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The Egehøj Cereals

Bread Wheat (*Triticum aestivum* s. l.) in the Danish Early Bronze Age

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INTRODUCTION

The site of Egehøj lies in eastern Jutland, near the north coast of the Djursland peninsula. It consists of three longhouses, all apparently contemporary, dating from period I of the Bronze Age. Three radiocarbon dates from the site are 1210 ± 100 bc (K-2238), 1390 ± 100 bc (K-2239) and 1290 ± 100 bc (K-2240). The site was excavated during 1969–73 by Niels Axel Boas, and has subsequently been published (Boas 1983).

The three longhouses were all similar, having one end dug down 20–40 cms into the subsoil. House III produced the cereal grains to be described here. It measured 19 × 6 m, its sunken east end measuring about 7.5 × 5 m (Boas op. cit.). During the excavation of this eastern end, a 30 cm wide baulk was left standing running along the length of the house (fig. 1). It was noticed that this baulk contained many cereal grains. It was therefore divided into portions, bagged, and stored in Randers Museum. Soil from a shallow pit (designated pit *caa*) below the baulk was also bagged and stored. This far-sighted policy enabled the present writer to sample selected portions in 1979, using a froth flotation unit of the type described by Jarman, Legge and Charles (1972).

The Cereals

Preservation was poor, a fact also noted by Helbæk, who briefly examined some of the grains (quoted in Boas 1983, p. 97). A total of 2370 grains was recovered, divided into 14 samples, 13 from the sunken part of the longhouse, and one from pit *caa*. Of these grains, 772 could not be identified (see table 1). This is a substantial proportion (almost one third), and this should be remembered throughout the following discussion.

Bread wheat (*Triticum aestivum* sensu lato) is very common. Many of the grains were quite compact (fig. 2), a fact already noted by Helbæk (in Boas op. cit.). All the grains are, however, referred to one taxon (cf. van Zeist 1968). No spikelet remains were found. For measurements see table 2a.

Barley (*Hordeum vulgare*) was also common (fig. 3). Many grains were twisted, indicating the 6 row variety. All the determinable grains were naked; poor preservation could however, have obliterated traces of the hulls in some cases, so it may be that a proportion of the barley grains could originally have been hulled. Measurements are given in table 2 b.

The third cereal type present is referred to emmer type (*Triticum cf. dicoccum*). The presence of spelt (*T. spelta*) among these grains cannot be dismissed, as this cereal has been recorded in the Late Neolithic and Early Bronze Age of Denmark (Jørgensen 1979). The grains are difficult to distinguish, particularly where preservation is poor. Most grains seemed typically emmer-like rather than spelt-like, and for this reason are tentatively referred to emmer. No chaff fragments were found. Measurements are listed in table 2 c.

No rachis or glume fragments were recovered, and weed seeds were very rare (see table 1). It seems, therefore, that the Egehøj house III samples represent cleaned grain, not residues from crop processing. House III is believed to have been destroyed by fire (Boas 1983 p. 92), so the material is likely to represent what was stored in the building when this happened.

The samples offer little direct evidence as to how the cereals were stored. One might expect that ground level storage in the sunken end of the longhouse would have been a problem due to damp. Hillman (1981) states that glume wheats (einkorn, emmer and spelt) in wet areas are often stored as semi-cleaned spikelets rather than as cleaned grain, because "in wet areas, the grain of glume wheats is less likely to spoil if stored as spikelets rather than naked grain" (p. 138).

The samples from Egehøj, however, show that the

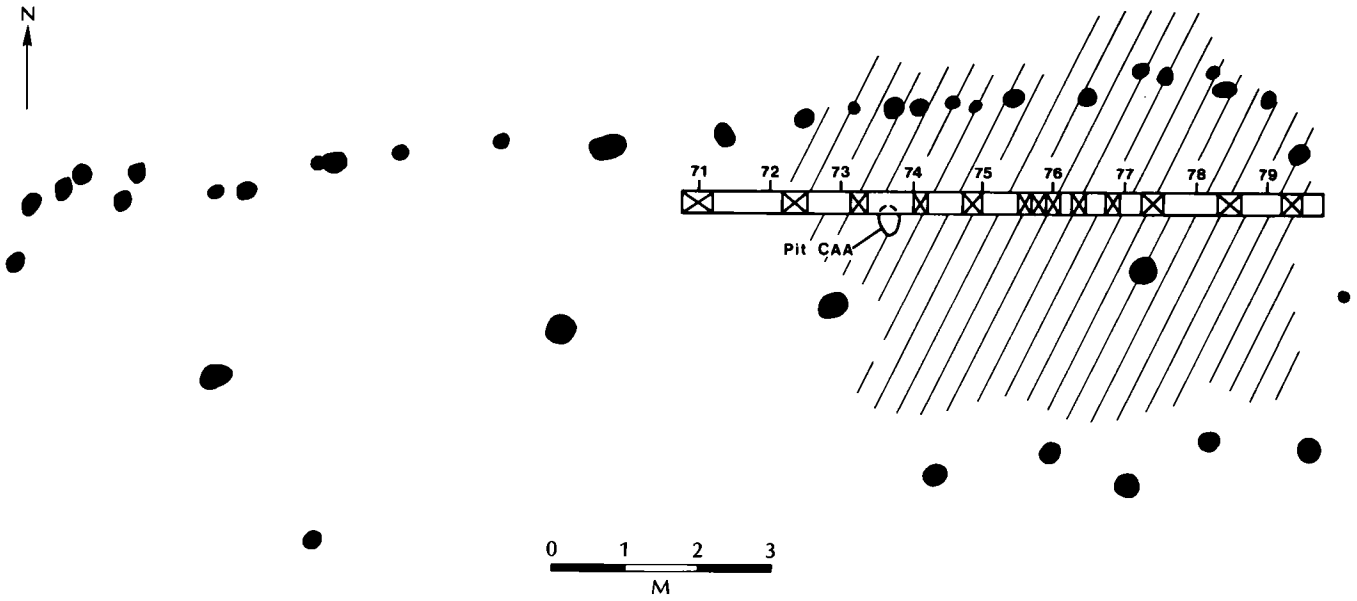

Fig. 1. Plan of Egehøj House III, showing the baulk from which the samples were taken. Crossed portions were sampled. Oblique shading indicates the deeper area in the east end of the longhouse. Some of the postholes in the north west part of the house may belong to house I, which overlaps house III at this point.

Egehøj emmer type grains seem to have been treated in the same way as the other cereals. One possibility is that the cereals were stored above ground level, perhaps up in the roof space, and so less exposed to damp. If this is correct, they would have arrived at ground level when the house was burnt down.

It must be stressed that samples of cleaned grain are the *end-product* of a long sequence of cleaning and processing activities (cf. Hillman 1981, Jones 1984), so that they offer little indication of the nature of the cultivation system that produced them. An absence of weeds in stored cereals cannot therefore be used to argue that they were absent in the field in which the crop was grown (cf. Madsen 1982 p. 225).

Spatial Analysis

Considerable variations in the representation of cereals occur along the length of the sunken section of house III. There is a major peak in the density of cereals per litre of deposit around the 72 and 73 m co-ordinates (fig. 4). This is not solely due to the heavy storage of one type of cereal in this portion of the longhouse – observed trends in crop proportions continue across this area without showing major distortions. It is thus most likely that the variations shown in fig. 4 are due to variable preservation.

Variations in the proportions of cereals are shown in fig. 5a and 5b. Barley is relatively common throughout, although less so to the west. Bread wheat and emmer type show clear trends: bread wheat is common in the west, and emmer type in the east. This separate storage shows that the three main cereal types were all grown as separate crops – the bread wheat was not just a weed of cultivation in another crop. Emmer type shows only a single peak. Had spelt been cultivated, processed and stored separately, there would have been two peaks unless emmer and spelt were stored next to one another. Storage close together cannot be ruled out, but in the absence of two distinct peaks it can be said that the presence of spelt as well as emmer receives no direct support. At the other end of its range of variation, spelt can resemble bread wheat. Once again, the single peak of bread wheat offers no support for the separate cultivation of spelt.

These variations must be born in mind before any conclusions are drawn regarding the relative importance of the three main crops. Bread wheat is the most common identified grain (see table 1). This is partly due to the fact that it happens to reach high relative values (fig. 5) where preservation was best and grains

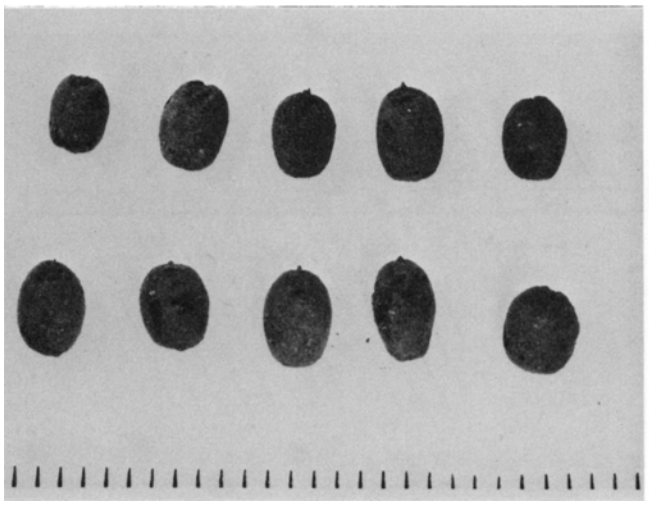

Fig. 2. Bread wheat (*Triticum aestivum* s.l.) from Egehøj house III. Scale in mm.

Fig. 3. Barley (*Hordeum vulgare*) from Egehøj house III. Scale in mm.

most numerous (fig. 4). If preservation had been best at the other end of the sunken part of the longhouse, more emmer grains and fewer bread wheat grains would have been found overall. Perhaps the best approximation of the proportions of the cereals *inside this part of house III at the time of its destruction* is an average of the percentages in the eight major samples plotted in fig. 5:

barley	25%
bread wheat	23%
emmer type	11%
unidentified wheat	6%
unidentified cereals	34%

The shallow pit *caa* contained cereals in roughly the proportions in the baulk above it. The grains presumably derive from the same event that produced all the other samples.

Comparison with Other Sites

Bread wheat is very rare throughout the prehistoric period in Denmark. Although the earliest publication of prehistoric plant materials from Denmark was of a single grain of club wheat from the Bronze Age site of Nagelsti on Lolland (Rostrup 1877), the analysis of Late Bronze Age cereal impressions in pottery by Sarauw later in the nineteenth century revealed only 4% bread wheat among a total of 246 impressions. It was correspondingly low in the other periods (quoted in Hatt 1937). Carbonised cereals are available from only a few Bronze Age settlements, but have shown a similar picture. Bread wheat was very rare at Lindebjerg, dating from Bronze Age I (Rowley-Conwy 1978); absent at Vadgård, dating from Bronze Age II, c. 1250 bc (Jørgensen 1979); and very rare at Voldtofte, dating from Bronze Age V, c. 800 – 600 bc (Rowley-Conwy 1984). Nor does it seem to have been more common in the neolithic. It was present as a trace in the earliest Neolithic at Store Valby (Helbæk 1954a), and at earlier Middle Neolithic Sarup (Jørgensen 1976, 1981; Rowley-Conwy in preparation). Finds from the later neolithic are less clear: Helbæk (1952) mentions the presence of bread wheat at Birknæs (c. 1700 – 1500 bc) without giving any indication of its frequency.

Later periods also offer little evidence of bread wheat. For example, pre-Roman Iron Age Gørding Hede had none (Helbæk 1951), nor did the Roman Iron Age sites of Østerbølle (Helbæk 1938) or Ginderup (Jessen 1933). Mention is made of bread wheat at the unpublished site of Alrum (Roman Iron Age), although there is no indication of its importance (Helbæk 1954b). The major unpublished find of Nørre Fjand (pre-Roman and Roman Iron Age) apparently contained none (Helbæk, quoted in Hatt 1957). Migration period Oxbøl contained none (Helbæk 1958), nor did Viking Age Aggersborg (Jessen 1954).

Jessen's conclusion was that "club and bread wheat ... are so far not known from the Viking period and are very rare in finds from the immediately preceding pe-

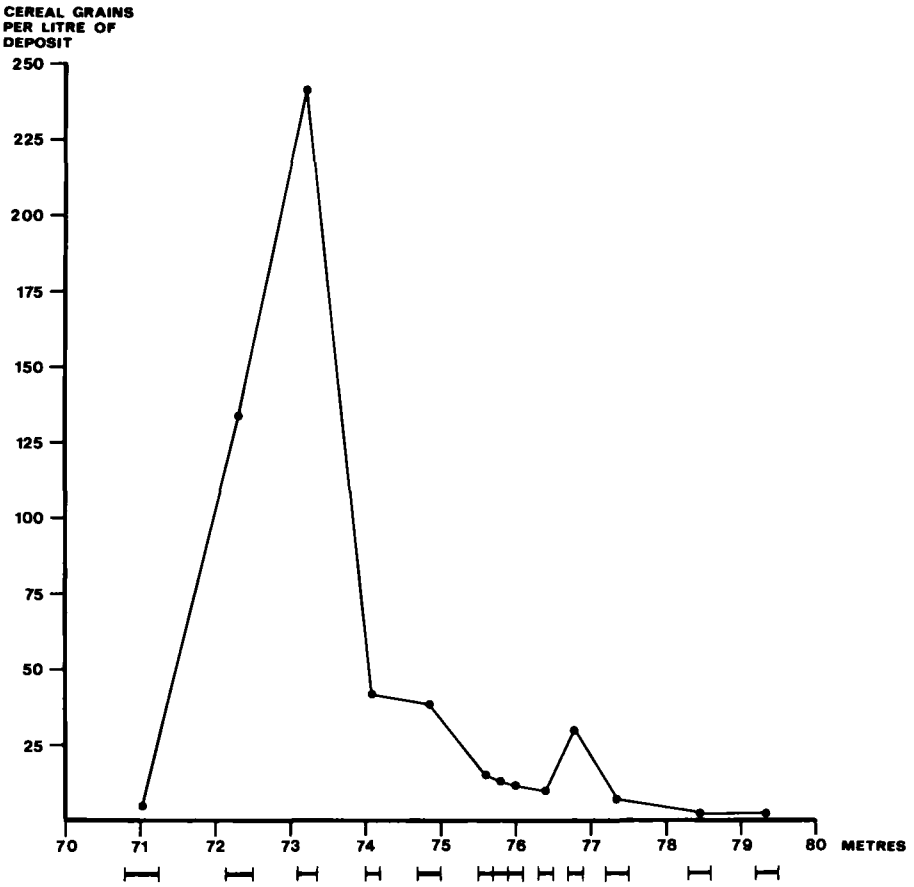

Fig. 4. Number of cereal grains per litre of deposit through the sunken section of the longhouse. The sampled portions are shown below the horizontal axis.

riod. In prehistoric Denmark these two cereal types were probably only chance weeds in seeds of other crops" (1954 p. 131, my translation).

Conclusion

Naked barley and emmer are the characteristic crops of the Danish Bronze Age, and their presence in house III at Egehøj is no surprise. What is remarkable is that bread wheat should occur, in circumstances clearly indicating that it was cultivated as a crop in its own right. Egehøj is unique within Denmark in this respect.

Interpretation of the find is thus something of a problem. Similar problems have arisen elsewhere. In the Netherlands, van Zeist (1968) found that 199 out of 289 seeds (69%) from the Neolithic site of Vlaardingen (2350 bc) were bread wheat. No other seeds of bread wheat are known from the Netherlands until the Roman period (van Zeist op. cit.). Similarly, in Greece a pure find of bread wheat is known from Pre-Pottery Neolithic Knossos (c. 6000 bc) (Evans 1968). No other pure finds are known thereafter until Late Bronze Age Assiros (late second millennium bc), from where a sample has been identified to either bread wheat or *Triticum durum* (Glynis Jones pers. comm.). Denmark is therefore not the only area to provide apparently anomalous finds of bread wheat.

There are two alternatives. Firstly, Egehøj may represent an isolated occurrence of bread wheat cultivation on a local and temporary basis. This was the view van Zeist put forward for Vlaardingen.

The second possibility is that bread wheat may have been more widely, if sporadically, cultivated than the single find from Egehøj would suggest. This may be more likely for Denmark (where a few seeds are known from several other prehistoric sites) than for the

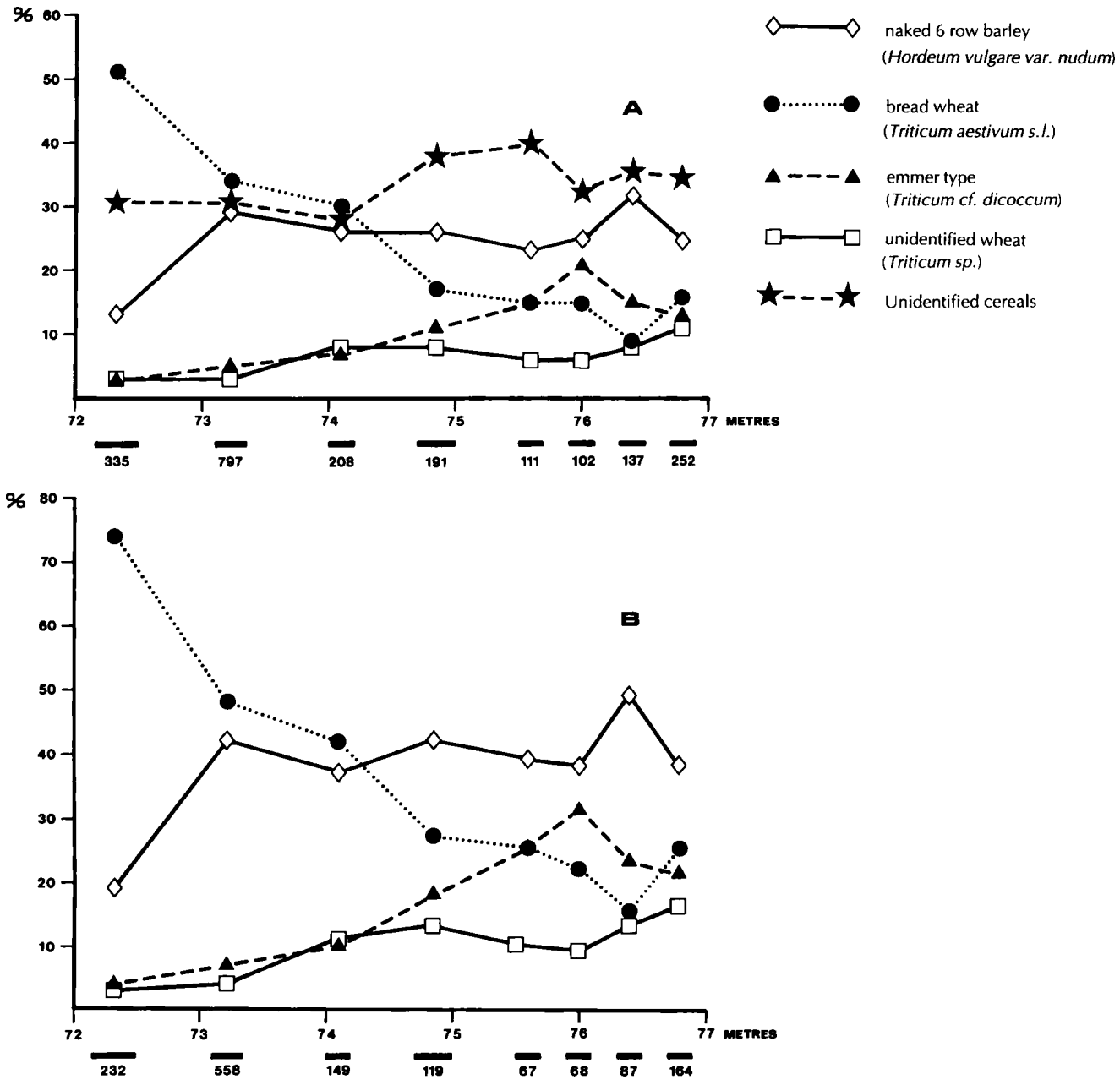

Fig. 5. Variations in the proportions of the various cereal types in the central part of the eastern end of the longhouse. A: unidentified grains included. B: only grains identified to species included. Samples and numbers of grains are shown below the horizontal axes.

Netherlands (where the cereal is completely absent before the Roman period, except for Vlaardingen). Many of the Danish samples from all periods derive from destroyed buildings, and thus represent only what was stored in the building *at time of its destruction*. If a species was cultivated sporadically and in not very great quantities, then it is quite possible that it might not have been in store in any of the buildings yielding the plant samples at the times of their destructions.

Denmark has a long history of phytoarchaeological research, but the number of published samples is by no means large enough to exclude this possibility. One can

Excavation co-ordinates	70.80–71.25	72.15–72.50	73.10–73.35	74.00–74.20	74.70–75.00	75.50–75.70	75.70–75.90	75.90–76.10	76.30–76.50	76.70–76.90	77.20–77.50	78.30–78.60	79.20–79.50	pit *caa*	total
Naked 6 row barley (*Hordeum vulgare*)	4	43 *(13%)*	232 *(29%)*	55 *(26%)*	50 *(26%)*	26 *(23%)*	11	26 *(25%)*	43 *(32%)*	62 *(25%)*	13	–	3	36 *(29%)*	604
Bread wheat (*Triticum aestivum s.l.*)	–	171 *(51%)*	267 *(34%)*	63 *(30%)*	32 *(17%)*	17 *(15%)*	6	15 *(15%)*	13 *(9%)*	41 *(6%)*	3	3	2	21 *(17%)*	654
Emmer type (*Triticum cf dicoccum*)	1	9 *(3%)*	37 *(5%)*	15 *(7%)*	21 *(11%)*	17 *(15%)*	4	21 *(21%)*	20 *(15%)*	34 *(13%)*	5	2	2	18 *(14%)*	206
Unidentified wheat (*Triticum sp.*)	2	9 *(3%)*	22 *(3%)*	16 *(8%)*	16 *(8%)*	7 *(6%)*	4	6 *(6%)*	11 *(8%)*	27 *(11%)*	3	–	2	9 *(7%)*	134
Unidentified cereals (*Cerealia*)	5	103 *(31%)*	239 *(30%)*	59 *(28%)*	72 *(38%)*	44 *(40%)*	14	34 *(33%)*	50 *(36%)*	88 *(35%)*	11	12	–	41 *(33%)*	772
Cereal grains, total	12	335	797	208	191	111	39	102	137	252	35	17	9	125	2370
Cereal grains per litre of deposit (approx)	5	134	241	42	38	15	13	12	10	30	7	2	2	50	
Bilderdykia convolvulus	–	1	–	1	–	1	–	–	–	–	–	1	1	–	5
Bromus sp.	–	–	–	–	–	1	–	–	–	1	–	–	–	1	3
Spergula arvensis	–	–	–	–	1	–	–	–	–	–	–	–	–	–	1
Polygonum cf persicaria	–	–	–	–	–	–	–	–	–	2	–	–	–	–	2
Polygonaceae indet.	–	–	–	–	–	2	–	–	–	–	–	–	–	–	2
Weeds, total	–	1	–	1	1	4	–	–	–	3	–	1	1	1	13

Table 1. The seeds from Egehøj house III, divided by sample.

envisage a situation in which bread wheat might not have been cultivated by each settlement or household each year, and only in small quantities when it was cultivated. Furthermore, we have no right to assume that all stored cereals were necessarily consumed at the same rate. If bread wheat was a winter planted cereal, then the seed corn would not have been stored very long before being sown. If the cereal was a relatively rare luxury, it might be that it was consumed quickly after being harvested, and not stored for use throughout the year[1]. In such circumstances, there would only be short periods in which bread wheat would be a major component of carbonised remains if buildings were destroyed. Given the rarity of such "windows" through which to observe bread wheat, it is not particularly surprising that the species has remained virtually invisible. Egehøj in this view would represent a (for us) lucky destruction of a building in one of its brief bread wheat storage phases.

Whether this suggestion will be proved correct remains to be seen. To call on future work to answer present problems is perhaps to take the easy way out; but this discussion does highlight two major needs in Danish phytoarchaeological work. (1) Some of the classic finds remain unpublished. (2) We cannot go on relying

		mean and standard deviation	range
A. Bread wheat (*Triticum aestivum* s.l.) N = 50			
	length	3.7 ± 0.4	3.0–4.6
	breadth	2.7 ± 0.3	1.8–3.4
	thickness	2.3 ± 0.4	1.5–3.0
B. Barley (*Hordeum vulgare*) N = 50			
	length	4.4 ± 0.5	3.4–5.6
	breadth	3.0 ± 0.5	1.9–4.3
	thickness	2.3 ± 0.3	1.4–3.1
C. Emmer type (*Triticum cf. dicoccum*) N= 20			
	length	5.2 ± 0.4	4.5–6.2
	breadth	2.7 ± 0.3	2.1–3.2
	thickness	2.2 ± 0.3	1.4–2.8

Table 2. Dimensions of grains from Egehøj house III. Measurements in mm.

on chance finds of destroyed buildings. As excavation costs increase, excavation size will continue to decrease, so such finds will become less common. Much more must be made of normal excavations, in other words flotation must be employed much more widely on sites of all periods. This will have the advantage of bringing to light the residues from many stages of crop processing (cf. Hillman 1981, Jones 1984). These residues are less easily visible during normal excavation work. They are, however, often of crucial importance for the identification of the cereals, and also provide a much better idea of the day to day activities carried out on the site. This is of more than botanical interest – Hillman writes:

"... it is more common for the composition of samples of plant remains... to provide the basis for assigning past functions to the features, structures, or even whole sites from which the samples were recovered than it is for the excavator's identification of context-type to provide the basis for interpreting the samples of plant remains. This observation cannot be stressed too strongly." (1981 p. 125)

Plant remains as an expression of human activities are thus a great source of information for the archaeologist. Egehøj highlights the need for more work in this area.

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NOTES

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1. I am grateful to Paul Halstead for drawing my attention to this possibility.

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