

EARLY ENGLISH BOATS

ROY SWITSUR

Godwin Laboratory, Cambridge University, Free School Lane
Cambridge, England

ABSTRACT. A large number of early boats discovered in the waterways of England are presently displayed in museums and as public monuments. In some cases conservation practices have caused problems in the radiocarbon dating of these otherwise undated artifacts. Specimen pretreatments are described and the chronology of the boats in different regions of England are presented with approximate calibration to calendar date ranges.

INTRODUCTION

To the early nomadic people from central Europe, the area which now constitutes the British Isles, appeared on the western horizon as a low hilly landscape on the edge of the continent. From the central European plain, the journey was reasonably easy, the way being low lying and marshy, but the country ahead was attractive, tree covered and lush. By 8500 BP or thereabouts, the journey became more difficult as the rising sea level cut off the region from the continental mainland. Further exploitation required transportation across the narrow sea by boats. Penetration into this wooded area would have been far easier using the numerous rivers and streams than journeying by land. Such water craft must always have been important for transport, trade and exploitation of the environment. The timber required for building these small vessels was abundantly at hand and many such craft in the form of rafts, dugout canoes and planked boats in addition to boats, such as coracles, covered with animal skins, undoubtedly would have been made. However, because of the frail organic nature of these boats, once abandoned, or wrecked, they would either rapidly decay, or possibly be re-used or probably burned in antiquity. In order to have survived for this investigation, the craft must have been buried rapidly and anaerobic conditions established and maintained until the present time. The sites where they might be preserved are not of the kind likely to attract the normal archaeological study. Hence, until relatively recently, little has appeared in the archaeological literature concerning these boats, their design, construction or use.

There appears to have been only three major reviews of the early boats of England and Wales. Fox (1926) placed the then known monoxylous craft into five classes based on morphological features. It was not until 40 years later that Graham (1966) produced a catalogue of the dugout canoes preserved in British museums and included some of the first reliable diagrams. McGrail (1978) made the most exhaustive and reliable study of the logboats of England and Wales and produced in his thesis a definitive catalogue of known finds with scale diagrams, photographs and references.

Because of the special conditions surrounding their preservation, an indication of the ages of these boats by means of associated finds or stratigraphy is not reliable and estimates based on stylistic grounds are not yet possible. There is a widespread mythology surrounding logboats that they are essentially "prehistoric" and the work of early man. It has been suggested that following the introduction of metal tools which could be used for fashioning planks, the construction of dugout boats would cease. Nevertheless, reports in local archives and newspapers indicated that logboats of this kind continued to be built and used in Ireland and Scotland at least until the 17th or 18th centuries and in parts of continental Europe until the present century. The general condition of the vessels together with lack of bark or sapwood seems to make dendrochronology of less practical use for these objects than at first imagined, so that, thus far, the chronology for the boats has depended on radiocarbon measurements. ^{14}C determinations of several early craft from England and other regions of Europe have been published and reviewed (McGrail & Switsur, 1975; McGrail, 1978; McGrail & Switsur, 1979 a, b), and these have shown that some of the boats originate as late as the Medieval period. This paper presents the calibrated date ranges for the earlier determinations together with results that I have obtained subsequently. It is primarily concerned with work carried out at Cambridge and is not intended to constitute a literature survey.

DISCOVERY AND CONSERVATION

Most of the boats studied were discovered during the past century. Often, they were found during civil engineering work on dredging or straightening waterways. Others were discovered during periods of extended drought when lake or river levels were abnormally low, thus exposing the boats to view. The boats were rescued and often placed on public display either out of doors or in local museums. Usually, they were allowed to dry out slowly and the water loss lessened by covering with sand, straw or bracken, but inevitably there were distortions and many cracks appeared. In an attempt to minimize these effects, primitive techniques at conservation were applied, and where these proved ineffectual, cosmetic preparations were used to enhance the general appearance of the displays. Thus, in many instances, large quantities of glycerol or raw linseed oil were applied liberally to the boats during considerable periods to replace the water and prevent shrinkage and decay. The cracks that did form were filled with molten paraffin wax which was colored with "Berlin" or "Brunswick" black. This dye is a suspension of finely divided carbon, "carbon black," in an organic liquid, usually turpentine oil. After solidification, this was brushed to help it take on the sheen and appearance of wood 'black with age.' Sometimes other mixtures were used, such as "carbolinium," and more recently, epoxy resins, such as "Araldite" mixtures. Other conservation measures were adopted but records of the substances used were not often kept. While these precautions may be admired from the point of view of public display, and indeed the more modern impregnation of large wooden objects with PEG and other polymers is the extension of this early

work, the use of such carbon-containing materials is somewhat detrimental to ^{14}C dating.

Contamination that was added to the boats in such large quantities contains carbon of disparate origins and ages. Glycerol was probably produced during the saponification of animal fats and so had carbon contemporary with the preservation date and with a greater ^{14}C concentration than the wood of the boat. Linseed oil would also be contemporaneous with the preservation date since it is obtained from growing flax. Likewise, turpentine oil is a natural product from the *Pinus* tree and so would also contain modern carbon. Paraffin wax, however, could have been produced as a side-product of the mineral oil industry or, more likely, half a century or more ago, by dry distillation of ozokerite or even bituminous shale or lignite. Thus, it is certain that this carbon would be radioactively "dead." The age of the carbon in the "carbon-black" would depend on its method of manufacture. It might have been produced from natural methane or by the combustion of turpentine, or other oil, in a limited air supply and the collection of the soot thus formed, on a cold surface. Hence, this ingredient could be either contemporary or ancient and could vary in different boats. The lack of documentary evidence from museum records makes it difficult to specify the contaminants in any particular logboat. Natural contaminants would also be dependent on the local environment in which the boat had been preserved.

SAMPLE PREPARATION

To obtain a reliable ^{14}C age for the wood, natural and added impurities must be removed or at least reduced to a very low level. The following procedure was developed and appeared to be effective for most of the specimens. First, the wood was cleaned thoroughly with a brush and vacuum cleaner to remove as much superficial dust and debris accumulated during storage either in the museum or in an open-air display. It was then cut into small pieces and boiled in distilled water for several days with frequent changes of water. The paraffin wax melted during this procedure and much of it floated to the top where it was decanted. The glycerol tended to dissolve in the hot water and was thus also removed during decantation. Several times the mixture was subjected to ultrasonic vibration to shake out the carbon black, some of which became suspended in the hot water. After a few days treatment, when the water remained clear, the wood chips were dried in an oven. They were then placed in a hammer mill and reduced to a powder, ca 250 to 500 μ . This was next extracted with organic solvents in a Soxhlet for ca 2 days, followed by 1 day using water as the solvent. This removed the remainder of the glycerol and carbon black. The purified wood was then treated in the normal manner with dilute sodium hydroxide and then acid to remove any humic or fulvic substances. The specimens were further treated to extract the cellulose using Green's (1963) method of chlorite oxidation followed by solubilization in Schweitzer's reagent (cuprammonium hydroxide) and re-precipitation. The specimens of purified cellulose thus produced were washed thoroughly and vacuum-oven dried prior

to oxidation in the combustion bomb (Switsur, 1973). The preparation was modified for materials other than the wood used in some of the studies.

It was important to obtain wood specimens as near to the bark as possible, so that the time as close to the use of the boat could be determined. This was sometimes difficult to ascertain; thus, some of the ages may be too early. In some instances in earlier determinations, the *in situ* position of the sample in the boat is not recorded and in some cases, too, wood found close to the boat was measured, rather than that of the boat timber itself. Providing such timber was a patch to cover a split in the boat, this might well give an age for the use of the vessel, if young wood was used, but the accidental proximity of a totally unrelated piece of wood must also be considered, as well as the re-use of ancient wood. In the case of the 'sewn' boats (see below) it was possible to use materials such as thin yew withies and moss which would be renewed during the lifetime of the boat and hence likely to date the final stage of use.

DISCUSSION

The majority of the vessels considered in this paper are of the type known as monoxylous craft or "logboats," *ie*, boats made from a single tree trunk. Even logboats vary greatly in size and character, eg, the length of the Brigg boat was almost 15m whereas the Giggleswick Tarn boat was <2.6m. Some boats kept the simple trunk outline, whereas others had been shaped and provided with rudders, beaks, washstrakes or transoms giving a variety of configurations depending on their purpose. Some were designed to carry people at speed and others were cargo carriers. An aim of this ongoing project is to study the development of the various features and styles of the craft and their temporal and geographic coverage.

Four of the vessels, "sewn" boats, are very different from the logboats and all are from the same part of England. Three (and recently yet another) were discovered in a tidal stretch of the River Humber at North Ferriby, near Kingston on Hull and another in the River Ancholme, a tributary to the Humber, at Brigg. The Brigg boat was discovered in 1888 and described then as a "raft." After excavation and brief study (Thropp, 1887) the site was backfilled. The boat was re-excavated (McGrail, 1975) using modern techniques. The "raft" consisted of a series of thin parallel, oak strakes, the long edges of which had been shaped and numerous small holes drilled. The planks were fastened together by sewing through the holes with pliable withies and moss caulking was applied to make the joints water tight. Cleats were carved in each of the planks to take thin cross members so that the boat could be linked together. The vessel had collapsed flat under the weight of the surrounding clay; hence, the name "raft," but in use, the strakes would have been pulled into a boat shape by the cross timbers. A study (Switsur, 1981) of the ages of different parts of the boat timbers was made as well as that of the environmental materials associated with the structure. The pooled age of the determinations for the Brigg boat, after calibration, yields a date range of 815 – 790 cal BC with a 95% probability. This precision is due to several close ages and the shape of the calibration curve in this region.

Although of different design, the boats from North Ferriby all had a similar "sewn" construction. Two were discovered in 1937 and 1941 by Wright and excavated in 1946 (Wright & Wright, 1947). Later, the third boat was excavated (Wright & Churchill, 1965) and, more recently, fragments of a fourth have come to light (Switsur & Wright, in press). The preliminary ages for three of the boats were determined on timber that was not directly connected. It is now believed that some of these ages should be discounted since the sample pretreatment was possibly imperfect and may have led to falsely early ages. Only determinations made with improved pretreatment techniques using actual boat timbers or caulking materials should be regarded as reliable. Considering the close geographic proximity and similar style of the "sewn" boats, it is tempting to hypothesize that they were all enveloped in a catastrophic event, such as a tidal wave entering the

TABLE 1
Logboats from the north of England

Q-no.	Boat	¹⁴ C age BP	Calibrated date ranges		Cal AD/BC
			68% probability	95% probability	
3130	Smallborough	520± 45	1390–1440	1335–1460	AD
1495	Oakmere	560± 40	1370–1405	1280–1440	AD
1245	Giggleswick Tarn	615± 40	1275–1385	1255–1405	AD
3049	Giggleswick Tarn	690± 40	1255–1285	1250–1380	AD
3126	Kentmere	740± 35	1250–1265	1220–1270	AD
1390	Arpley Meadows	760± 60	1220–1265	1150–1295	AD
1395	Walton Arches	860± 60	1040–1230	1015–1265	AD
1456	Irlam	865± 40	1045–1220	1030–1245	AD
1393	Fairclough	880± 60	1035–1220	1010–1260	AD
1396	Barton	920± 65	1015–1190	985–1240	AD
1391	Walton Lock	930± 50	1015–1150	995–1220	AD
3051	Chirbury 1	930± 40	1020–1140	1005–1210	AD
1457	Astbury	980± 50	995–1045	960–1150	AD
1394	Arpley	990± 65	975–1045	890–1165	AD
1247	Chirbury 1	1000± 50	980–1030	955–1130	AD
1392	Howley	1075± 60	885–1005	870–1030	AD
1386	Banks	1120± 45	875–970	835–1000	AD
3132	Thornaby	1265± 40	670–805	655–880	AD
1248	Knockin	1270± 45	665–800	650–880	AD
3131	Ryton	1340± 50	645–685	610–790	AD
1379	Ryton	1410± 40	605–660	590–670	AD
1496	Baddiley Mere	1980± 50	40 cal BC–65 cal AD	100 cal BC–110 cal AD	
3050	Ellesmere	2260± 45	405–275	410–200	BC
1246	Ellesmere	2320± 50	415–390	465–275	BC
1497	Blae Tarn	2550± 50	810–700	825–530	BC
288	Branthwaite	3520± 100	1980–1750	2135–1610	BC
3053	Branthwaite	3545± 50	1945–1795	2025–1780	BC

Humber and her side valleys early in the transition to the Subatlantic period. This would account for their preservation in the anoxic conditions of the clay and mud deposition. The age for the Brigg boat and her environmental samples would not be inconsistent with this hypothesis. The age of

TABLE 2
Logboats from the south of England

Q-no.	Boat	¹⁴ C age BP	Calibrated date ranges		Cal AD/BC
			68% probability	95% probability	
3135	Oakley Park	470± 50	1405–1460	1385–1470	AD
1398	Oakley Park	525± 40	1390–1435	1345–1450	AD
1364	Cambridge	535± 45	1380–1430	1300–1450	AD
3137	Hulton Abbey	545± 40	1375–1415	1295–1445	AD
3038	Kew	720± 40	1250–1270	1225–1335	AD
1453	Kew	770± 45	1220–1265	1170–1270	AD
3127	North Stoke	860± 40	1050–1225	1030–1250	AD
1387	North Stoke	915± 50	1020–1165	1000–1225	AD
3052	Sewardstone	1070± 45	905–1000	875–1025	AD
3040	Sewardstone	1130± 45	875–965	805–990	AD
1454	South Stoke	1150± 90	790–970	660–1025	AD
1455	Burpham No. 1	1200± 40	790–885	730–890	AD
3139	Burpham No. 1	1245± 45	680–850	655–885	AD
3041	Walthamstow	1255± 40	675–810	655–885	AD
3128	South Stoke	1275± 35	665–790	650–840	AD
3140	Amberley No. 1	1290± 50	655–790	645–875	AD
828	Amberley No. 3	1310± 70	650–790	605–880	AD
1388	Walthamstow	1335± 45	650–685	620–785	AD
3138	Hardham No. 1	1530± 45	450–595	415–610	AD
1244	Hardham No. 1	1575± 50	410–535	380–600	AD
3042	Walton	1585± 50	405–530	370–575	AD
827	Hardham No. 2	1655± 50	325–425	235–505	AD
1399	Wisley	1780± 45	195–255	110–345	AD
1389	Woolwich	1990± 50	45–55	110–105	BC
3039	Woolwich	2070± 45	145–35	205–10	BC
3125	Glastonbury	2095± 45	185–60	210–30	BC
1563	Glastonbury	2120± 50	205–90	340–30	BC
1375	Clifton No. 2	2175± 50	340–175	400–95	BC
1473	Holme Pierrepont	2220± 55	400–200	410–135	BC
821	Poole Harbour	2245± 50	405–250	410–190	BC
1374	Clifton No. 1	2250± 45	400–270	410–195	BC
3134	Clifton No. 2	2270± 50	405–280	415–205	BC
357	Shapwick	2305± 120	760–220	795–80	BC
3048	Clifton No. 1	2310± 50	410–390	450–270	BC
3129	Peterborough	2535± 40	805–635	810–530	BC
1564	Peterborough	2610± 50	830–795	875–770	BC
3122	Chapel Flat Dyke	3500± 40	1890–1770	1935–1750	BC
3046	Chapel Flat Dyke	3590± 60	2035–1825	2135–1775	BC

TABLE 3
Boats from the Humber region

Q-no.	Boat	¹⁴ C age BP	Calibrated date ranges		Cal
			68% probability	95% probability	
3212	North Ferriby	2350± 40	510–385	530–395	BC
1200	Brigg	2545±100	825–520	910–405	BC
1499	Brigg	2550± 50	810–700	825–530	BC
1261	Brigg Raft	2560± 50	810–770	830–540	BC
1263	Brigg Raft	2570± 60	820–770	845–530	BC
1257	Brigg Raft	2595± 50	825–790	845–660	BC
1260	Brigg	2600± 70	835–790	910–540	BC
1256	Brigg Raft	2605± 50	830–795	850–705	BC
1199	Brigg	2630±100	890–790	990–450	BC
1259	Brigg	2640± 65	870–800	925–770	BC
1255	Brigg Raft	2655± 50	870–810	920–790	BC
1258	Brigg Raft	2672± 75	915–805	975–780	BC
1262	Brigg	2675± 70	915–810	970–790	BC
1500	Brigg	2720± 50	925–835	980–810	BC
78	Brigg Logboat	2784±100	1045–840	1245–800	BC
79	Short Ferry	2795±100	1100–845	1255–805	BC
3047	North Ferriby III	2945± 40	1255–1130	1285–1015	BC
3045	North Ferriby III	2975± 45	1285–1140	1370–1040	BC
3043	North Ferriby I	2980± 55	1280–1130	1375–1010	BC
3124	North Ferriby I	3020± 40	1355–1230	1415–1150	BC
80	Appleby	3050± 80	1425–1220	1515–1060	BC
1462	Appleby	3080± 60	1425–1280	1515–1205	BC
3044	North Ferriby II	3095± 40	1425–1320	1445–1275	BC
3123	North Ferriby II	3120± 45	1435–1345	1520–1290	BC
3133	Appleby	3135± 40	1445–1410	1525–1315	BC

TABLE 4
Logboats from Wales and Scotland

Q-no.	Boat	¹⁴ C age BP	Calibrated date ranges		Cal
			68% probability	95% probability	
1243	Lyn Lyddaw	640±50	1260–1380	1250–1405	AD
3143	East Greens	860±50	1045–1225	1025–1260	AD
3136	Llandriddod Wells	915±40	1025–1155	1010–1220	AD
857	Llyn Llangorse	1135±60	870–965	770–1005	AD
3142	Kinnordy	1215±45	760–850	670–890	AD
3121	Loch Errol	1465±40	550–625	515–650	AD
3141	Loch Errol	1520±45	490–600	420–620	AD

logboats from the same valley would give additional credence to this supposition. An assessment of these measurements has been prepared (Switsur & Wright, 1989 in press).

CONCLUSION

The major part of this study has been concerned with logboats recovered at different times during the past century. The results will be considered in detail in other publications, but general conclusions may be drawn. The ages of the logboats cover a wide range from a few hundred years back to ca 3500 yr. Virtually all of the surviving boats were constructed from oak trunks. Such lengthy survival appears to be characteristic of this species. Many other types of tree were probably used for boat building, since they would be easier to work than oak. However, conditions have not been suitable for long-term survival. Tables 1–4 show the ^{14}C ages and calibrated dates (Stuiver & Pearson, 1986; Pearson & Stuiver, 1986) for the craft, by region, loosely from the north and the south of the country but with separate tables for the boats from the Humber region and a few examples from Wales and Scotland. A future study of the temporal development of various logboat structural features is planned.

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