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EDITED BY
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Phosphate mapping of a Funnel Beaker Culture house from Flögeln-Eekhöltjen, district of Cuxhaven, Lower Saxony

W. Haio Zimmermann

11.1 INTRODUCTION

From 1971 until 1986 the Lower Saxony Institute for Historical Coastal Research (NIhK) in Wilhelmshaven conducted the research project 'Evolution of an Inhabited Isle since Neolithic times with special regard to economic conditions'. It was funded by the German Research Council (DFG) in order to study the evolution of settlement and its economic background over five millennia on the inhabited isle of Flögeln, district of Cuxhaven, Lower Saxony (fig. 11.1) (Behre/Kučan 1994; Zimmermann 1992; 1994). As part of this project, three structures from the Neolithic Funnel Beaker Culture period (FBC) were excavated, two of them long houses and one a sunken-featured building. The function of the latter, which is not discussed here, is interpreted as to be cultic; we think it is comparable to the FBC-culthouses south of the Limfjord in Jutland, DK (Becker 1997). The excavation results for the Neolithic and Bronze Age features are being analysed, and they will be published in the near future, as will the Neolithic and Early Bronze Age pottery which has been analysed by Jan Albert Bakker (Bakker in prep.).



Figure 11.1 Map of location of Flögeln in the area south of the North Sea.

The two FBC houses from Flögeln-Eekhöltjen are quite similar. As the same characteristics were found for other FBC houses in the area south of the North Sea, we may use the term 'type Flögeln'. Some discussion of the FBC dispersed settlement structure and houses has already been published (Kossian 2007, 246; Zimmermann 1994; 1995) and we will deal with these aspects in greater detail in the final publication of the Flögeln-Eekhöltjen excavation (Zimmermann in press).

Full-scale reconstructions of the FBC-Flögeln houses have been built, in varying quality, in the Netherlands in the Themapark Archeon, Alphen, ZH and in the Hunebedcentrum in Borger, Drenthe, and in Germany in Schleswig-Holstein in the Museum für Archäologie und Ökologie Albersdorf as well as in the Steinzeitdorf Küssow in Mecklenburg.

During the Flögeln project, phosphate mapping was carried out. As the results of mapping of one of the Neolithic/Funnel Beaker Culture houses are of considerable interest, we have great pleasure in presenting them here to our colleague and friend, Leendert Louwe Kooijmans, who has followed all stages of the Flögeln project both in field and during analysis.

11.2 THE PHOSPHATE MAPPING

Phosphate mapping (P-mapping) was applied by the Flögeln Project from 1975 onwards, at four different scales: 1) for prospection before excavation to map the areas of settlements and agrarian fields with a grid +/- 50 m, 2) to map the different functional areas in and around buildings with a grid of 1 m, 3) in smaller houses with a grid of 0.4 m and 4) to map a corpse silhouette in a grave *etc.* with a grid of a few centimetres (Zimmermann 1992; 2001a; 2001b; 2006a). During the excavation, samples were always taken from around the archaeological features. Choosing an appropriate method of analysis is also very important; one should select a method, which in practice tests all phosphates in the samples, or at least more than 90% (Zimmermann 2001a; 2001b; 2006a).

Many houses from the Roman Iron Age, Migration Period and Early to High Medieval times, a few from the Bronze Age and three FBC structures were P-mapped. The

experience gained from working on the many first and second millennium AD buildings provides the basis for interpretation of the P-mapping results from the Neolithic features.

For the P-mapping in and around house 2, the samples were taken on a 0.4 m grid. The use of these short distances, coupled with analysis using software which demonstrates the presence of faint differences in P-values (OASIS montaj 4.1c from Geosoft Inc. 1 Toronto) provided a result in which details are clearly visible (fig. 11.3)).

The P-mapping of house 2 is a good example to demonstrate not only the advantages of this method but also its disadvantages. Possible disadvantages are that phosphates in any one area might derive from different times, and that only activities which produce no phosphates, some phosphates or a lot of phosphates can be differentiated. Which activities these were cannot be deduced directly from P-analysis. Other evidence, including that provided by archaeological features, has to be taken in consideration. For a room which has higher P-values than other rooms, for instance, several functions can be suggested. For example if characteristic internal features are present, the room can be interpreted as a byre.

The first step for interpretation of the P-mapping is to decide whether the higher and lower P-values really 'belong' to the house, *i.e.* to try to exclude P-distributions which might derive from earlier or later activities. In the case of house 2, the distribution of higher and lower P-values is bordered by the walls or runs parallel to them. As the areas of both house 2 and house 1 were probably not used for building houses at any other times, the P-values are probably the result of the FBC houses having been used. Only the higher P-values east of house 2 could theoretically be derived from some other activities.

The distribution of areas with high phosphates under houses, testifies that these houses were used intensively for some decades (Zimmermann 2006b). Phosphates normally remain at the very spot of deposition, and only seeps downwards a little (Gebhardt 1976). Therefore it seems to be a clear contradiction that some 20-30 cm beneath the FBC surface, in the excavated area, quite high P-values can be found. However, like under dung heaps where plenty of liquid serves as a carrier for the phosphates to seep down, this could to some extent be the case in the houses as well, where special humidity conditions may have developed as a result of the use of the building.

All three FBC structures and their immediate surroundings were sampled for phosphate analysis. In the sunken featured building, a hearth was clearly recognisable (Zimmermann 1986).

11.3 FLÖGELN HOUSE 2

House 2 was situated in a laminated fluviosol (*Bänderparabraunerde*); the foundation trenches of the outer walls and

several internal walls were clearly visible (fig. 11.2). The house was aligned almost north-south. In contrast to house 1, which was rectangular, house 2 had a trapezoidal ground plan; it was *c.* 12.5 m long and 4.6-5.15 m broad, being slightly wider at the southern end. Like house 1, it was divided by wall trenches into several rooms; in the case of house 2 there were six. In principle the structure was two aisled, with central roof-bearing posts. There were no external posts like house 1 had, and roof bearing was based equally on the posts in the central axis and the outer walls (see the discussion about the reconstruction of the upright structure in Zimmermann 1979; 1980; 2002).

According to Bakker (in prep.) the pottery (almost 40 pieces) found in the foundation trenches of house 2 belongs to phase Bakker E1+E2, Brindley 5, Laux D; corresponding to MNA III/IV in Denmark (pers. comm. J.-A. Bakker). This dates it to *c.* 3000 BC. As there was no earlier settlement in the immediate surroundings, it is very probable that this pottery 'belongs' to the house.

11.4 INTERPRETATION OF THE FEATURES AND FUNCTION OF FBC HOUSE 2 FROM FLÖGELN-EEKHÖLTJEN

During the excavation of house 1 in 1977 and house 2 in 1984, several proposals were made concerning the function of the structures; for example as a living house for several families, because of the different rooms, or not a house but a grave, the latter suggestion deriving from the Barkær discussion in Denmark (Liversage 1992).

The post-excavation analysis of a house plan for reconstructing the original different functions has to follow a certain strategy, combining the evidence of features and their associated finds on the one hand, with the interpretation of the distribution of higher and lower P-values on the other.

11.4.1 *The evidence from excavation*

During excavation, observations were made which are of importance for the reconstruction of the functions of house 2; they are described here from north to south.

On the northeast corner of house 2 a recent disturbance could be recognized. Such disturbances were frequently found during the Flögeln excavations, and came to be recognised as places where an erratic (*i.e.* a large stone left by glacial action) had been removed. The Eekhöltjen peninsula had been under the plough for a few decades before we began excavation. This fact is not detrimental to the P-mapping because the phosphates, like modern phosphate fertilisation, seep downwards only a little, remaining in the ploughsoil (Gebhardt 1976). More important is the fact that the erratics which hindered agriculture were cleared only a few years before the archaeological excavation started. The faint traces found beneath the recent disturbance at the northeast corner of house 2, from where an erratic was



Figure 11.2 Overview from the south of Funnel Beaker Culture house 2 from Flögeln-Eekhöltjen.

removed, can be interpreted as a bedding pit, dug during the construction of house 2, for erection of a standing stone just outside of the northeast corner of the house. This is reminiscent of the high guard stones at the end of (FBC) megalithic graves, as well of parallels in Denmark and Kujawien, Poland (see further discussion in Zimmermann forthcoming).

In the northernmost room, room 1, a pit was uncovered; it contained two undecorated FBC pots and two amber beads. Though it cannot be completely excluded that the pit

functioned as a cellar, for storage, it is more likely to have been a grave. Kossian discussed two FBC houses from Pennigbüttel, district of Osterholz (Assendorp 2000), which are very similar to the Flögeln houses. He argued on the basis of a stone-lined pit in Pennigbüttel house A, possibly a grave, that this house could perhaps have been a ritual structure, if the pit was functionally associated with the building. He compares it with the FBC-culthouses south of the Limfjord in Jutland, DK (Becker 1997). However, since the practice of burying in houses and settlements was certainly not

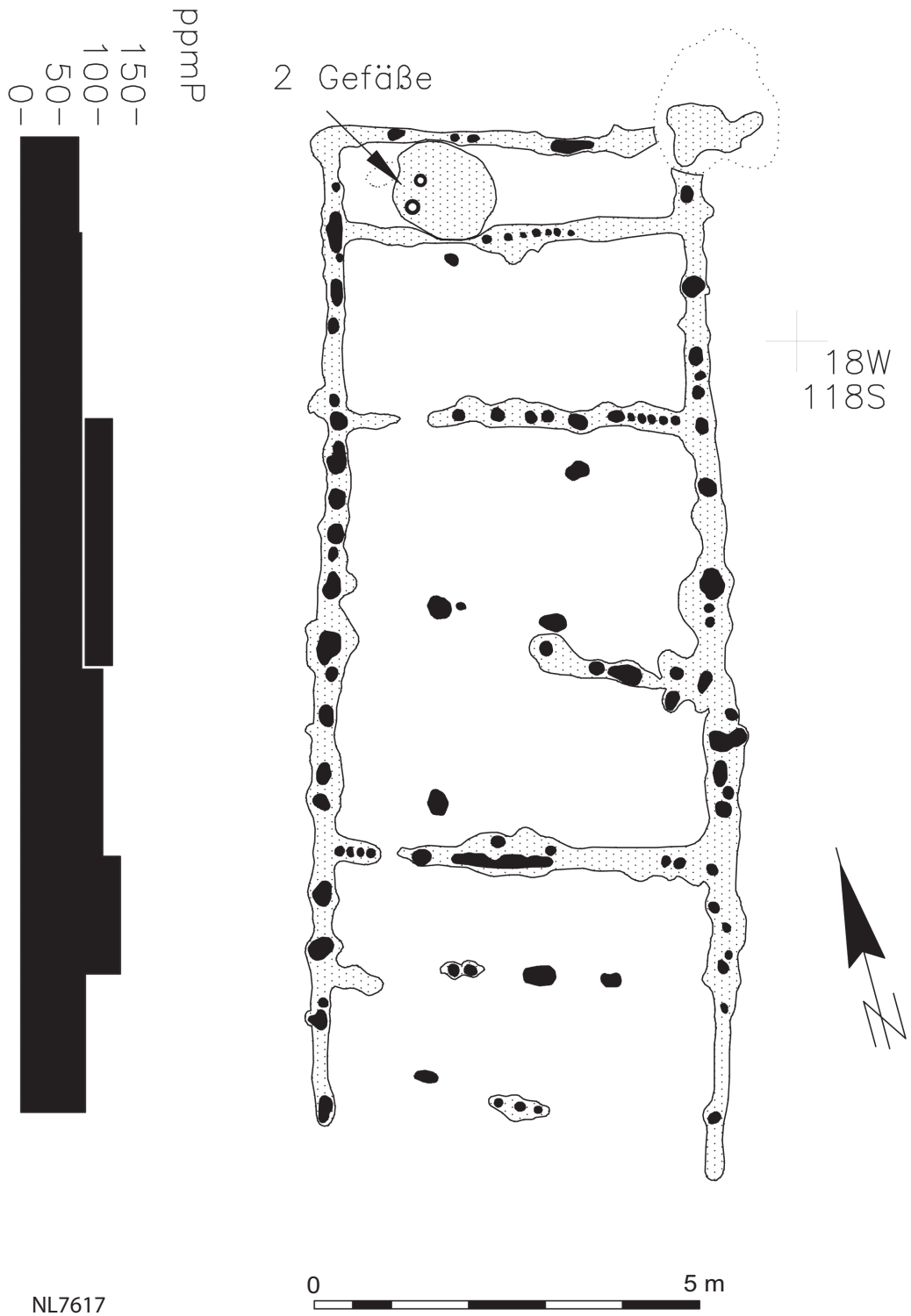


Figure 11.3 Plan of Funnel Beaker Culture house 2 from Flögeln-Eekhöltjen with bar chart of the average values on the left of the medium phosphate values.

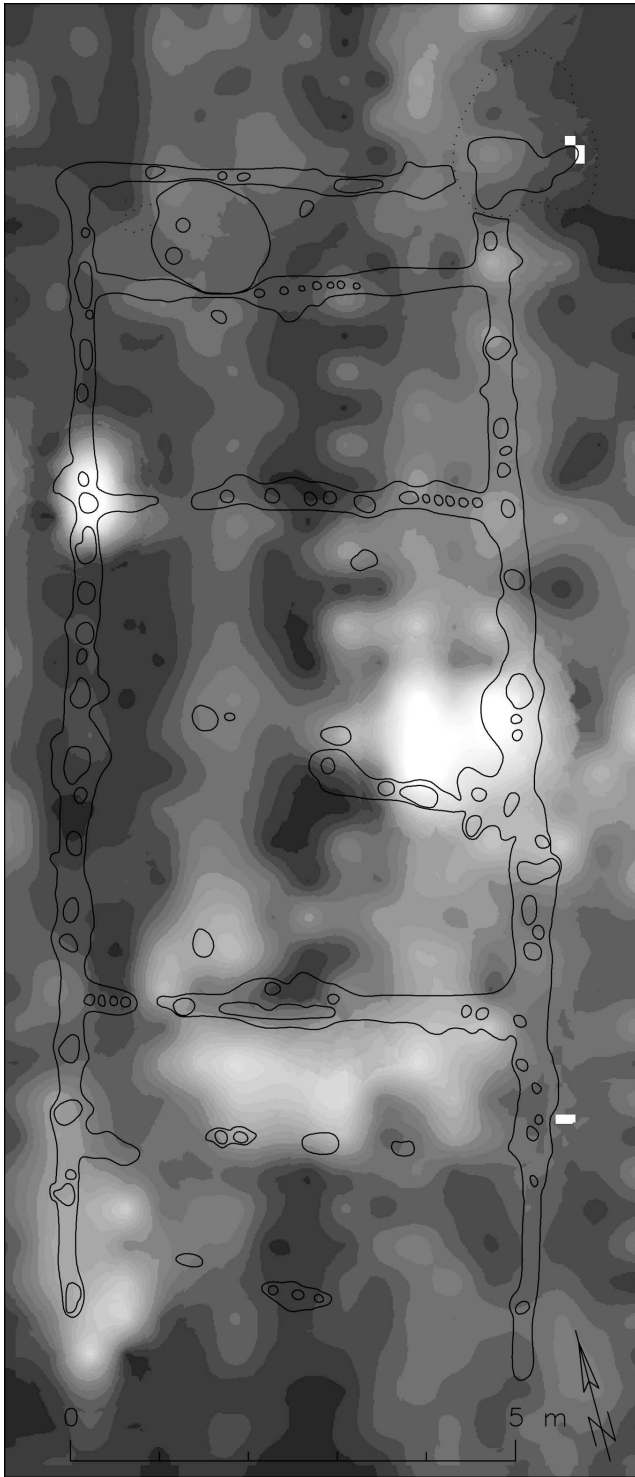


Figure 11.4 Phosphate mapping of Funnel Beaker Culture house 2 from Flögeln-Eekhöltjen (from dark = low to light = high P-values).

exceptional in Neolithic times (Happ 1991; Veit 1995), a grave cannot be a sufficient argument for interpreting a whole house as a cultic building. The same would be true for Flögeln house 2 as well. For Flögeln, the coincidence of grave and structure and the presence of the earth-set erratic, a standing stone, all close to each other, might suggest that the northern end of house 2 was a sacred area. Unfortunately we missed the chance to sample the base of this pit for phosphate analysis.

In the SE corner in room 3, infiltrations of charcoal were observed, clear evidence for the presence of a hearth.

11.4.2 Interpretation of the P-mapping results from house 2

In general, the spots and areas with the higher P-values cannot directly be equated with certain functions (fig. 11.4). It will be remembered that during excavation it was suggested that the Flögeln houses 1 and 2 might have sheltered several families, one per room, or that they might not have been houses for the living but a burial structure. However, the uneven distribution of phosphates within house 2 is a clear contradiction to the suggestion that this house was for several families. It seems clear that it was a farmhouse for one family, with rooms of different functions. This interpretation is further supported by the lack of evidence for a second or more hearths, although multiple hearths have been found in the contemporary Dümmer settlement, c. 130 km to the southwest (Kossian 2007). As for the interpretation of house 2 as a burial structure, although a possible grave was found in the northernmost room, once again the uneven distribution of phosphates throughout the structure suggests this interpretation is implausible.

Room 3

As with many other cases of houses of the 1st and 2nd millennium AD, the hearth in the SE corner of the third room shows high P-values. This hearth is unusual in being situated close to the wall, probably a wattle work and daub wall, which is but seldomly observed in early house building. This presupposes that the wall was protected from the fire by something like a thick loam layer, as has been found in some cases, for example in an early medieval house in Langwarden, Butjadingen, district of Wesermarsch (Brandt 1986).

Room 5

Room 5 was used for function(s) which resulted in higher P-values in the whole room, in contrast to rooms 3 and 4 where the higher P-values are concentrated along the eastern wall. The phosphate levels and distribution might suggest that room 5 could have been a byre, but this is unlikely as the room was only about 1.5 m wide; in addition, the results

of palaeobotanical research indicate that, during the FBC period, cattle were kept in the forest and not in a byre (Behre/Kučan 1994).

Bands of high phosphate levels

In general, the distribution of areas of higher phosphates both within and external to house 2 can be interpreted as activity areas, but there is no clear evidence which allows any more detailed interpretations, except for the hearth. However, there are two narrow strips or bands of higher phosphate levels where more can be suggested.

With the houses of the 1st millennium AD, in many cases we could discern bands of medium-intensity phosphate levels along and outside of the long walls (Zimmermann 1992). For the FBC period, such a band can be observed outside of the western wall of house 2 (unfortunately outside the frame of fig. 11.4). This was possibly the same along the eastern wall, but less clearly so. We have interpreted such strips or bands as the space under the overhanging roof where small domestic animals searched shelter and where man performed the call of nature. At the later prehistoric site of Feddersen Wierde, clear traces of toilet pits were observed in the same situation under the overhanging roof (Haarnagel 1979). Because of observations from within houses from the 1st millennium AD (Zimmermann 1992), we also dare to give a proposal for the interpretation of a second example of a linear distribution of raised phosphate levels. Inside of house 2, to the west of the central axis, there is a north-south band of increased phosphates running from room 1 to room 4. Such traces could be recognized in the houses of the 1st millennium AD as the regular path that people took through the house. Here at house 2 of the FBC, we can see through the phosphate mapping what is probably the pathway from room to room. It is no contradiction, that it crosses the wall trenches in some places: at sites where wattle work is preserved, there are many examples to show that it is woven through under the sills (Haarnagel 1979). The position of this path in house 2 could be the reason why the hearth in room 3 was not situated centrally.

11.5 CONCLUSION

The results presented here show how P-mapping yields valuable information for understanding house features. They show that every house plan which is not overlapped by other features, and which is not P-mapped, is a lost chance. The often-heard argument, that in projects there are not the means for such additional analytical work, can be countered with the point that the samples taken can wait for examination many years. In all cases where the original surface is not preserved, P-mapping is the only method to find evidence for the possible functions a house had.

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