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Palynological and Archaeological Data – a Comparative Approach

Abstract: The 600 km² of the basin of the Wetterau, part of the “Rhein-Main-Tiefland” in the federal state of Hesse in Germany, is an archaeologically intensively investigated landscape. Numerous precisely dated palynological studies are available, and so a direct comparison of archaeological and palynological results is possible. The vegetation history, as recorded in four pollen diagrams, will be discussed in relationship with the archaeological data known from a radius of 1, 3 and 5 km around each of the sites from which pollen was taken. The aim of the study is to investigate in which cases the established vegetation changes can be directly linked to the archaeological record. Furthermore, possible causes will be investigated.

Introduction

The study area is the 600 km² of the Wetterau, situated north of Frankfurt am Main, in the federal state of Hesse in Germany (Fig. 1). Overall the area is a large basin, but there are numerous ridges that rise

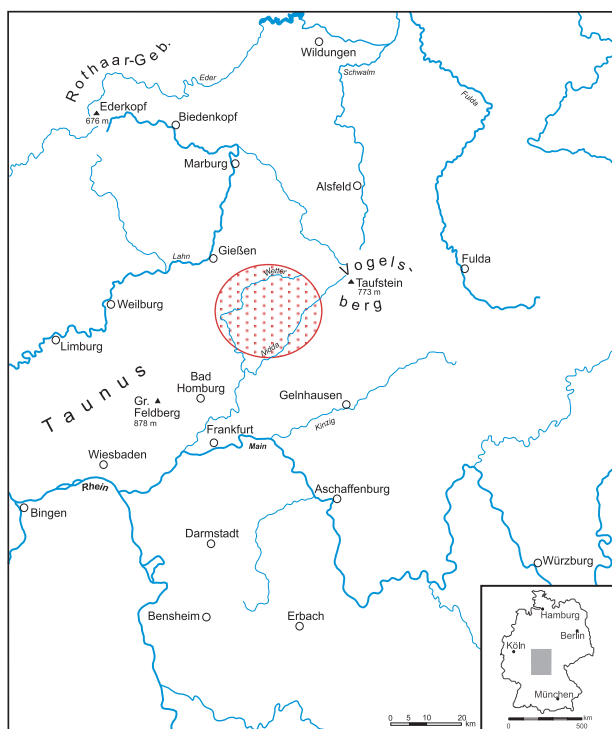


Fig. 1. The study area: the Wetterau in the federal state of Hesse in Germany.

from the valley floor. Due to this undulating relief the Wetterau differs from other plains, for example the North German Lowlands. The valley is surrounded by two low mountain ranges (Vogelsberg in the east and Taunus in the west) with peaks of some 800 m and more. Extreme fertile loess soils cover the area which has been intensively inhabited since the first farmers of the linear pottery culture (LBK). Above all the sensational discovery of the Early-Latène “Fürstensitz” (princely site) at the Glauberg attracted public interest in the area (BAITINGER / PINSKER 2002). Altogether the Wetterau is an archaeologically intensively investigated region. Additionally, numerous precisely dated pollen records are available. As this rich data set is available a direct comparison between archaeological and palynological results is possible. The main focus of this paper lies on the Late Bronze Age (ca. 1200–750 BC, Urnenfelder period) and the Early Iron Age (ca. 750–300 BC, Hallstatt/Early-Latène period), as these periods have been studied by two major interdisciplinary projects funded by the German Research Foundation¹.

Palynological Investigations

The floodplains in the study area contain a number of peat bogs. These developed in abandoned river beds (STOBBE 1996; 2000) and are of depths between

¹ A) “Kelten, Germanen, Römer im Mittelgebirgsraum zwischen Luxemburg und Thüringen. Archäologische und naturwissenschaftliche Forschungen zum Kulturwandel unter der Einwirkung Roms in den Jahrhunderten um Christi Geburt („Romanisierung“), DFG-SPP 190.

B) “Frühe Zentralisierungs- und Urbanisierungsprozesse zur Genese und Entwicklung frühkeltischer Fürstentümer und ihres territorialen Umlandes“, DFG-SPP 1171.

1–4 m. Nowadays the area covered by peat ranges from 1–20 ha, but it is likely that in the past the bogs were much larger. Brown coal mining in the area led to lowering of the groundwater table, which probably has caused a partial destruction of the peat.

The analysed pollen records derive from the centre of the Wetterau (profiles Salzwiese and Dorfwiese) and from the eastern margin (Mönchborn, Heegheim, Büches) close to the lower Vogelsberg (Fig. 2). The records from the valley border show that about 3000 years ago the area was dominated by a dense beech forest (Fig. 3, zone 1). Nevertheless, the forest cover was interrupted by sporadic clearances. Meanwhile in the central Wetterau, (Fig. 4, zone 1) far more clearances existed and the beech forest was not as extensive as it would have been in a natural environment. About 700 BC (zone 2) distinct vegetation changes can be observed at the Wetterau border. In particular the beech-curve declines significantly, whereas the NAP-values increase. However, the main characteristic of this period is that very similar vegetation composition and development can be observed in all parts of the study area. This indicates that the land use patterns were the same for the whole region. There were no differences between the periphery and the centre. In

the Late-Hallstatt/Early-Latène period, that is the main settlement phase at the Glauberg, surprisingly a regeneration of the beech forest can be detected in some diagrams (Figs. 3, 10, zone 3). The unitary pattern of land use that had prevailed so far ended abruptly. Instead we now find a complex husbandry system with small local variations.

The Comparison of Archaeological and Palynological Results (Methodical Approach)

In order to match the vegetation history with the archaeological record, the AP/NAP-values of the different periods and the distribution of archaeological sites must be compared. Since the spatial range of the pollen diagrams is usually rather limited, first it is necessary to reconstruct the local vegetation. A radius of 1, 3 and 5 km around the pollen sites was chosen and all known archaeological settlements recorded (Fig. 5). The number of archaeological sites was then averaged and afterwards compared with the NAP-values of the pollen diagrams².

Urnenfelder Period

During the Urnenfelder period the NAP-values in the centre already reach 21–30%, while in the border area they only attain values of 10–14% (Fig. 6). The high NAP-values in the central Wetterau can easily be explained by looking at the archaeological record. At that time the central Wetterau was very densely populated, so it is only natural that the NAP-values are very high. So far we know of 128 settlements of the Urnenfelder period in the Wetterau (SAILE 1998; POSLUSCHNY 2007). Of these 21, in other words more than 16%, were situated within a 5 km radius around one pollen sample site, Salzwiese. Similarly about 14 Urnenfelder period settlements are known within a radius of 5 km around Dorfwiese, which also indicates a densely populated area. One of these settlements was only 1 km from the pollen sample site, and hence we find extremely high NAP-ratios of 30% or more and very high cereal-values. They can be as high as 9% and indicate human activity in the surrounding area. The high settlement density in the central Wetterau also accounts for the markedly

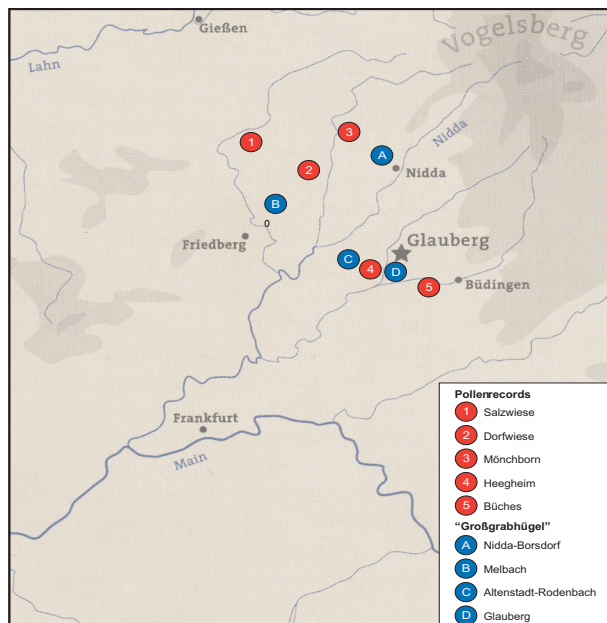


Fig. 2. Locations of the pollen sample sites.

² In this investigation all non-arboreal-plants from the uplands are included into the NAP-sum. Poaceae and Cyperaceae are excluded as well as *Alnus* and *Salix* from the AP-sum.

Profil Mönchborn
(selected pollen types)

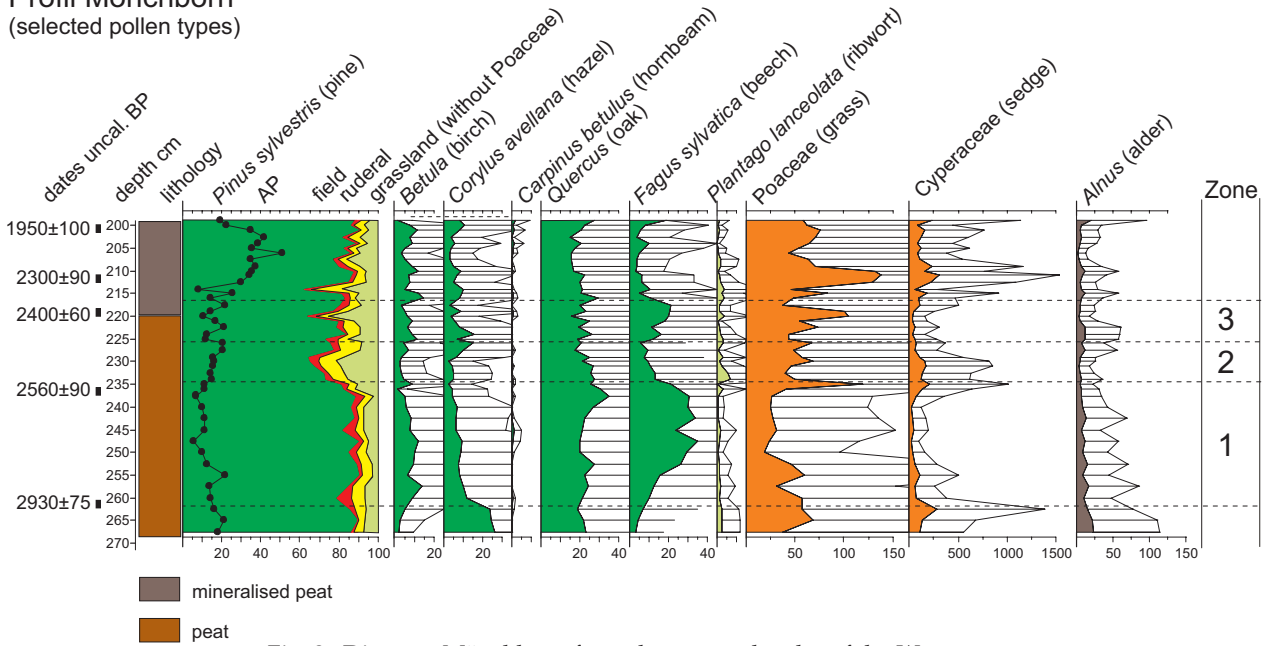


Fig. 3. Diagram Mönchborn from the eastern border of the Wetterau.

Salzwiese
(selected pollen types)

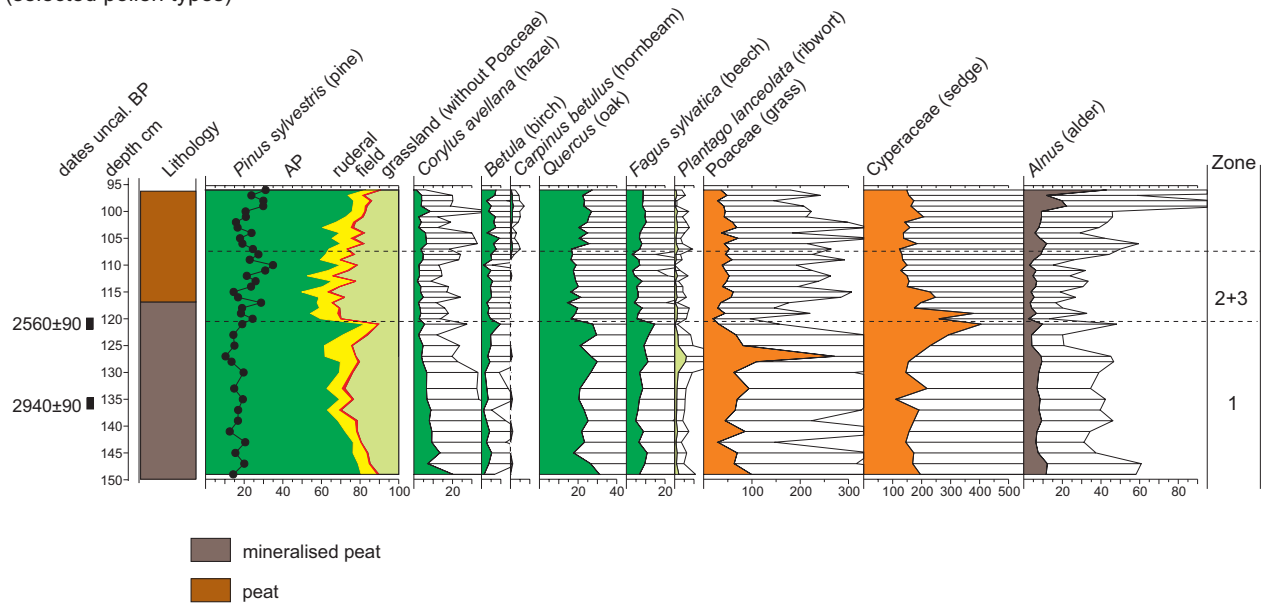


Fig. 4. Diagram Salzwiese from the central Wetterau.

decreased presence of beech. Beech trees prefer fertile soils that are suitable for agriculture, thus in this intensely cultivated landscape only a few suitable areas for beech expansion were left.

In contrast, in the marginal areas there was much less settlement activity. 1 km and 3 km around the

locations Mönchborn and Heegheim respectively there is no evidence for any settlement at all. Even 5 km around the sites only one and two settlements respectively have been definitely located so far. Consequently beech could spread and develop dense stands in this area. Altogether, for the Urnenfelder

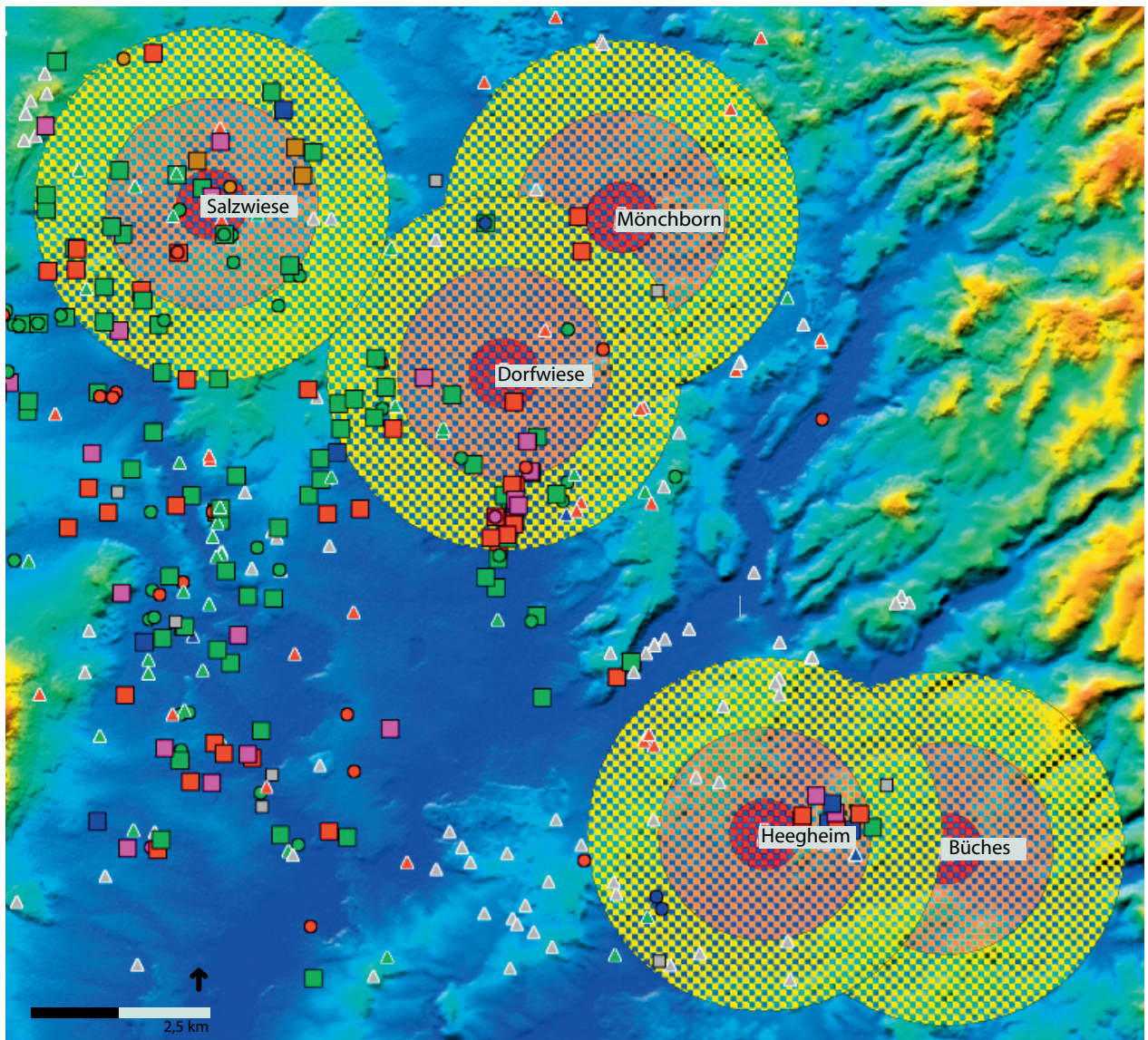


Fig. 5. Distribution of the archaeological settlements. All known settlements (rectangles) and burial sites (triangles) within radii of 1, 3 and 5 km around each pollen sample site are recorded (based on A. Posluschny (www.fuerstentitze.de/1121)).

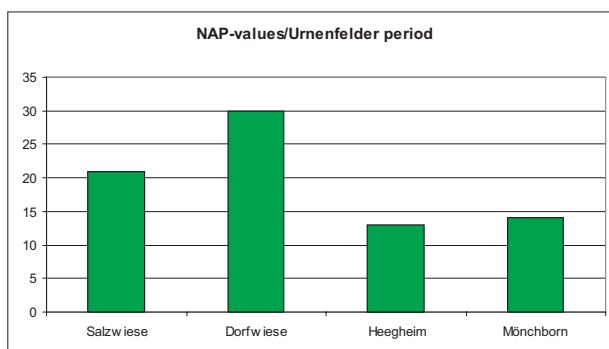


Fig. 6. NAP-values in the Urnenfelder period. The percentages in the pollen records from the border areas are much lower than in the central region.

period archaeological and palynological records match directly, with no discrepancies occurring.

Hallstatt Period

During the Hallstatt period contradictions occur between the palynological and archaeological records. About 700 BC beech-values decline clearly in the border area, while at the same time the NAP-values rise distinctly. The NAP-values of the outskirts in fact reach almost the same value as in the central Wetterau (Fig. 7). The pollen record seems to indicate a population explosion, but the number of archaeological sites stays low. We can only observe a small

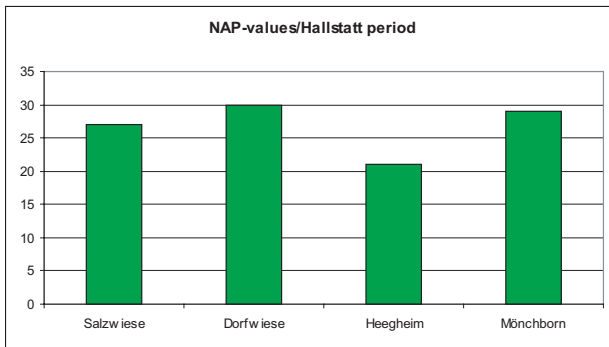


Fig. 7. The NAP-values in the Hallstatt period. The percentages in the pollen records of the border areas are almost as high as in the central part.

increase in the number of settlements during the Hallstatt period. In contrast, in an area 5 km around Salzwiese in the central Wetterau a very distinct decline in settlement is documented. There the number of archaeological sites is halved within 100 years (4.3 settlements per 100 years in the Urnenfelder period and 2.3 settlements per 100 years in the Hallstatt period). On the one hand we have an overall drop in the density of archaeological sites, while on the other hand the NAP-values rise. The archaeologists feel confident that the reduction in archaeological sites is not the result of deficiencies in research. They believe that the number of settlements and settlers did indeed decline after the Urnenfelder period in the Wetterau (POSLUSCHNY 2007). This implies that during the Hallstatt period a smaller or at least comparably sized population was intensively cultivating a larger area. One explanation may be that increased cattle-raising (EBERSBACH 2002; SAILE / ZIMMERMANN 1996) and resulting intensified wood pasture led to the destruction of the forests in the border areas. Increasing Poaceae- and Cyperaceae-values (pollen diagram Mönchborn, Fig. 3), as well as an increased number of wetland and alder carr indicators (pollen diagram Heegheim) which simultaneously, also point to an increase in the importance of cattle-raising (STOBBE 2008).

Early Latène Period

The palynological data indicates that from about 500 BC onwards, which is the main settlement phase at the Glauberg, the land use system was not as uniform and intense as before. In the centre the vegetation cover stays stable, and no indications of population or land use changes are visible (Fig. 4). Consistent with this the absolute number of archaeo-

logical sites declined insignificantly when 100-year intervals are examined. Thus, the palynological records are in accordance with the archaeological results. They both indicate hardly any changes compared to the Hallstatt period.

In contrast, the pollen profiles from Dorfwiese and Mönchborn reveal distinct changes around 500 BC (STOBBE / KALIS 2002). The beech-curve rises sharply, while the NAP-values decrease (Figs. 3, 10, zone 3).

Around Mönchborn no archaeological site was detected, and initially this is consistent with the palynological record. However, looking into the details, contradictions arise, because not only did the beech-values increase, but the cereal-curve also rose and the NAP-values only decreased slightly (Fig. 8). While the rising beech pollen-values indicate reforestation, the NAP- and cereals-values do not point to a lessened anthropogenic influence. The author concludes from this that changes in the land-use system, probably animal husbandry, took place (STOBBE 2008).

Compared with the values known from the Hallstatt period, around the pollen sample site at Dorfwiese the number of archaeological sites, averaged for 100 years, did increase. In the palynological record a rise of beech-pollen paralleled by a decline of NAP-values can be observed at the time (Fig. 9). This record, as well as the record from the Urnenfelder period informs us about the pollen-catchment area of the site. The record from Dorfwiese is transitional between the central parts and the eastern border area. During the Urnenfelder period the eastern parts were covered by beech forests. This is clearly reflected in the record from Dorfwiese (Fig. 10). In contrast the NAP-values as well as the number of archaeological sites, suggest an increased settlement density. A

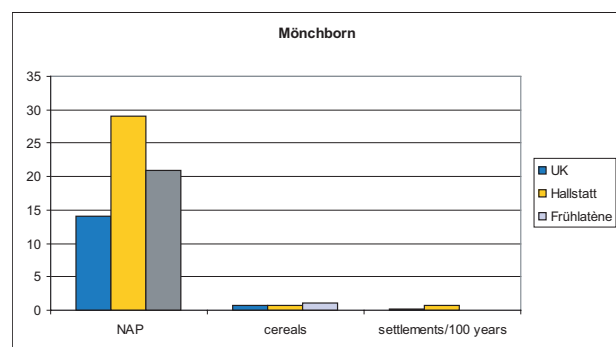


Fig. 8. The NAP- and cereal-values compared with the number of settlements. In the Early Latène period the cereal-values rise but no settlements are known from the 5 surrounding km.

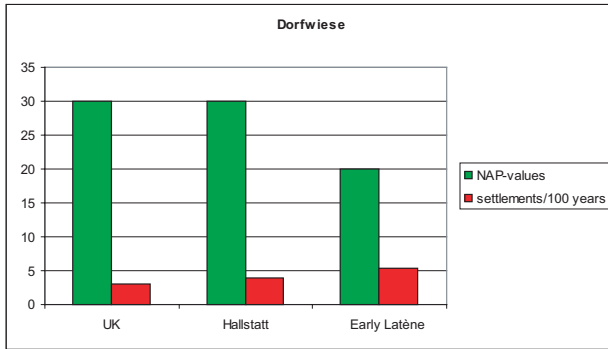


Fig. 9. Around the pollen sample site Dorfwiese the number of settlements – averaged for 100 years – increases in the Early Latène period. The palynological data, in contrast, show a decline of NAP-values.

very similar pattern can be observed during the Early Latène period. Again the “eastern” beech-peak can be detected in the pollen diagram, but the number of archaeological sites rises (Fig. 9). The regional components of the record from Dorfwiese are a mixture of pollen influx from both the central parts and the marginal area. The diagram from Salzwiese on the other hand represents only the central Wetterau. When all things are considered the pollen records during the Early Latène period clearly differ in complexity from those of the Hallstatt period, because in the Hallstatt

period we find similar patterns in the central as well as in the marginal parts of the Wetterau.

Final Remarks

The data presented here shows that archaeological sites within a 1 km radius from the pollen sample site are very closely reflected in the pollen records. In these cases very high NAP-values occur above all those of cereal pollen. High values of anthropogenic indicators suggest settlements in the vicinity of the pollen sample site, even if archaeological proof of this is missing. Contradictions between archaeological and palynological results need to be discussed. They indicate changes in settlement behaviour and frequently are caused by changes in land use patterns. Vegetation changes that occurred more than 10 km away from the pollen site are ambiguous. Diagrams from sites that are located between different vegetational settings show a mixture of these. Dealing with complex landscapes such as the Wetterau shows very clearly that the evidence of single studies must not be overrated. Only very detailed pollen studies that compare numerous sites from one region can lead to conclusive results in this “Altsiedellandschaft”, and make

Dorfwiese

(selected pollen types)

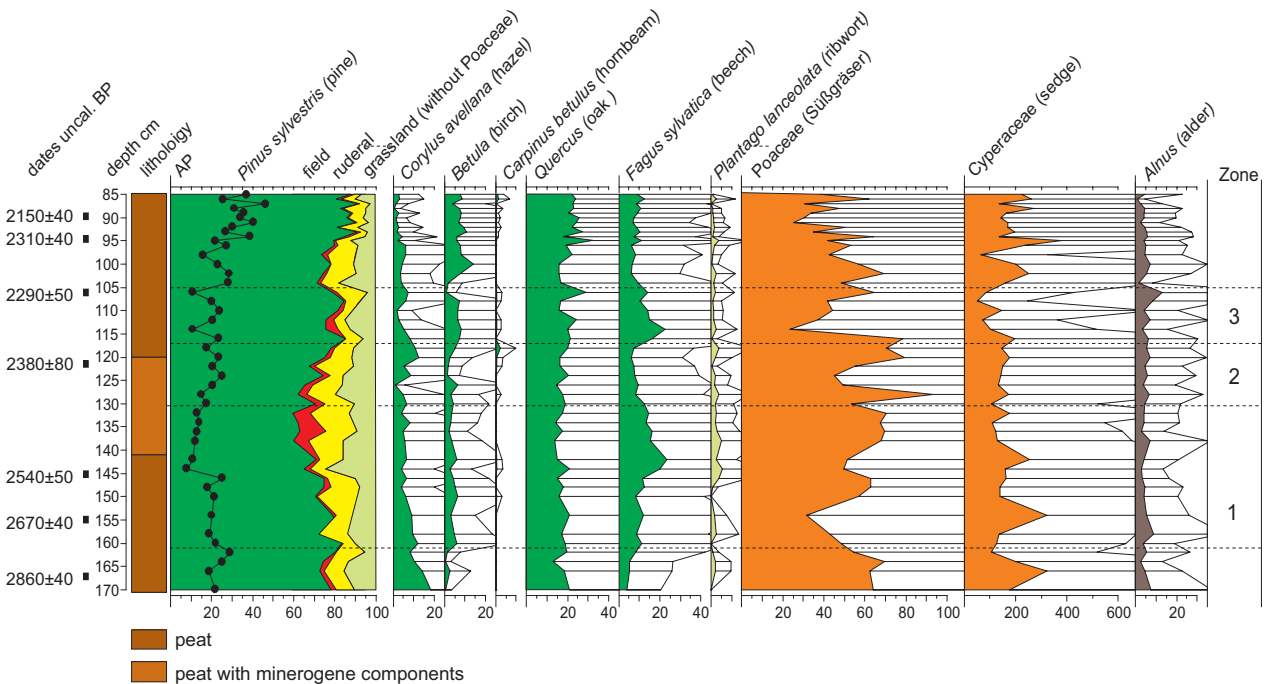


Fig. 10. Diagram Dorfwiese. The record is transitional between the central parts and the eastern border area of the Wetterau.

it possible to uncover and differentiate population decrease and/or changes in land use or settlement patterns.

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