

century, a style that also favoured the contoured outline as it appears on the lugs, a feature which rarely, if ever, occurs on Ringerike animals. Moreover, the mirror-image symmetry of the spear-socket's ornamentation is alien to the later Viking styles, so, taken with the decorative details, the object cannot be as late as Kendrick and Fuglesang maintain. There is every reason for regarding the York spear-socket as a local product from the hey-day of the Viking kingdom of Jorvik.

JAMES T. LANG

NOTES

- ¹ Wardell, correspondence, *Archaeol. J.*, vi (1849), 401-02.
- ² T. D. Kendrick, *Late Saxon and Viking Art* (London, 1949), 102, pl. LXIX, 1.
- ³ I am grateful to Mr C. G. Read, Chief Engineer of the York Waterworks Company, for confirming the date of the construction work. No record of any archaeological finds appears in the Company's records. See C. B. Knight, *A History of the City of York* (1944), 675.
- ⁴ Wardell, op. cit. in note 1, 402.
- ⁵ Kendrick, op. cit. in note 2, 102. The dimensions rely on the British Museum's photographic record, kindly provided by Mrs Leslie Webster.
- ⁶ British Museum, *Guide to Anglo-Saxon Antiquities* (London, 1923), 92, pl. vi, no. 4; S. Horn Fuglesang, *Some Aspects of the Ringerike Style* (1980), 139.
- ⁷ H. Shetelig (ed.), *Viking Antiquities in Great Britain & Ireland*, Pt. IV (Oslo, 1940), 15, fig. 3.
- ⁸ *V.C.H. Yorkshire*, II, 99. I am grateful to Mrs Elizabeth Hartley for indicating the provenance of this weapon, which Shetelig lists as coming from York itself; Shetelig, op. cit. in note 7, 93.
- ⁹ B. Hellner, 'Spjut', *Kulturhistoriskt Lexikon för nordisk medeltid*, xvi (1971), col. 515; Fuglesang, op. cit. in note 6, 136-40, pl. 109.
- ¹⁰ J. T. Lang, 'Some late pre-Conquest Crosses in Ryedale, Yorkshire: a reappraisal', *J. Brit. Archaeol. Assoc.*, ser. 3, xxxvi (1973), 20, pl. iv, 3.
- ¹¹ Fuglesang, op. cit. in note 6, 137 and 140.
- ¹² Kendrick, op. cit. in note 2, 98-109.
- ¹³ Fuglesang, op. cit. in note 6, 39.
- ¹⁴ W. G. Collingwood, 'Anglian and Anglo-Danish Sculpture in the West Riding', *Yorkshire Archaeol. J.*, 23 (1914), 230, ii.
- ¹⁵ Kendrick, op. cit. in note 2, pls. LXXVIII, 1; and LXIX, 3.
- ¹⁶ S. H. Fuglesang, 'Stylistic Groups in Late Viking Art', in J. T. Lang (ed.) *Anglo-Saxon and Viking Sculpture and its Context* (B.A.R. 49, Oxford, 1978), 218, pl. 10.2.
- ¹⁷ Kendrick, op. cit. in note 2, 108, fig. 16; Lang, op. cit. in note 16, 157, pl. 8.2.
- ¹⁸ J. Graham-Campbell, 'The Viking-age silver and gold hoards of Scandinavian character from Scotland', *Proc. Soc. Antiq. Scot.*, 107 (1975-76), 119-21.
- ¹⁹ I. R. Pattison, 'The Nunburnholme Cross and Anglo-Danish Sculpture in York', *Archaeologia*, 104 (1973), pl. XLVII.
- ²⁰ Lang, op. cit. in note 16, 164, pl. 8.9.
- ²¹ R. J. Cramp and J. T. Lang, *A Century of Anglo-Saxon Sculpture* (1977), no. 11.
- ²² Fuglesang, op. cit. in note 6, pls. 4-7; Shetelig, op. cit. in note 7, fig. 80.
- ²³ Lang, op. cit. in note 16, 150 ff.

A MEDIEVAL LOGBOAT FROM THE R. CALDER AT STANLEY FERRY, WAKEFIELD, YORKSHIRE (Fig. 5; Pl. xv, B)

History of the Find

This logboat (dugout canoe) was found in the bed of the R. Calder (SE 3561 2305) during excavations for an aqueduct in August, 1838. It was acquired by the Yorkshire Philosophical Society in 1840 and for a time was displayed in their museum at York on top of a case of stone tools (Pl. xv, B). During the period of my survey of the logboats of southern Britain¹ the fragmentary remains of this boat were under conservation by the North Western Museums Service and could not be examined; however, the documentary evidence then available was summarized in the published catalogue of English and Welsh logboats.²

During conservation the surviving timbers were consolidated with PVA in Acetone and IMS, and they were then re-assembled by pinning with brass rods, the missing areas being filled with expanded aluminium covered with a pigmented mixture of polyester resin and sawdust. Eleven ribs of new pinewood were fitted using metal screws through some of the original holes in the boat. The two parts of the reconstituted boat were mounted on

cradles so that the boat was sandwiched between cradles and new ribs. The boat was returned to the Yorkshire Museum in 1976 and became available for examination.

Recording the Boat

The plan and sections (Fig. 5) are of the boat as reconstituted; they attempt to differentiate between original wood and modern 'fill'. The transverse section (CD) was taken at a position thought to give the most representative form of the original boat. There are 29 easily visible holes through the boat's bottom and sides which appear to be original; 21 other possibly original holes, marked X on the drawing, are partly obscured by modern ribs. Removal of these ribs whilst maintaining the safety of the boat is a lengthy procedure and was attempted only once: should it in future prove necessary to remove ribs for other reasons, the holes revealed should be compared with Fig. 5. On the drawing the holes have been allocated either a letter (A to O) or, if interpreted as for treenails to fasten ribs, the letter R and a number. One original rib has survived, but because of distortion it is impossible to convey an accurate representation of its shape in a two-dimensional drawing.

The reconstituted boat

There is no early measured drawing of this boat and the main evidence for the original condition are two photographs from the period 1891–1925 now held in the Yorkshire Museum. The reconstitution of the fragmented remains was thus a difficult task and the North Western Museum Service are to be congratulated in producing a displayable artefact, approximating in form to that evident in the early photographs (Pl. xv, B). Nevertheless, some of this work inevitably had to be done subjectively and it is possible to question some of the detail. In places the boat has been given a rounded form where the bottom meets the sides: on the evidence of original wood this should be an angular junction with flared sides, as in the transverse section CD in Fig. 5. The fragments of original wood generally now appear to be at or close to their relative positions in antiquity, but the side shown in the longitudinal section of Fig. 5 is not connected by original timber to the remainder of the boat and should probably have been re-assembled at a lower level to match the other side. It also seems likely that the fragment which forms the surviving end of the boat and which is also unconnected should be neither so prominent nor so high.

Interpretation

(a) *The log*

The log was oak (*Quercus* sp.) and the early photographs show it had at least two moderately large knots. The pith is not visible in the surviving remains but the position deduced from the growth rings visible on the end fragment is marked on Fig. 5, so a whole log rather than half a split log was used. If this end fragment were to be repositioned as I have suggested above, the pith position would be lowered. The maximum diameter of the original log cannot be estimated with precision but it must have been greater than Hodson's maximum inside beam measurement of 1.17 m + c. 0.12 m (thickness of two sides) + 0.10 m (sapwood and bark) = c. 1.39 m. The length was greater than 5.41 m. When compared with parent logs of other logboats this log was well above average for girth and above average for length.³

(b) *The boat*

In a letter to the Yorkshire Museum dated 30 April, 1840, H. Hodson of the Aire and Calder Navigation Office at Goole gave the surviving length of the boat as c. 17 ft. 9 ins. (5.41 m), and the internal breadth as c. 3 ft. 10 ins. (1.17 m.). As reconstituted the remains are now 5.55 m in length with a maximum internal breadth of 0.84 m. If the end fragment were to be placed nearer the other original timbers as suggested above, the surviving length would be reduced to c. 5.41 m: the original full length cannot now be determined. The difference between original and present maximum internal breadth may partly be explained by shrinkage: the mean shrinkage factor⁴ calculated from eight holes is 1.23 which indicates an original internal breadth of c. $0.84 \times 1.23 = 1.03$ m. Hodson

STANLEY FERRY LOGBOAT
as reassembled in 1978

14.11.78 S. McGreal

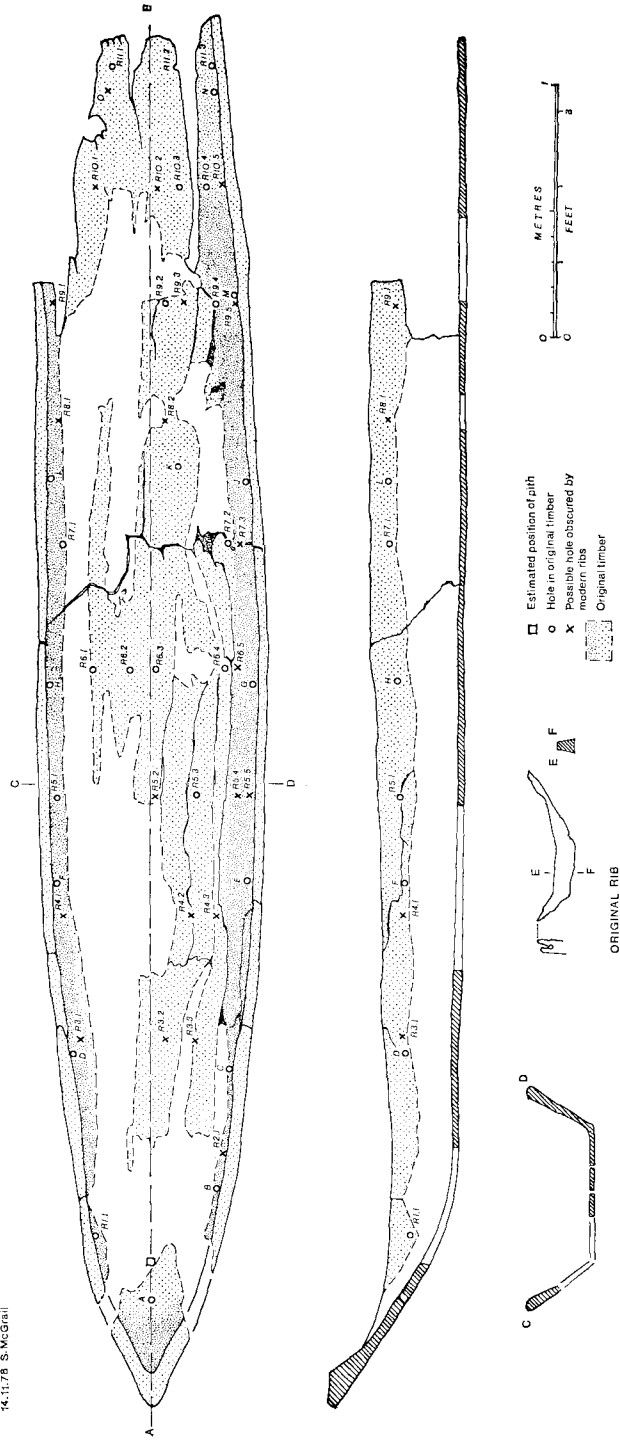


FIG. 5
Measured drawing of the reconstituted Stanley Ferry logboat
Drawing: National Maritime Museum

did not give a height for this boat, but the maximum external height where there is original wood is now 0.27 m (excluding the raised end) which suggests an original height of *c.* 0.33 m. The bottom would originally have been *c.* 25 mm thick, and the sides at the top edge *c.* 60 mm. With external measurements of length > 5.41 m, breadth 1.29 m and height amidships 0.33 m, this boat was above average for length and well above average for breadth but below average for height, when compared with other logboats.⁵

The surviving end need not have been the bow, for logboats with similar bow and stern are known, nevertheless it would be a suitable shape for one, albeit probably not protruding as much as now reconstituted: the form of the other end cannot now be determined. The transverse section of flat bottom with flared sides results in good cargo space: it also ensures good transverse stability for as the boat is heeled the righting arm is increased. Having the sides thicker than the bottom results in a relatively higher centre of gravity and thus tends to reduce stability, but this thick top edge adds to the boat's longitudinal strength.

(c) Fittings

The series of holes shown on Fig. 5 with an R identification are interpreted as for treenails to fasten ribs (R1 to R11). In the early photographs (Pl. xv, B) two fitted ribs are shown approximately in the position of my R1 and R2 rows, but the first modern rib in the reconstituted boat appears to be too close to the end. The original ribs seem to have been fastened with up to four treenails through the bottom and one or two through each side. The one surviving rib, which is an oak crook (naturally curved timber), is now very distorted but it is probable that the portion to the right of EF on Fig. 5 would formerly have been horizontal, thus making it likely that the notch was a limber hole to allow free passage of bilge water along the bottom of the boat. As oak crooks with appropriate *double* curves were probably difficult to find it seems likely that the ribs were 'alternating half-ribs plus side timbers'⁶ with the near-vertical arm of the L-shaped, grown timbers on alternate sides. Another possibility, that these were closely-paired, alternating half-ribs, seems less likely. Rib spacings are 320 and 450 mm between the first two pairs and then 480–500 mm for the remainder.

There are several reasons why ribs may be fitted to logboats:

- (i) To help retain the shape of an expanded boat (sides forced apart).
- (ii) To support washstrakes (extra planking to extend height of boat).
- (iii) To support thwarts (crossbeams used as seats).
- (iv) For use as footrests.
- (v) An unnecessary copying of plank boat fittings.

Whether this boat was originally expanded cannot now be determined, but it seems unlikely as there is no *oak* logboat indisputably known to have been expanded.⁷ In order to support washstrakes the ribs would have to extend above the top edge of the boat and there is no evidence for this in the Stanley Ferry logboat. None of the other reasons seems likely but thwarts for passengers to sit upon seems the least improbable: 500 mm between thwarts is too short for paddlers⁸ but adequate for passengers. If this boat had indeed been used to carry passengers, crew with paddles or poles could have been stationed at bow and stern.

Holes A and K (and possibly O) through the bottom of the boat are interpreted as thickness gauges⁹ used to indicate the required hull thickness when hollowing the log. There may have been similar holes in the now missing parts, and some of the holes used to fasten fittings may have had a previous use as thickness gauges.

The horizontal holes (B, C, E, G, J, M, N, and D, F, H, L) along each side of the boat, *c.* 70–110 mm down from the top edge, could be for treenails to fasten either washstrakes or stabilizers. These holes are spaced at an average of 800 mm over the central section reducing to 300–500 mm towards the surviving end: this is too wide for a waterproof joint between washstrake and hull.¹⁰ On the other hand, in the southern British logboats so far analysed transverse stability is more of a problem than inadequate freeboard¹¹ and thus it may be argued that stabilizing timbers were more likely to have been fitted than washstrakes. The extra buoyancy provided by such stabilizers would compensate for the relatively low side height of the Stanley Ferry boat. With small half-logs treenailed along the sides at the waterline as stabilizers the boat would have had little freeboard, but ethnographic parallels indicate that this is often the case in logboat operations on inland waterways.¹²

The principal holes found in this boat had an average pre-shrinkage diameter of 20 mm: there could have been 75 or more of them originally. There are also many smaller diameter holes which were probably recent ones used to fasten metal supports when the boat was on display (Pl. xv, B).

Date

Fragments of wood which could not be positioned during re-assembly were left untreated and some of these were subsequently dated by the Harwell Carbon 14/Tritium Measurements Laboratory: HAR 2835: 960 BP \pm 70 = *c.* ad 990. It is unfortunate that samples with a known location in the log could not have been made available. Nevertheless it is likely that the samples provided were from near the outside of this logboat thus giving a *terminus post quem* for the felling of the tree and the building of the boat; an early 11th-century A.D. date seems likely.

Significance of the find

This medieval oak logboat is important not least because she is the earliest-known logboat from Britain with direct evidence for fitted ribs. Her useful beam, flared transverse section and (probable) stabilizers mean that she would have had good stability. This and the fact that she may have had thwarts would make her suitable for use as a passenger ferry, a role echoed in the site name.

Acknowledgements

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NOTES

¹ S. McGrail, *Logboats of England and Wales* (National Maritime Museum Archaeological Series, 2; B.A.R., 51, Oxford, 1978).

² *Ibid.*, no. 132.

³ *Ibid.*, 309.

⁴ *Ibid.*, 123-25.

⁵ *Ibid.*, 325-26, 350.

⁶ *Ibid.*, 59.

⁷ *Ibid.*, 40-41.

⁸ *Ibid.*, 132.

⁹ *Ibid.*, 31-32.

¹⁰ *Ibid.*, 42.

¹¹ *Ibid.*, 314.

¹² *Ibid.*, 91.

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ON THE COMPOSITIONS OF SOME LEADED BRONZE OBJECTS OF THE 14th AND 15th CENTURIES

As part of a wider analytical study of the compositions of copper alloys of the medieval and post-medieval periods, certain objects of known date or period have received special attention. Some medieval cast objects of the 14th and 15th centuries, one dated precisely, the others carrying arms or inscriptions, have been analysed by X-ray fluorescent technique. The objects were the Towthorpe mortar (1308), Yorkshire Museum; an inscribed ewer (second half 14th century), Victoria and Albert Museum; weights (second half 14th century), Winchester Museum; Henry VII gallon and bushel measures (end of 15th century), Winchester, Salisbury and Victoria and Albert Museums. Analytical data on the Ashanti ewer (second half 14th century), British Museum, have been supplied for comparison through the courtesy of Dr Paul Craddock, British Museum Research Laboratories.