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Wood-anatomical Investigations of Charcoal from a Bronze Age Settlement at Hemmed Church, East Jutland

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INTRODUCTION

During excavation by Djurslands Museum about 200 m east of Hemmed Church, which is situated 12 km northwest of the town of Grenå, a settlement was found in 1987–89 comprising house sites, pits, culture layers and cultivation layers from about 1500–1000 BC (Fig. 1) (Boas 1991, this volume). Some of these structures were unusually well preserved, due to a cover of drift sand, which also covered the eastern end of the latest house I with a 0.3 m thick dune. Two settlement phases can be distinguished, dated by a variety of flint implements and pottery. The early phase belongs to Late Neolithic C and Early Bronze Age period I, the later phase to the transition between the Early and Late Bronze.

In connection with the excavation, charcoal for C^{14} dating was collected in one part of the excavation, where structures from the two phases were clearly separated from each other. At the bottom was a c. 0.4 m deep depression containing culture layers with burnt stone, pottery and charcoal from the early phase, and at the top the remains of a long-house from the late phase. In this house I, which had two inner rows of roof-bearing posts and a room division, the charcoal lay in the easternmost room in a centrally placed fireplace (A3), in the surrounding floor layer, and in a cooking pit (A19).

RADIOCARBON DATING

A total of 6 charcoal samples were drawn from the excavation, which in the subsequent treatment have been amalgamated to form 4 samples. 1 sample weighed only 1.7 g and was too small, while 3 were large enough (3.7–13.2 g) for conventional dating, which was carried out at the radiocarbon dating laboratory of the National Museum and the Danish Geological Survey (DGU). The datings (Fig. 2) have been corrected for isotope fractioning and expressed in conventional C^{14} years b.p. and in calibrated calendar years according to Pearson & Stuiver (1986). A C^{14} sample from the early phase has been dated to 1525 BC (K-5168), which corresponds to the age of the nearby Egehøj houses, which are from the Early Bronze Age, period I (Boas 1983).[1] Two samples from the late phase at the Hemmed Church settlement are dated to 1000 and 940–985 BC (K-5169 and K-5170).

WOOD-ANATOMICAL INVESTIGATION

It was desirable to identify as much of the charcoal as possible in order to learn which species had been used. Identification was often difficult, because the individual pieces of charcoal were very small, as a rule less than 0.1 g. Altogether, 196 pieces of charcoal and bark, equivalent to 55–70% by weight, were identified (40 pieces are from the early phase and 156 pieces are from the late phase).

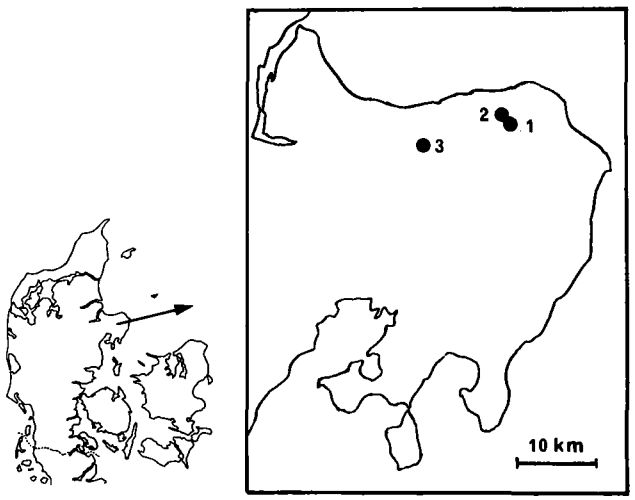

Fig. 1. Location map. 1: Hemmed Church settlement, 2: Egehøj settlement and barrow, 3: Fuglsø Bog.

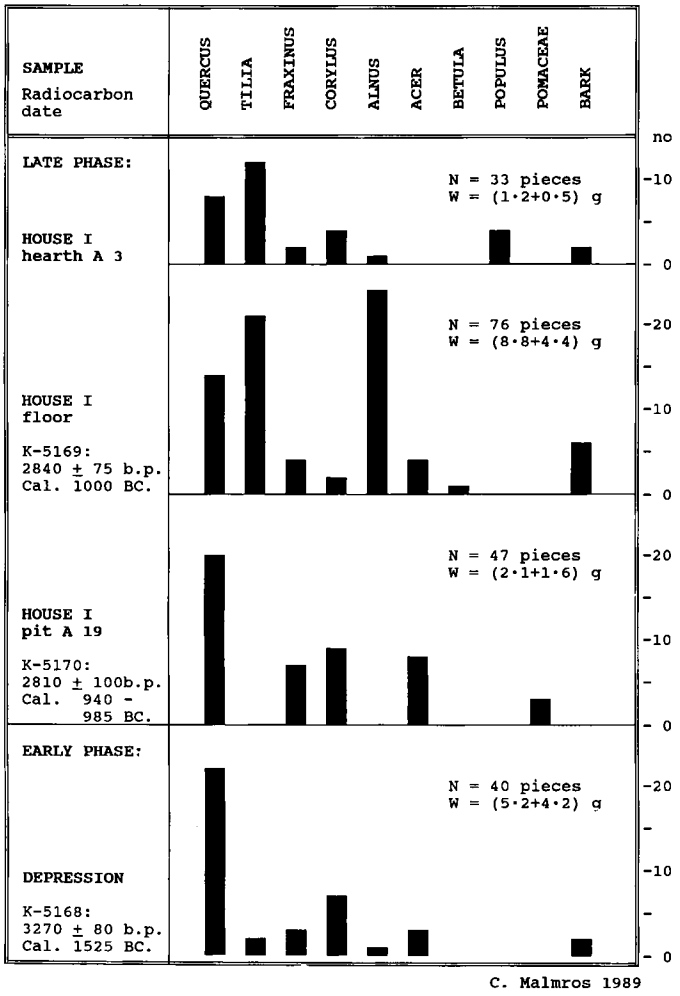

Fig. 2. Radiocarbon dates and distribution of wood species (pieces of charcoal and charred bark) from the Bronze Age settlement at Hemmed Church, East Jutland. N: total number of identified pieces. W: weight of identified + unidentified pieces. Dates in radiocarbon years and calendar years according to Pearson & Stuiver (1986).

The charcoal can be assigned to 9 genera (Fig. 2). Oak, *Quercus*, ash, *Fraxinus*, and hazel, *Corylus*, occur in all 4 samples; lime, *Tilia*, alder, *Alnus*, and maple, *Acer*, in 3 samples; while birch, *Betula*, aspen, *Populus* and apple or rowan, *Pomaceae*, are each found in only 1 sample. In addition there were 10 pieces of charred bark, one piece of which was identified as *Alnus glutinosa*, black alder. Despite the small size of the samples, it was in some cases possible to identify charcoal and bark of thin branches, which are particularly common in the sample from the fireplace in house I. They occur in smaller quantities in the other samples.

30–45% by weight of the samples consist of innumerable small pieces of charcoal and bark, which have not been identified, but a superficial examination shows that they probably represent the same genera as mentioned above.

DISCUSSION

A comparison between the samples shows that 6 genera – oak, lime, ash, hazel, alder and maple – occur in both the early and the late settlement phase. The inhabitants of the settlement at Hemmed Church have thus at an interval of 500 years employed wood from the same species of tree, and presumably the wood was used for the same purpose, as fuel for cooking and for heating the houses.

When collecting fuel, people throughout most of antiquity could presumably make do with fallen wood and broken off dead branches, suited to the purpose (Malmros 1987). Thus, selection occurred, and some species may have been deliberately avoided, for example sloe, hawthorn and rose, which are furnished with sharp thorns and are difficult to break. A systematic production of fuel with tree felling and drying, as we know it today, would undoubtedly have resulted in a more limited number of species.

During burning at the fireplace, a considerable part of the original wood has disappeared, and subsequently a whole series of artificial and natural processes has further reduced the amount of charcoal. That charcoal which is finally available for the laboratory investigations makes up only a minute part of the fuel originally collected, and the species distribution will only to a limited extent reflect tree cover in the collecting area.

If it is assumed that the wood was collected from a limited area in the vicinity of the settlement, an analysis of the charcoal, under the above-mentioned circumstances, would give an idea of the local tree cover. The species composition indicates a mixed, light forest consisting of oak, lime and ash, with hazel, alder, maple, birch, aspen and apple or rowan growing in glades and at the edge of the forest. The soil must have been relatively rich and damp.

Bent Aaby's pollen diagram from Fuglsø Bog, which lies 11 km west of Hemmed Church demonstrates vegetational development from the Stone Age up to the present day (Aaby 1985, fig. 5 and 1986, fig. 6). In pollen zone IXa (hazel-lime beech subzone), which is dated to

c. 1450–1000 BC, i.e. coeval with the Bronze Age settlement, a similar tree cover recurs, with the addition of beech, which, however, occurred only sparsely in this period. At the transition to the following pollen zone IXb, c. 1000 BC – 150 AD, beech expands markedly and becomes the dominant forest species.

The absence of charcoal of beech at Hemmed Church can naturally be due to the small size of the samples, which are a product of the aforementioned reducing factors. But it is also possible that beech grew far from the settlement or in dark stands devoid of undergrowth which could supply a sufficient quantity of fuel to make collection worth while. In the course of pollen zone IXa, gradual changes appear in the forst cover around Fuglsø Bog. The changes tend towards a more open landscape, and an increased content of dust in the peat samples indicates increasing use of the surrounding area for agriculture. The sand and mould drift from the open fields in the spring must have given rise to the blown sand demonstrated at Hemmed Church. It is this drift sand which has created the unusual preservation conditions which characterize this Bronze Age settlement.

Translated by Peter Crabb.

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NOTE

1. The Bronze Age settlement at Egehøj (800 m NW of Hemmed Church comprises three longhouses and two wells from Period I and secondary features: a cooking pit, an oven etc. from the Late Bronze Age (Boas 1983). A barrow 50 m north of the settlement contains a central grave from Period IIbc/III. The following radiocarbon dates are available (calibrations according to Pearson & Stuiver, 1986):

Early Bronze Age Period I

K-2238: 3160 ± 100 b.p. = 1435 BC.
Charcoal of *Quercus* from post-hole in house III.
K-2240: 3240 ± 100 b.p. = 1520 BC.
Charcoal of *Quercus, Ulmus, Tilia* and *Fraxinus* from well II.
K-2239: 3340 ± 100 b.p. = 1645 BC.
Charcoal of *Quercus, Tilia, Corylus* and *Acer* from well I.

Early Bronze Age period IIbc/III

K-1761: 2870 ± 100 b.p. = 1030 BC.
Decomposed wood of *Quercus* from coffin in central grave.

Late Bronze Age

K-2241: 2550 ± 100 b.p. = 790 BC.
Charcoal of *Quercus* from cooking pit "båe".
K-2223: 2400 ± 100 b.p. = 410 BC.
Charcoal of *Quercus* and *Alnus* from oven "bac" from period V–VI.

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