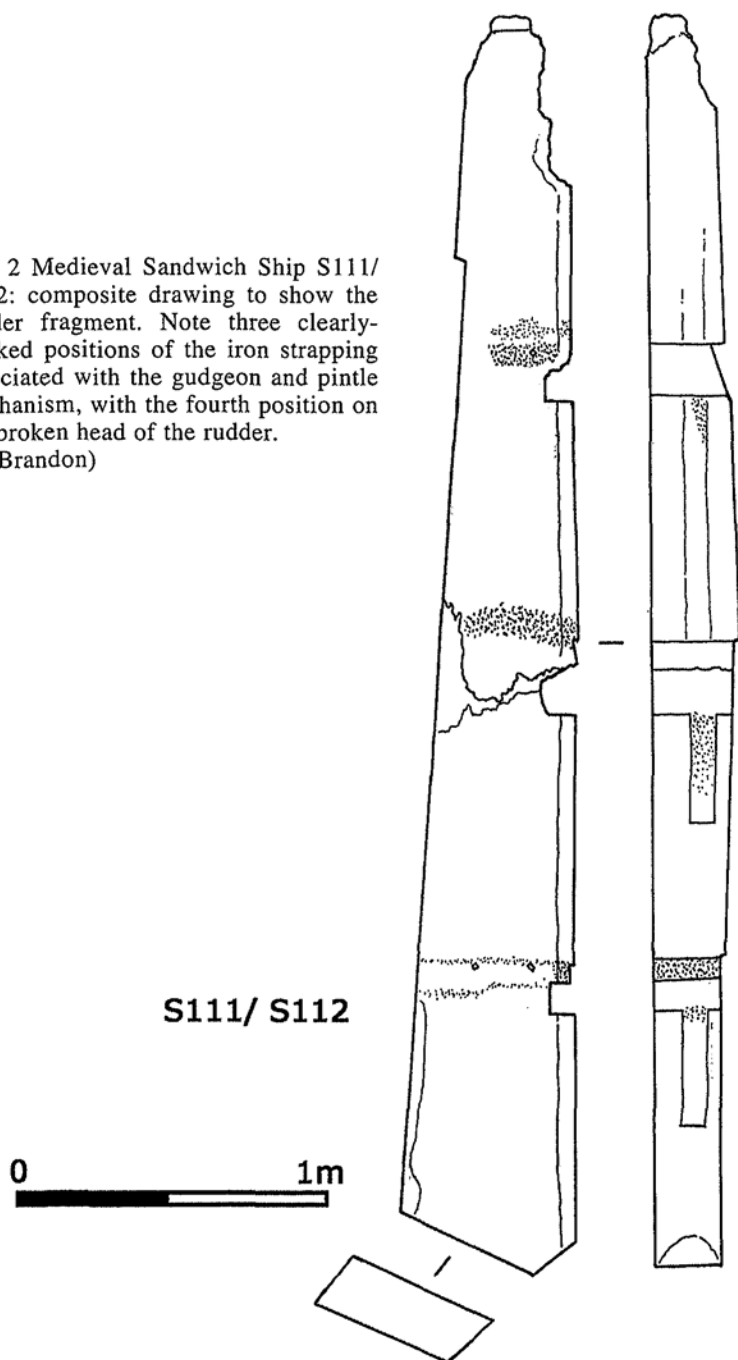
KAS surveys: Sandwich 2002

Protracted negotiations were then initiated over a two-year period in an attempt to organise a modest evaluation excavation of the Sandwich site to clarify the plan form of the vessel, but unfortunately these proved fruitless. Instead, at the suggestion of Keith Parfitt, the *Kent Archaeological Society* stepped in, and in May 2002 undertook a resistivity survey of the infilled inlet over an area some 100m long by 20m wide lying between the River Stour and the Sandown Road (C and B McNaughton 2002, 2-3). The results of this work identified two anomalies each some 12m long in the southern half of the surveyed zone, with a third area some 18m long lying to the east of the survey base line, corresponding to the general location where the late medieval ship timbers were recovered in 1973. In August 2002 a magnetometer survey by KAS of the same 100m x 20m area recorded high anomaly readings presumably representing concentrations of iron or of burnt material in very similar locations to those identified by the earlier resistivity survey (C and B McNaughton 2002, 4). Taken together, an implication of these important surveys is that the remains of the vessel (or vessels) may still survive in the infilled creek, despite the attrition of time and the continuing need to upgrade the drainage system.

THE SHIP TIMBERS

The catalogue of timbers recorded in 1973-4 at Deal included twenty-five plank fragments varying from 0.23 to 1.88m in length; twenty-two framing elements up to c.2m long, seven fragments of stringers, parts of four pillars, a 2.20m length of the stern post in two separate pieces, part of a rudder 4.10m long, also broken in two, and twenty-four miscellaneous fragments. This description of those timbers recovered from the Sandwich Ship excavation is based principally on that report compiled by William Honey at the Deal Maritime Museum, with corroborative contemporary comments from Reg Varrel. Comments on the material that was still available for study twenty-five years later (such as that by James Cole, Tristan Wood-Davies and Martin Bridge) has now been added to those primary records. In other words, this section is a re-ordering of the observations, interpretations, identifications and measurements

Fig. 2 Medieval Sandwich Ship S111/
S112: composite drawing to show the
rudder fragment. Note three clearly-
marked positions of the iron strapping
associated with the gudgeon and pintle
mechanism, with the fourth position on
the broken head of the rudder.
(K. Brandon)



made by the perceptive William Honey and his team, in the light of the more recent research.

Rudder (Fig. 2)

The most impressive piece is the rudder [S111 & S112], the first of the ship timbers to be pulled from the trench in 1973. Apart from damage to its aftermost edge and the loss of its topmost section, it was extremely well preserved. It is in two pieces that when fitted together represent the forward part of a rudder with a length of 13ft 5in. (4.1m) from the iron-shod sole. According to Dr Jon Hather, the rudder had been converted from a halved log taken from a tree with complacent rings and low branches: in other words, two broadly identical rudders could have been fashioned from the same log.

Some 0.36m above the rudder base there were two nail holes, 6mm square which contained a hard black substance. Set 0.46m above that was an articulated iron pintle and gudgeon (the pivot mechanism that allowed the rudder to turn) although this subsequently became detached (Fig. 3). Rebates set into the spine of the rudder housed the pintles to ensure that the rudder could not be unshipped by accident. Indeed, the depth of the rebates implies that the strapwork would have been added to the rudder as it was being hung.

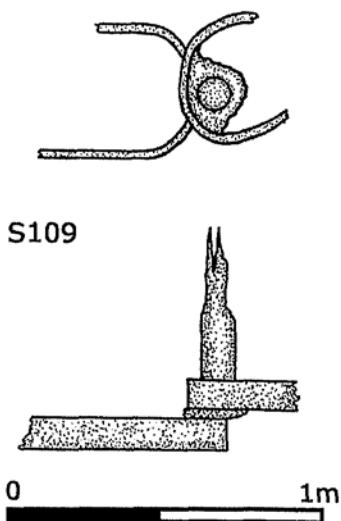


Fig. 3 Medieval Sandwich Ship S109: iron gudgeon and pintle fragment, now detached, but originally found attached to the bottom of the rudder. (K. Brandon)

The scars and housings for three more such fastenings were recorded, the second set being 0.96m from the first, where a transverse break occurs; the third 1.05m from the second, and the last is clearly defined but in the fragmented head 0.95m above the third. It is not known if the higher iron straps were removed for recycling in antiquity, although it is certainly a possibility, with just the lowest ironwork surviving through its inaccessibility below the contemporary water level.

The form of the rudder is of crucial importance to any evaluation of the parent vessel. Assuming that the spacing of the straps was consistently set at *c.*1m intervals, for example, it is possible to suggest that the complete rudder was some 5m in length, a figure that relates directly of the size and draught of the ship. Again, the angle of the base of the rudder clearly shows that the raked sternpost would have risen at an angle of between *c.*110 and 117° to the keel.

Sternpost (Fig. 4)

The 7ft 3in. (2.21m) length of the sternpost was recovered in two separate pieces split in half down the rebate line [S113]. It would seem that this substantial fragment represents the truncated upper section of the stern post which would have been scarfed to a similar-sized timber that would in turn have articulated with the keel. On the after face of the surviving element were two marks incised for the acceptance of the gudgeons; these were 1.05m apart, the same distance that separ-

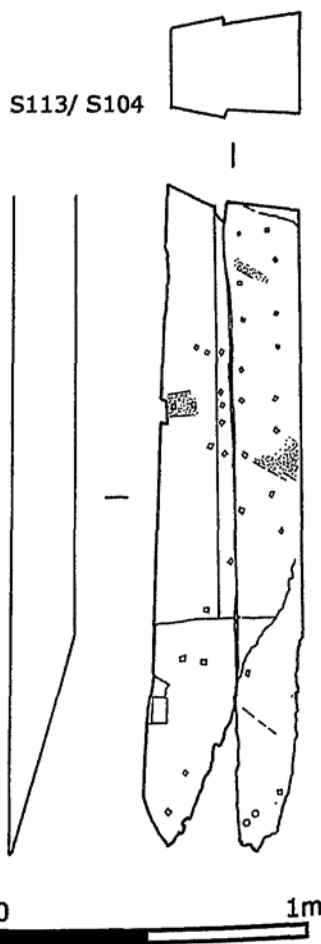


Fig. 4 Medieval Sandwich Ship: S104/113: stern post fragment, head broken off, with scarf joint at foot to accept additional timber and rebate in edge to take ends of clinker-laid hull planking (note associated nails and scars from rising lines of plank strakes). (K. Brandon)

ated the second and third strap marks on the rudder (see above). Its lower end was cut for a flat scarf 0.8m long which had been fixed with eight spikes 125mm long by 15mm square in two rows, one driven from each side of the scarf, and a treenail running through the centre.

Three coatings were recorded by Varrel. A black one, presumably pitch, had been applied externally and had run into the stern joints, under and around rudder irons; a white substance was found internally and a grey almost metallic one on parts of the rudder.

The stern post had been in good condition and two plank fragments remained firmly in place on the post until removed for safety. These fragments were 3.10m from the baseline of the rudder and consisted of a plank overlap. The lower plank was set at an angle of 9.5° to the centreline of the vessel, the upper was set at 12° to the centreline. This gives a vessel of very fine exit at a considerable height above the keel.

The rudder, gudgeon and pintle mechanism and sternpost fragments

had clearly articulated in antiquity, providing a significant insight into the structure of the vessel (see e. g. Fig. 12), and it is possible that the otherwise disarticulated fragment [S106: Fig. 5] may also be associated with the stern assembly.

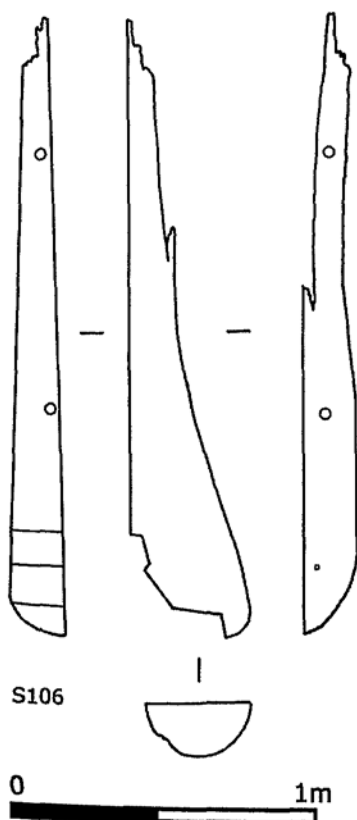


Fig. 5 Medieval Sandwich Ship: S106 timber, perhaps derived from junction of keel and stern post, with head broken although rebates on foot in tact. (K. Brandon)

Planks (Fig. 6)

Twenty-five fragments were recorded in 1973. According to Varrel, the planking appeared to have been riven and was approximately 0.30m wide and some 40-60mm thick. These general measurements are confirmed by Honey, who recorded that the plank fragments varied in length from 0.23-1.98m (9in. to 6ft 6in.), and in width from 0.08-0.31m (3¼in. to 1ft). However, only two of these pieces retained their original full width, which was 0.29m and 0.305m (11½in. and 1ft respectively).

The maximum plank *thickness* measured on the Sandwich Ship was recorded across the middle of the planks, since each one had been dubbed off on its inner upper face to lie flush on the frame, on its inner lower face so that it would lie fairly on the strake below, and also on its outer lower face. The cross-section of each plank therefore assumed a diamond shape, losing about a third of its thickness between the middle and the edges. The planks were originally of radial cross-section. Taking all twenty-five fragments into consideration, the maximum *thickness* was calculated as 75mm (3in.) and the minimum 50mm (2in.). Honey considered those figures less than might be expected for a ship of that size but McGrail has suggested that 'large ships' were built in the medieval period with planking of only 30mm in thickness (McGrail 1993, 11).

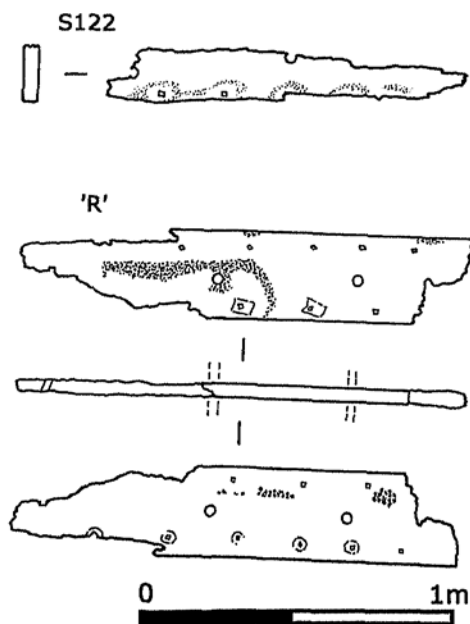


Fig. 6 Medieval Sandwich Ship: plank fragments (K. Brandon).

(a) 'R' a re-drawing of a fragment recorded at Deal Maritime Museum to show marks of circular nail heads (outboard) and diamond-shaped roves (inboard) impressed into the wood; close spacing of the clenched-nail holes used to join the runs of planking; three widely-spaced treenail holes representing the spacing of the framing of the ship. (b) S122: last surviving plank fragment, both ends and both edges badly damaged (i.e. obviously not full width), recorded in 1999.

Plank scarfs

Evidence for six scarfs was recorded by Honey, of which five were cut on the outer face, from left to right while the sixth was cut on the inner face in the reverse direction (unfortunately it did not fit any of the others). The angle of cut varied from 8° to 12° . Given that plank scarfs were usually cut with the outer feather edge facing aft (to help counteract the egress of water as the vessel moved forwards) then clearly these were all from the starboard side of the vessel. At the thick end of one of these scarfs was a clear vertical line of chisel marks where the feather edge of the partner piece, no doubt cut too long, had been trimmed. Varrel adds that the plank scarfs were approximately 0.28m long and were usually fastened by four clenched nails.

There are two minor oddities to be mentioned here:

a) A plank fragment initially labelled (*Ri*) was 26in. (0.66m) long of which the upper two thirds remained, having a treenail hole and nail holes with rove impressions. However, it had a gradual taper throughout its entire length, being 2 $\frac{1}{2}$ in. (55mm) thick at the right hand end and 1in. (25mm) thick at the left hand end; both ends were broken away. It is thought that this might be a thinning of the hood-end of the plank as it approached the sternpost to fit better into the rebate but it is surprising that a plank of this thinness even over a short distance should be acceptable on such a large vessel.

b) Another fragment initially labelled (*Eiii*) was 9in. (0.23m) long and 4 $\frac{3}{4}$ in. (0.12m) wide, tapering in its length from $\frac{3}{4}$ in. (20mm) to a feather edge, being luted on both sides and having one nail hole in the middle. It was eventually classified tentatively as a filling wedge between plank and frame to make good a badly-cut land.

Luting (with J. Cole)

Varrel noted that the planks were luted with a loose twist of black hair, running the length of the plank. For his dissertation report submitted in 1997, Cole sampled surviving traces of the material he observed on both the inboard and outboard edges of Plank 'R'. Macroscopic examination showed that it comprised strands of un-tufted animal hair up to 0.20m long. This he identified as the body hair of a young adult domestic ox, *Bos taurus*, following microscopic study which revealed that the finer hair had no medulla, whilst the coarser hair had a continuous latticed dark cortex (Cole 1997, 18). Michael Ryder's study of the luting material used on the large

assemblage of medieval vessel plank fragments excavated on the London waterfront suggests that cattle hair, a by-product of the tanning industry, was commonly used for luting in the twelfth-century examples and was still used (though less universally) in the fourteenth (Ryder 1996, 204).

Clench nails

Clearly observable differences in the surface of the planking suggests that the average overlap of each strake was 90mm (3½in.). The strakes had been fastened together by clench nails, as in normal clinker-building practice. The spacing between the nails varied from 0.125m to 0.235m (5-9¼in.), the average of sixty-one instances being 0.19m (7½in.). Study of the two fragments of full-width planking with nail holes at both upper and lower edges showed that on one the upper and lower holes were in pairs, while on the other the nail holes were staggered.

Although no actual clench nails remained, in several instances there were a few fibres of iron residue in the holes and fortunately a few lumps of concretion had formed over the outer ends of nails and these contained iron corrosion products. The conclusions drawn were consequently based on a study of nail *holes*, of which there were ninety, an infinitesimal proportion of the number in the entire ship, but arguably sufficient for this purpose.

The general appearance of the nails would seem to be similar to those described in the initial report of the Bursledon Ship published in the *Mariner's Mirror* (Anderson 1934). In view of the suggestion then made that the Bursledon nails were driven from inside through a rectangular 'washer' and clenched over a circular rove on the outside, particular attention was given to the Sandwich fastenings.

Nails were driven approximately 0.05m (2in.) from the lower (outer) edges and 0.04m (c. 1½in.) from the upper (inboard) edges. The thickness varied very little, ¾in. (0.019m) sq. or ¾x⅝in. (0.019 x 0.016m) at the outer face being typical. Careful measurement showed in several instances a slight decrease in thickness indicating a tapering of the nail from outboard to inboard.

An off-centre quadrant section of one or more sides of many of the nail holes led to the suggestion that all holes had been first drilled to a diameter of ⅝in. (16mm) and that a wooden dowel had been inserted prior to the nail being driven. If the nail was driven perfectly true, its four faces cut cleanly into the timber of the plank and no impression of the round hole remained. If it was slightly off-centre, however, then some part of the curvature of the drilled hole was visible and in several instances fragments of transverse wood fibre from the dowels were found in the hole.

Honey observed that most nail holes had, at the outer plank face, circular depressions of $c.1\frac{3}{4}$ in. (0.045m) diameter in the wood fibre surrounding the hole, and at the inner plank face roughly rectangular depressions of varying proportions, typical sizes being $2\frac{3}{4} \times 2\frac{1}{4}$ in. (0.07 x 0.058m), $3 \times 1\frac{7}{8}$ in. (0.075 x 0.047m) and $4 \times 2\frac{1}{4}$ in. (0.102 x 0.057m). It was thought that these impacted scars represented a circular nail head on the outboard side with a rectangular rove inboard. Varrel confirms that picture with his more general observations that the clenched nails had a head measuring 0.05m, a square shank 0.015m and were clenched over a rectangular rove measuring 0.05m by 0.07m. He also noted that the corners of the roves turned down slightly into the plank.

The implication was obviously that the Sandwich Ship nails were driven from the outside inwards, a suggestion supported by the following: the tapering inwards of the nail holes; a short and contused enlargement of a few of the nail holes in the last half inch immediately below the rectangular depression which was interpreted as an expansion of the nail below the rove by the hammering during clenching; visual and x-ray examination of sections of the remaining concretion found over a few of the circular nail head depressions showed the curved run of metal fibres which might be expected to be produced during the forging of the nail, and in no instance showed any suggestion of the straight fibres of the nail passing through a plate.

Plank Treenails

There was normally one treenail through each plank into each frame. Some twenty treenail holes of 30mm ($1\frac{1}{4}$ in.) diameter were recorded, many of which contained fragments of treenails but only two were in good condition. Of these, one had quite clearly had been wedged from the outside, while the other equally clearly had not. A calculation of the *frame spacing* of 0.52 ± 0.12 m is based on the measurements made by William Honey, taken from the six plank fragments that had two or more treenail holes. These are: 0.0405m (1ft 4in.); 0.420m (1ft $4\frac{1}{2}$ in.), 0.425 (1ft $4\frac{3}{4}$ in.), 0.450m (1ft 5in.), 0.510m (1ft 8in.) and 0.640m (2ft $1\frac{1}{4}$ in.).

Varrel records a slightly different result, based on his measurements of a single plank where the distance between treenail holes gave a dimension of 0.563m. These figures for the frame spacing on the Sandwich Ship may be compared with the figures of 0.44m \pm 0.03m; 0.52m \pm 0.09m and 0.56m \pm 0.08m for the thirteenth-century 'large ship' TG9 represented by articulated plank fragments recorded on the Wood Quay site (McGrail 1993, 39).

Frames

The majority of the twenty-one frames recorded in 1973 had been chopped, sawn, or broken away either by the contractor or in antiquity. Nevertheless, sufficient survived to facilitate the identification of several elements. There were two *floor timbers* both with slightly concave curvature and with sharp natural crotches [S101 and S120: **Figs 7 and 8**], the feet of which presumably rose from the stern assembly of the vessel. The unique '*knee timber*' [S115: **Fig. 9**] might represent a frame sitting over a deckbeam or corbel-headed cross-beam (see e.g. Gotche & Host Madsen 2001, 32), since part of the (?lower) edge has not been cut to accommodate overlapping hull planking. The majority of the framing elements, however, represented eighteen *first futtocks* (e.g. S102: see **Fig. 10**), all showing slightly convex curvature, the maximum being about 0.125m (5in.) in a length of 1.91m (6ft 3in.). Only two frames of 1.86m (6ft 1in.) and 1.98m (6ft 6in.) retained their full original length but there were five

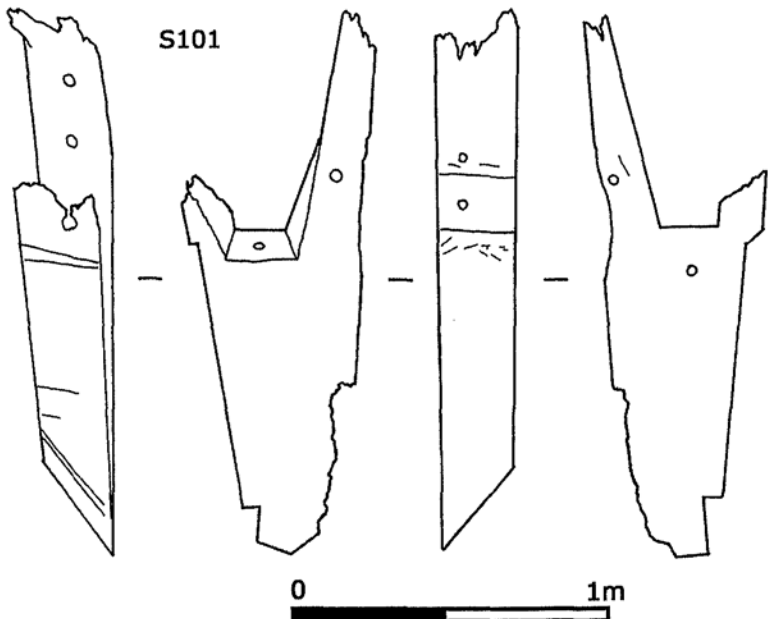


Fig. 7 Medieval Sandwich Ship S101: four faces of a natural Y-shaped floor-frame from the stern of the vessel. Although badly damaged the general form can be readily appreciated. Note the well-preserved angle on the foot of the floor, suggesting that it sat on a rising raked member, and not on the keel.
(K. Brandon)

THE FOURTEENTH-CENTURY MERCHANT SHIP FROM SANDWICH

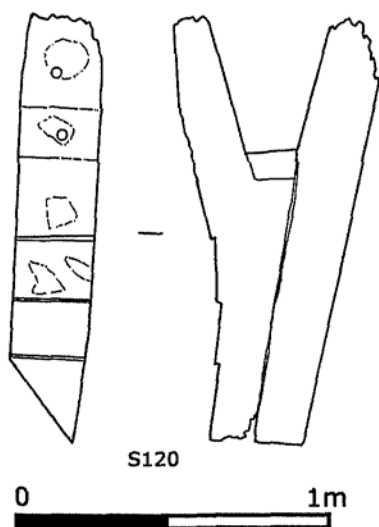


Fig. 8 Medieval Sandwich Ship S120: two faces of a damaged but naturally-shaped floor-frame from the stern of the vessel, showing in particular the lands or joggles representing the runs of hull planking. Note this member also has a well-preserved angle on the foot of the floor: see Fig. 7. (K. Brandon)

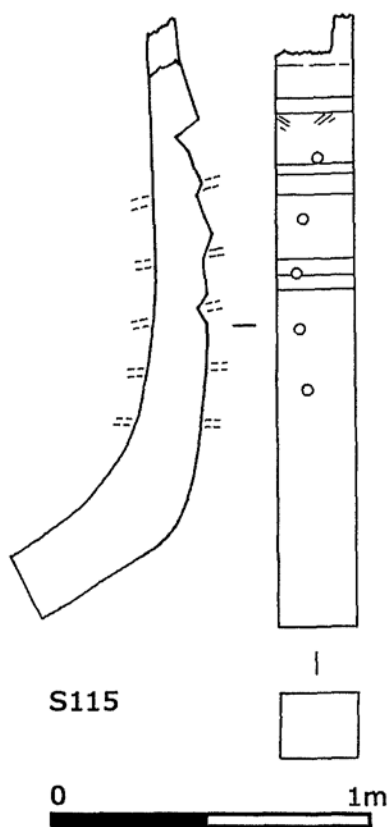


Fig. 9 Medieval Sandwich Ship S115: framing element, both ends damaged, but showing pronounced joggles for overlapping clinker planking over only the upper level of the timber. (K. Brandon)

with broken ends of more than 1.50m (5ft) and two of more than 1.80m (6ft) in their incomplete length. Sided thickness was between 0.29m (11½in.) and 0.38m (1ft 3in.), an average of 0.33m (12¾in.). Moulded thickness over the lands varied from 0.18-0.27m (7- 10¾in.), the average being 0.23m (9in.).

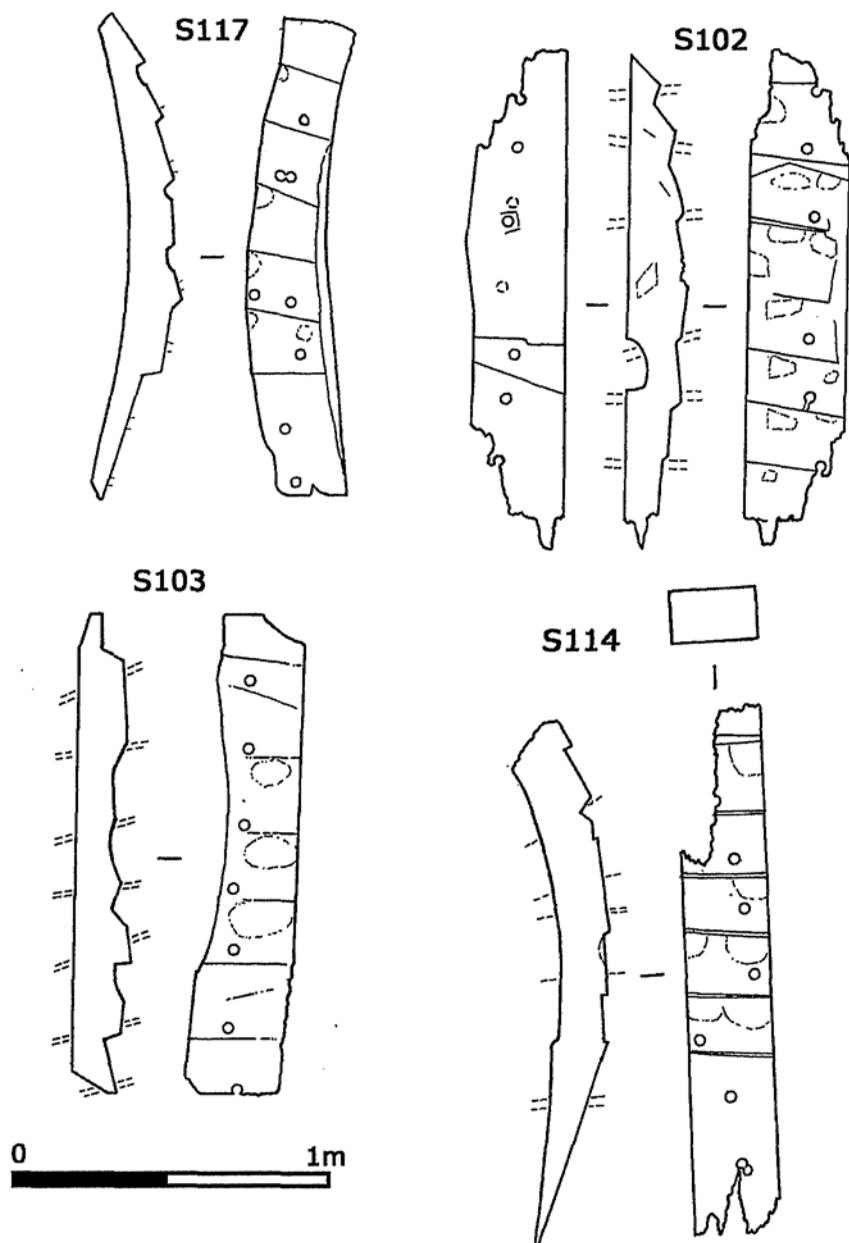


Fig. 10 Medieval Sandwich Ship S102, S 103, S114, S117: selection of futtocks. None survived to their complete length, but these drawings show the range of scantlings, lands or joggles to take the hull planking, clench pockets cut into the lands to accommodate the protruding iron-fastenings from the hull planking; treenail holes from the wooden pegs that held the frames to the hull, scarf joints where the ends are not damaged; and, on some, evidence of the curvature of the hull itself. (K. Brandon)

Bevels

All these frames were cut to a bevel on their outer and inner faces and thus were presumably set up square to the keel; no cant frames were recovered. From the bevel one should in theory be able to state the angle between the plank run and the fore and aft line at that particular frame and thus place the frame in its relative position fore and aft within the hull, but the outer faces of the frames retrieved were so confused with plank lands, clenched pockets and splits in the way of treenail, that one would be very rash to base firm calculations on the angles of bevel measured. When a frame shows bevels at successive lands of 2°, 14°, 16°, 13°, and 8°, it is apparent, even after making maximum allowance for later distortion, that this face was never formed to a fair bevelled surface before the lands were cut. It therefore seems probable that the lands were first cut into a roughly-estimated bevel while the frame timber was still in the square, after which the intervening timber then chopped out with an adze or axe.

Nevertheless it is safe to say that of the eighteen first futtocks examined, only one (with a bevel from right to left) came from starboard aft or port forward and the remaining seventeen bevelled from left to right came from starboard forward or port aft. Since parts of the rudder and sternpost were unearthed very early in the proceedings followed by the two crotch floor timber (all from a very narrow trench) it follows that all of these first futtocks most likely came from the starboard side, one from the quarter and seventeen from the bow.

Plank lands

Planking lands are a characteristic feature of clinker-building. Their width varied greatly from 0.165-0.260m (6½-10in.), with an average over 64 instances being 0.21m (8¼in.). It will be recalled that the full width of the associated planks was only recorded in two instances, and was 0.29m and 0.305m (11½in. and 1ft respectively).

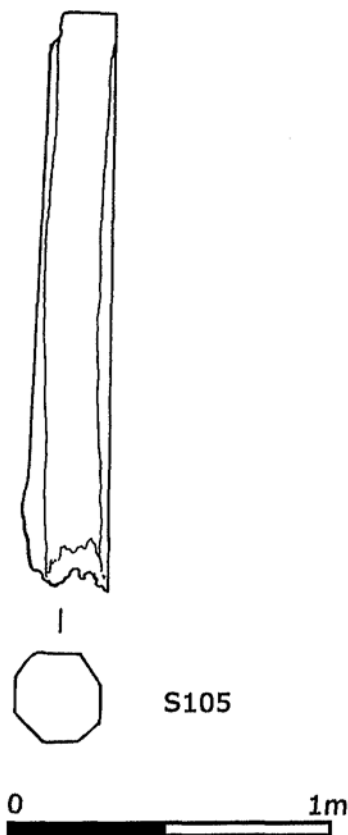
Clench Pockets

'Pockets' were cut into the outer face of the lands to accommodate the protruding bulk of the clenched roves fastening the planking. These were by no means as neatly cut or spaced as indicated in the Bursledon drawings and varied greatly in size, spacing and depth; they had apparently each been chopped in by three or four blows of a 2in. adze or chisel. Several of these 'clench pockets' still contained a mass of iron-stained bedding material but in no instance was there a recognisable remnant or shape of the plank nail or rove.

Frame Treenails

In general the frames show one treenail hole in each plank land; the spacing is irregular varying from 5-11 in. (0.13-0.28m) the average of seventy-seven measurements being 8¼ in. (0.21m), coinciding with the average land spacing given above. Some treenail fragments were found in the holes and it was established that some of these had been wedged from the inside. No full-length treenail was recovered either from the frames or the planks so we can merely say that some treenails were wedged from the plank side and some not; some treenails were wedged from the frame inside and some not. It was not possible to establish from which side the treenails were driven, although one would expect it to be from the outside, and certainly the slightly rounded end of one on an outside plank face tended to support this expectation.

There are several instances of 'double-treenailing' with pairs of treenail holes about 2½ in. apart, some pairs drilled nearly parallel and some at an acute angle so that they merge into a common hole on the inner face of the frame. It has been suggested that this was done where a run of planking was unwilling to take the twist required; it would then be clamped in hard to the frame and a second treenail driven. There are six blind treenail holes on the inner faces of the frames perhaps to secure stringers or clamps but in no instance is there any scarring or indentation on the inner face of the frame to give indication of what was so secured.

*Pillars (Fig. 11)*

There were several pieces representing three broadly octagonal pillars c.6ft (1.83m) long and between 8¾ in. (0.22m) and 11½ in.

Fig. 11 Medieval Sandwich Ship S105: damaged fragment of an octagonally-shaped pillar, presumably to support a deck beam. (K. Brandon)

(0.29m) in 'diameter' [see e.g. S105]. Such pieces would support deck-beams for decking, at least at the bow and stern.

Unidentified

At least 24 fragments whose function was not immediately recognisable were also recovered in 1973, their scantlings ranging from: 16-96in. (0.405-2.44m) in length; 4-22½in. (0.1-0.57m) in breadth; ¾-10½in. (0.002-0.265m) in thickness.

Parent log and parent tree studies *with Tristan Wood-Davies*

Framing elements from the Sandwich Ship were studied by Tristan Wood-Davies (under the supervision of Dr Jon Hather) to determine the form of the parent log and of the parent tree. From his detailed report (Wood-Davies 2000) summarised here, it seems that most of the framing elements were converted from their parent logs by hewing and cleaving. Reconstructions of parent trees, based upon the morphologies of their parent logs, indicate that the surviving framing elements were predominantly derived from large mature wood-pasture or possibly hedgerow trees with low branches or limbs. The exploitation of trees from such contexts makes sense when the shape and function of the framing elements in the sample is considered: elements S101, S110, S115, S117 and S130 all utilise natural curves in the grain of their parent logs and trees. In the case of element S101, a crutch formed by a break of limb or fork in the trunk has been utilised to produce a V-shaped element of great natural strength. Having split the parent log down the centre of its stem section, the inner faces of the crutch formed by the remaining stem wood and the break of limb was hewn out to provide the element's squared inner profile. However, the entire element was not fashioned in one piece, but seems to have had a section scarfed on to extend one of its arms, suggesting that a suitable crutch of the required shape could not be found.

Timber S110 uses the natural-grown shape of a curved branch, and was used in the round with just the minimum amount of working, probably with a side axe, to fashion its two flattened sides. The curved futtock or floor timber element S115, and the two curved futtocks, framing elements S117 and S130, have been shaped in order to fit tightly against the curved lines of the parent vessel's hull. In order to maximise the structural integrity of the parent vessel, each of these framing timbers has been made in the strongest possible way, utilising the natural flow of grain and curves of the parent trees from which timbers were derived. These timbers have been hewn from

parent logs which incorporated crutches formed by the stem of the parent tree and its break into a major limb, thus exploiting the natural flow of the grain from the one into the other, resulting in an extremely strong framing element. The fact that these elements were not converted entirely from stem-wood, might indicate that suitable crooked, distorted trees were not available from which naturally curved trunk wood timbers might have been derived. The way in which many of the timbers (elements S101, S115, S117 and S130) have been hewn, rather than simply split from their parent logs, is again an indication that perhaps suitable grown stem-timber was not available. However, the trees which have been utilised for the provision of structural frames do seem to be quite adequate for their tasks; the timbers from this admittedly small sample would seem to suggest that no serious compromise was made with regard to timber selection.

Dendrochronological Investigation by Martin Bridge

A number of timbers was examined in the Dover Museum store at Deal in the summer of 1999, when an assessment of their suitability for dendrochronological sampling was carried out. Oak timbers with in excess of 60-70 annual rings and traces of sapwood were the preferred choice, since these are most likely to be datable. When trying to date a structure it is useful to be able to have a number of contemporaneous elements, since extracting the common growth patterns they exhibit serves both to enhance the likelihood of successful dating (by minimizing the unique growth characteristics of single trees) and confirming that the trees really are contemporaneous, and not later repairs or odd timbers re-used or stored before use. To be considered as dated, one expects to get consistent cross-matching against a number of independent chronologies both visually (using plots of the series) and statistically (using t -values) where t -values in excess of 4.0 are generally considered as significant (Baillie and Pilcher 1973).

Only four timbers were considered likely to yield useful tree-ring series, and these were cored using a special 15mm corer attached to an electric drill. The samples obtained were given laboratory codes (**Table 1**) and transported back to the laboratory where they were mounted on wooden laths and polished, using progressively finer grit papers, on an electric belt sander. The tree-ring series thus exposed were measured to an accuracy of 0.01mm on a specially constructed moving stage attached to a desktop computer. The measurement and subsequent analysis utilised the software package *Dendro for Windows* (Tyers 1999).

The sequences were compared with each other to see if they

TABLE 1: DETAILS OF THE TIMBERS SAMPLED

Sample number	Origin of core	Total no. of years	Av growth rate (mm yr ⁻¹)	Sap-wood details	Date of sequence	Felling date of timber
SWS01	Lower section of rudder - timber No. 111	c.60	3.40	-		unknown
SWS02	Joggled frame element - timber No. 102 (probably first futtock)	139	2.08	11	1193 - 1331	1332 - 1361
SWS03	Joggled frame element - timber No. 118	c.135	1.62	2		unknown
SWS04	Stern post - timber No. 113	c.60	2.03	-		unknown

crossmatched. They were then crossmatched with a wide range of regional and site chronologies to look for consistent statistical agreement at positions which could be checked by matching plots of the ring-width series.

All samples were of oak (*Quercus* spp) but most had breaks in their cores making measurement of the complete ring-width series impossible, though long sections were measured. Only sample SWS02 was intact, but had a band of very narrow rings midway along its length. The series was therefore initially treated in two halves, the complete series being the result of crossmatching both halves against dated material and confirming the number of rings in the band of very narrow rings. None of the individual series measured crossmatched with any of the others but each was individually compared with dated reference material. Series SWS02 gave consistent matching at a position corresponding to the years 1193-1331 (Table 2) – this being checked both for the latter part (1262-1331) and the complete series.

Series SWS02 was compared with data from Britain and the near Continent. The consistent crossmatching with sites in Southern England suggests this as a source area for the timber, implying that the Sandwich Ship was an English merchantman, rather than an abandoned (or captured) alien trader. Although such dendroprovenancing is difficult (Bridge 2000), further support for the suggestion of local timber used in the ship's construction is provided by the crossmatch-

TABLE 2: DATING EVIDENCE FOR SERIES SWS02

SWS02 AD 1193-1331		
Dated reference or site master chronology	<i>t</i> -value	Overlap (yrs)
FEB2000 (Bridge, unpublished chronology)	8.0	139
Hants 97 (Miles pers. comm.)	7.2	139
Oxon 93 (Miles pers. comm.)	6.6	139
London 1175 (Tyers pers. comm.)	5.4	139
Kent 88 (Laxton and Litton 1989)	4.0	139
Wick, Worcs. (Bridge 1983)	6.8	75
Toddington, Beds (Bridge 2001)	5.3	106
Sompting, Sussex (Tyers 1988)	5.0	100
Borden, Kent (Litton <i>et al.</i> 2000)	4.6	114
Marwell, Hants (Groves pers. comm.)	4.5	89

ing against a chronology from Frindsbury Barn, which gives $t = 5.5$ with 78 years of overlap (Arnold *et al* 2002). Adding the appropriate sapwood estimate for southern England (Miles 1997) that applies to 95% of the oak population, this makes the most likely felling period 1332-61. As timber was generally used soon after felling, this dates this individual element. Although extrapolating the date of the whole structure from a single timber could be potentially hazardous, in this case, the joggled frame is a major element unlikely to have been replaced, and with no evidence of use in an earlier structure.

DISCUSSION AND CONCLUSION

The Sandwich Ship timbers are clearly derived from at least one clinker-built vessel, but raise the question as to whether the parent feature (or features) was an abandoned hulk or were the timbers simply nautical elements re-used in a wharf-side structure that had been disturbed by the sewer trench excavation? Examples of such recycling have been identified on many medieval waterfront sites excavated in Britain and elsewhere in Europe. The evidence from Sandwich, when taken together however, strongly supports the suggestion that an abandoned but relatively coherent hulk is represented here. The rudder seems to have been more or less upright when initially exposed for example, implying that a substantial proportion

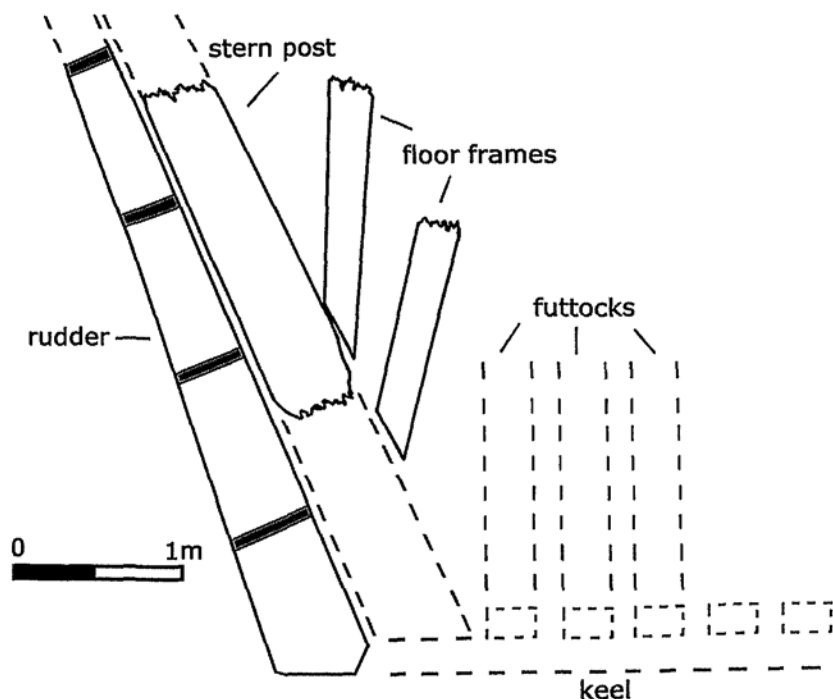


Fig. 12 Medieval Sandwich Ship: schematic illustration to show possible disposition of some of the timber in the stern assembly of the parent vessel. (J. Stripe)

of the stern assembly of the parent vessel survived (Fig. 12), while the albeit rather rushed recording of the site in 1980 confirmed that what was probably the port side of a large vessel was also still upstanding. The *diversity* of vessel parts recovered (not just hull planking but futtocks, stern post and a rudder) also strongly implies that at least one vessel had been disturbed *in situ*, while the uniformly-generous scantling shared by all those timber elements is not inconsistent with the interpretation of one large parent vessel.

Some general attributes of the form of such a vessel (or vessels) can be readily deduced, initially working with the methodologies developed by nautical archaeologists who have studied large groups of disarticulated vessel timbers. One of the first such assemblage to be published was that from medieval Bergen in Norway (Christensen 1985) in a landmark study that clearly demonstrated how boat-parts might be differentiated from those of a ship. A similar range of vessel

parts have been published from the Hedeby/Schleswig region of the Baltic (Crumlin Pedersen 1997, 252-300), from London (Marsden 1996) and also from eleventh-thirteenth century contexts from Dublin (McGrail 1993). The latter report lists a range of size-classes for medieval vessels related to overall length, ranging from small boat (less than 7m) to large ship (over 24m).

Professor McGrail also suggests that, even if only a single element survives, the parent vessel's size-class can be suggested through consideration of the scantling of that element, given that the proportions of a boat timber will be slighter than those of a ship timber, for example. Working from his published tables (McGrail 1993, 11) based on evidence from Dublin together with that from other analogous site reports, it seems clear that the disarticulated futtocks and planking fragments from the Sandwich ship timbers came from a vessel larger than the thirteenth-century Guernsey ships (Brandon 2002) or the fifteenth-century river barge Blackfriars III (Marsden 1996). However, timbers of a similar general size-class have been recorded on the fourteenth-century wrecks from Hundevika (Norway: Teisen 1994) and from Bremen (Germany: Lahn 1994) or the slightly later wreck from Aber W'rach (France: L'Hour, *et al.* 1989; 1994) or the late fifteenth-century hulk excavated at Newport, Gwent (Howell 2003).

As for the Sandwich rudder, this must have been some 5m long, up to 0.5m wide and 0.2m thick. For comparison, the rather later *Mary Rose* (c.1510), a multi-decked, multi-masted ship with a surviving keel length of over 31m and an estimated draft of 4.5m (Marsden 2003) had a rudder standing just under 5m tall, 1.10m wide and 0.26m thick (Christopher Dobbs, pers. comm.). Consequently it can be argued that the Sandwich ship, although proportionally slighter than *Mary Rose*, was quite obviously from a ship and not a boat. A better indication of its size-class is provided by the late sixteenth-century Alderney wreck. Although again representing a very different style and type of ship, it nevertheless had a rudder of very similar size and proportions to the Sandwich example. Owain Roberts (1998) has calculated that the Alderney vessel would have been some 22m long at the waterline, with a depth of hold of c.3m and a maximum beam of c.6m. These figures therefore provide an outline of the type of vessel-size represented at Sandwich. The disarticulated but virtually complete rudder trawled up from the seabed in Rye Bay, some twenty years ago was of a similar size, being c.4.5m long. Its base was also shaped to take a raked stern post and turned on a set of three wrought iron pintles. The C14 sample taken from the heartwood provided a suggested date range of late fourteenth or early fifteenth century for that vessel (Marsden 1997, 65-6).

Thus it can be deduced that the Sandwich Ship timbers derive from at least one 'large ship' (McGrail 1993, 11) certainly in excess of 20m in length, perhaps up to 30m, given the distribution of timbers from the machine-cut trench. Joe Trussler has suggested a beam of some 7-8m, based on his first-hand knowledge of the vessel and its location. The futtocks and planking elements show that it was clinker-built, with perhaps as many as sixty frames set at 0.5m intervals. The median rudder shows that it had a raked stern assembly and that the ship stood over 4m tall above the keel, while the c.1.8m-tall pillars imply that it had at least a partial deck structure. There is no evidence that it was constructed in the 'cog' tradition with a carvel-planked bottom, and thus it seems most likely to have been clinker-built throughout, as was the more recently excavated late fifteenth-century Newport Ship, for example (Howell 2003). It was also observed that, given the damage to the ends of the frames, it seems the hulk as initially exposed had already 'been robbed of all timber down to the unladen waterline at some period in antiquity' (Trussler 1974, 166). The dendrochronological study presented here, although very limited in scope, is nevertheless of considerable significance, not only in suggesting an absolute date for the vessel's construction, but also in that it seems to show that the vessel was locally-built, rather than being a foreign trader.

Taking all that analysis as a body, and comparing it with broadly contemporary manuscript illuminations has allowed Dr Flatman (2003) to make suggestions as to the general form and profile of such a vessel. His detailed study concludes that, despite depicting a carvel-built vessel, a useful comparison is the ship shown in Bod. Lib. MS Douce 353, f. 31 (see e.g. Bill *et al.*, 1997; Rose 2002, pl. 1). This illustration shows a large vessel with a single mainmast with furled square sail, a strong median rudder, end-castles that have been partially merged into the hull, and nascent masts fore- and aft. He has also argued that the Sandwich ship bears comparison with other forms of medieval iconography, particularly the series of thirteenth-fifteenth-century English town seals discussed by Ewe (1972) for example. These include one from Sandwich itself (*ibid.* 81, 186) that dates to the thirteenth century, but the one from Rye, dating from 1400 offers the best overall match so far with the Sandwich ship according to Flatman (see **Fig. 13**). The vessel in the latter example has a particularly strong, clinker-built hull with sharp ends, and a high, tapered median rudder ending well above deck (Flatman 2003).

That vessels of such a size operated out of Sandwich in the fourteenth century can be shown by study of contemporary documentary accounts; Martin (1978, 10) for example notes that the Sandwich-based vessels on the King's ship service then included three with crews between 28 and 32, and three with crews of 41 to 48.

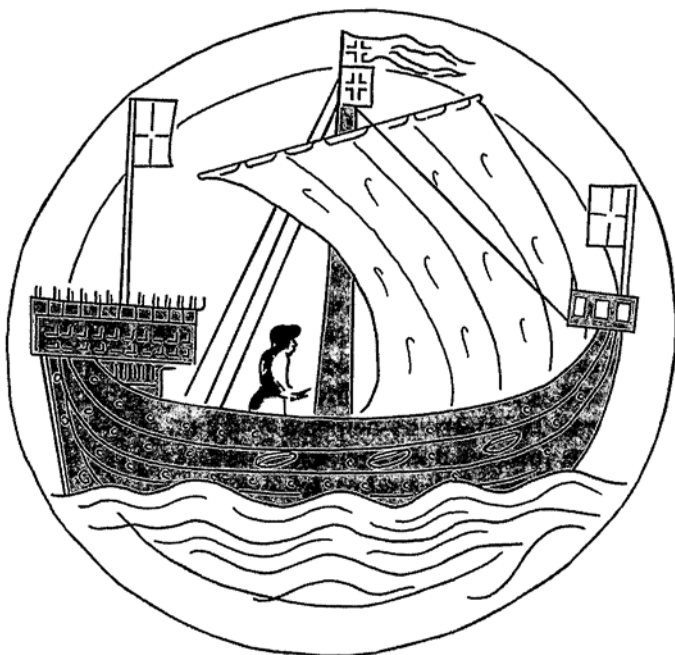


Fig. 13 Interpretative illustration of the general form of the late medieval merchantmen depicted on the Town Seal of Rye, its shape constrained by the circular format of the seal itself. (J. Stripe)

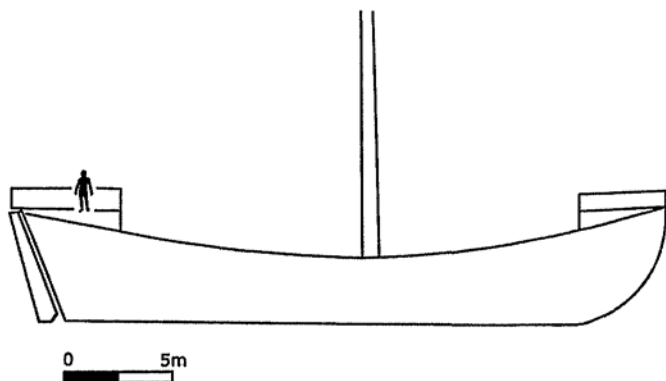


Fig. 14 Interpretative illustration (to scale) to show a suggested outline of the general form of the late medieval merchantmen represented by the timbers found at Sandwich, 1973. This may be compared with Fig 13. (J. Stripe)

The larger ships would have been owned by the Cundys, the Lovericks, or the other principal merchant/ship-owning families whose influence dominated civic life as much as their shipping would dominate the harbour (Martin 1978, 3; 11-12).

As a general rule, it seems that the size of the merchantmen being built in the fourteenth century increased, especially those operating on the lucrative Anglo-Gascon wine trade, with vessels of 150-200 tons becoming increasingly common (Unger 1980, 163). However, as the broad tidal estuary at Sandwich silted up, so the port's ability to accommodate the largest contemporary vessels diminished, following the departure of the last great galley and the last large carrack recorded in 1479 and 1492 respectively (Cole 1997, 44). A comparison of the import and export returns from Sandwich for 1465 and 1514 shows that while cargoes carried by some 152 vessels in the fifteenth century were valued at over £11,500, by the early sixteenth century the value of cargoes from 289 ships was only £9,000 (Burwash 1947, 217). The clear implication is that the port was forced to handle substantially smaller vessels by that date.

The fifteenth-century decline of the port was dramatically exacerbated by the punitive French raid in 1457, from which it has been argued the medieval port never really recovered. In the shocked aftermath of that attack, timbers from two hulks broken up in the harbour were used to strengthen the port's defences in 1458 (Gardiner 1954, 139). One lay at Fishergate, the other in an unspecified creek nearby, perhaps the Sandown Creek where the Sandwich Ship was found. There is plenty of evidence that vessels were systematically broken up at the end of their operative lives, the ironwork and timbers recovered from such hulks being routinely recycled. The practice has been discussed by Dr Friel in his study of the *Grace Dieu*, for example, an extremely large ship that was broken up after being struck by lightning in 1439. The stripping out of the plank fastenings produced over 7,840 kg of valuable iron that was taken to the King's storehouse in Southampton (Friel 1993, 11). Such practices were unsurprisingly common at ports like Sandwich. In 1385 for example, during the Hundred Years War, two large captured French vessels were brought to the port and broken up, with some of the timbers being recycled in the town's defences. There are also documented references to ship-breaking dating to the fifteenth century in addition to the two mentioned earlier which have been highlighted by Cole (1997, 44-6). A cogship was broken up after having taken from 'her dock at the further crane to Fishergate' in 1482-3, while the Treasurer's Rolls for 1489 mention 'iron sold of the old ship that lay in the creek near Fishergate'; and 4*d.* received of a man of Boston for a ship that lay in Sandown Creek'.

The tidal Sandown Creek itself also merits further discussion. It seems that it was deliberately blocked as a flood-prevention measure in 1493, when it was ordered that 'a substantial dam be made at the common cost between the Bulwark and Sandown bridge, able to keep out the sea in rages' (SA/AC1 f.246). Thus any vessel found in the creek must have been laid up there before that date. There is a reference recorded in Leland's visit to the port during his journey around England and Wales (1535-43) that might possibly be of relevance here. He mentions a 'caryke that was sunk in the haven in Pope Paul's time (that) did so much hurt' as the wreck caused 'a great bank' to accumulate around it. It is debatable whether the reference is to Pope Paul II (1464-71) or to Pope Paul III (1534-49). If it were the former, then it might be worth recalling that Leland notes that the location 'is called Sanded Bay' (Toulmin-Smith 1909, 48).

Additional questions to be raised are how extensive was the tidal Sandown Creek and precisely what was it used for, prior to its blocking at the end of the fifteenth century. Trussler has suggested that the southern shoreline of the tidal waterway may have followed the line of the Sandown Road, providing a very extensive open waterfront. Perhaps this may have provided foreshore space for the town's fishing industry or additional wharfage for the port. The location of the eastern end of the inlet, at the foot of the land rising to the site of St Clement's church, is arguably of significance, the church serving as both a sea mark and a focus for the harbour itself 'whereby sea-farers may give thanks to the deity for a safe passage' (Trussler, pers. comm.).

Another possibility is that it served as the wharf for Sandwich Castle (Stewart 2000, figs 1, 2), a major structure built in the thirteenth century, repaired in the fourteenth and mid-fifteenth centuries, but faded from the documentary records (perhaps significantly?) after the creek on its northern flank was infilled. Another suggestion that merits serious consideration is that such a large tidal creek on the seaward side of the town would be a prime location for ship-building, ship repair and ship breaking, three closely-related activities in the medieval period (see e.g. Bellamy & Milne 2003). If such maritime industries were located there, just outside the settlement but with the Ropery set on the walls to the south (Bragard *et al.* 1999, 42-6) then that might help to explain why hulks were laid up there. Clearly an understanding of the creek's form and development together with a precise understanding of the chronology of its silting would be essential to understand the wider context of the Sandwich Ship's situation and demise.

Ironically, 1973 was not only the year that the remains of this unique late medieval merchantman was ripped apart during a sewer-digging

scheme in Sandwich, but also saw the passing of the *Protection of Wrecks Act*, a measure that ensures shipwrecks on the seabed would be safe from accidental damage or wilful interference. So far some fifty historic wrecks have been afforded a measure of statutory protection (Fenwick & Gale 1998). The inland location of the Sandwich Ship meant that it fell outside the remit of the new Act, and thus no official provision was made for its recording or recovery. Although by great good fortune, there was just enough local interest and expertise to facilitate a salvage record of some of the timbers so rudely exposed, there were no funds made available for the full study or publication of the remarkable find for a quarter of a century. This inexplicable neglect of our nautical heritage is not alas, unusual: the preserved timber from the medieval Kingsteignton (Devon) boat, photographed *in situ* in 1898 and stored in a local museum subsequently, were not fully published for over a century, for example (Dudley *et al.* 2001, 266-272). Since then late medieval vessel or vessel fragments have been found in inland locations at Bursledon in Hampshire, Hungate in York, (1951), Eastbourne and Rye (1963), Blackfriars in London (1970), Lincoln (1972) and at Custom House in London (1973). Of all these finds catalogued by Gillian Hutchinson (1994, 191-8) that were made before the discovery of the Sandwich Ship, only those from London (Marsden 1994 1996) and Hampshire (Friel *et al.* 1993) have been published adequately. Hopefully the significance of such vessels is now more widely appreciated and thus both they and the many similar discoveries of late medieval vessels made after 1973 should not languish unseen for so long. The remarkable speed with which the thirteenth-century Magor Pill vessel was recorded, lifted, documented and fully published (all within a five-year period) provides a rather more optimistic and commendable model for the future of medieval nautical archaeology in the UK (Nayling 1998).

To sum up, the ship-type represented by the timbers recovered from the creek in Sandwich is a large late fourteenth-century locally-built merchantman of clinker construction (**Fig. 14**). This example of a late medieval *navis* is a rare and significant survival in the English archaeological record: the listing of Historic Wrecks does not include *any* twelfth, thirteenth or fourteenth-century vessels at all (Fenwick & Gale 1998, 146). Although sharing in general terms the stern-form of the more famous *cogs* (the distinctive vessels developed by the German Hanseatic League), its hull seems to have been built throughout of overlapping strakes, a technique recorded by nautical archaeologists in Saxon contexts at Sutton Hoo and Graveney right up to the later Newport Ship of c.1465. As such the Sandwich Ship therefore

stands as a type-fossil of the late fourteenth-century developments within that quintessentially medieval ship-building tradition.

The construction of the Sandwich Ship can also be seen as exemplifying the heyday of what may well have been its homeport: a fourteenth-century census of this town lists 400 mariners in a population of 2,000, as well as shipwrights and pilots, not to mention the merchant class. By contrast, the subsequent stripping out of the laid-up vessel in a silted up creek that was deliberately blocked is an equally-telling reminder of the dramatic reversal in fortunes endured by the port in the later medieval period. Thus the assemblage of timbers conscientiously collected in 1973, are of as much importance to the history of the Cinque Ports as they are to nautical archaeologists across Europe.

ACKNOWLEDGEMENTS

The author and contributors gratefully acknowledge the assistance of the British Academy, a grant from which supported the work of Kim Ayodeji (project assistant) Kitty Brandon and Jenny Stripe (project illustrators). Active encouragement for the project and access to the Dover Museum store and archives was generously provided by Jon Iveson (Dover Museum). The team from UCL included James Cole, who produced the initial report in 1997, the recording team of Kitty Brandon, Andrew Mayfield, Steve Miller (who undertook much of the photography), Rikke Osterlund, Elissa Rauba, and Mattias Engdahl, with the specialist contributions of Jon Hather, Martin Bridge and Tristan Wood-Davies. Significant comments, support or information were provided by Gillian Hutchinson (National Maritime Museum), Damian Goodburn (Museum of London) and Joe Flatman (University of Southampton) while the KAS surveys were instigated by Keith Parfitt and conducted by C. and B. McNaughton.

The work of an earlier generation of archaeologists, however, merits especial mention, and it is to them that this report is dedicated, particularly William Honey (Deal Maritime Museum), Reg Varrel (NMM) and of course, Joe Trussler, who discovered the remains of the ship in 1973.

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