

First anthracological results from Rhine's plain and comparison with other palaeo-environmental data

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Summary: Rescue excavations on the high-speed railway of the “LGV-est” between Baudrecourt and Strasbourg have initiated palaeo-environmental studies in Kochersberg region (Bas-Rhin, Alsace). The results of charcoal analyses from three sites are presented here: Ingenheim Hungerberg, dating to the recent Neolithic (4000-3600 BC), Mittelhausen Langmatt, dating to the Hallstatt D (6th century BC) and Mittelhausen Vorderen Berg, dating to the late Iron Age (5th century BC). All sites are located in a perimeter of ten kilometres around the Vierbruchgraben valley bottom. These analyses allow for the first time, a proposal of woodland evolution in this micro-region. During the Neolithic period, the forest environment was rather closed while it was much more open during the Iron Age. These results are consistent with the pollen and plant macro-fossils analyses from an “off-site” core taken close to the investigated sites. They indicate a moderate influence of Man during the Neolithic period and an increasing deforestation starting with the Iron Age. Anthropogenic indicators show a strong agricultural influence with wet meadow vegetation on the valley bottom, probably influenced by livestock grazing.

Key words: eastern France, charcoal analysis, plant-macro-fossil analysis, pollen analysis, Rhine valley.

INTRODUCTION/BACKGROUND

In the context of this conference, we present here the preliminary anthracological results for the Rhine valley. Archaeobotanical studies are very scarce in this region. Rescue excavations preceding the construction of a high-speed railway line, which link together Baudrecourt (Lorraine) and Strasbourg (Alsace), have allowed the analysis of charcoal and plant macro-fossils. Archaeobotanical data from three archaeological sites provided the opportunity to discuss preliminary results of charcoal analysis and to compare it to other palaeo-ecological data. The following sites were investigated: Ingenheim *Hungerberg*, attributed to the Michelsberg culture (4000-3600 BC), Mittelhausen *Langmatt*, dating to the Hallstatt D period (6th century BC) and Mittelhausen *Vorderen Berg*, dating to the beginning of the late Iron Age (La Tène A2/B1, 5th century BC). They are all located in a perimeter of ten kilometres around the valley bottom of the *Vierbruchgraben* in the Kochersberg region.

The interest of these studies is assembling results from different sites located close to each other and establishing the environmental evolution of woodland from the Neolithic period to the Iron Age. These data will be compared to palynological and carpological studies from an “off-site” core located close to the investigated sites.

GEOGRAPHIC SITUATION

The Kochersberg region is located west of Strasbourg between the foothills of the Vosges and

Rhine valley (Department of Bas-Rhin). The fertile, loamy and not completely decarbonised soils on loess attracted early human settlements. Deforestation was intense and at present, there are only a few scattered woodlands of oak-hornbeam forest type and some woody riverside vegetation.

DATA AND RESULTS

The following data was obtained from similar contexts: mainly from pits used for domestic waste disposals. Only dispersed charcoals particularly rich in taxa (Chabal, 1997) deriving from the fill of pits have been used in this study. The similarity between the proportions of recorded taxa with present forest formations allow for a reconstruction of the past forest environments exploited around the sites.

The excavation of Ingenheim was directed by Christophe Crousch, PAIR (Pôle d'Archéologie Interdépartementale rhénan) in 2009. Seven pits were studied from the recent Neolithic (4000-3600 BC). By determining 1437 charcoal fragments, 14 taxa were identified. The proportions of oak reach and sometimes exceed 80% while heliophilous species located at the edge of the valley are much less visible. The charcoal spectra present an image of a closed forest environment.

The excavation of Mittelhausen *Langmatt* was directed by Yohann Thomas, Inrap (Institut national de recherches archéologiques préventives) in 2010. One investigated pit was dated to the Hallstatt D period. A dozen taxa have been identified represented by 213

charcoal fragments. Heliophilous taxa dominate with over 50%. Forest taxa total 44%, while the riverine taxa do not exceed 2%. The predominant presence of heliophilous species in the charcoal spectra suggests an image of an open environment. The site is situated in the valley bottom but the riparian forest taxa are not well reflected in the charcoal spectra.

The excavation of Mittelhausen *Vorderen Berg* was directed by Yohann Thomas in 2009. Five pits of the early La Tène period (La Tène A2/B1) were studied. At least 14 taxa have been identified from 579 charcoal fragments. The forest species are well represented while the heliophilous species are present not more than 5% of the sample. The represented taxa could indicate a rather closed environment. The changing proportions of taxa between different pits probably reflect the diversity of forest types. The presence of riverine taxa could indicate the site proximity to a wetland where firewood could be collected.

The results of these three sites were grouped in the diagram (Fig. 1).

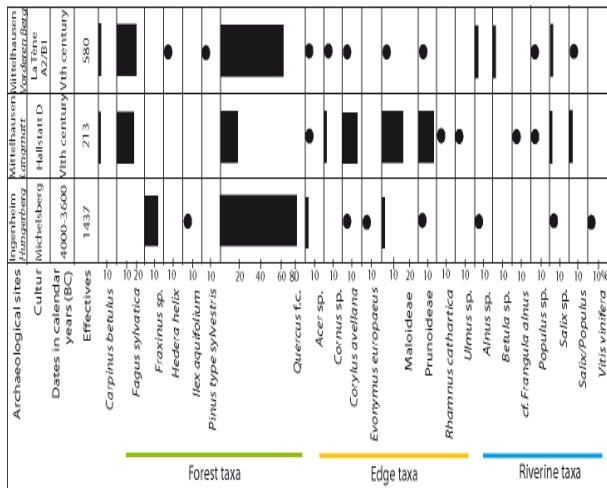


FIGURE 1. Anthracological diagram of the LGV-est sites

DISCUSSIONS AND COMPARISONS WITH PALEO-ENVIRONMENTAL DATA

The results from pollen and plant macro-fossil analyses from a core collected “off-site” in the valley bottom of the *Vierbruchgraben* (Table 1) (Ertlen and Schneider, 2010) allow for a comparison with the charcoal analysis. These indicate only a partially opened environment during the Neolithic period when human impact was less intense. From the Iron Age onwards, we can observe a strong agricultural influence reflecting increasing deforestation and land-use. Plant macro-fossils are indicating that the valley bottom was occupied by meadows, probably used for pasture (Wiethold, 2010). Such presence of a semi-open environment could explain the poverty of riparian taxa at Mittelhausen *Langmatt*.

The anthracological results from Mittelhausen *Vorderen Berg* show a significant increase in forest taxa. The hypothesis of a forest return is not supported by palynology and sedimentology results. In the context of an open environment, the increase of oak could be explained by the exploitation of stump shoots, coppicing. The spectra of the La Tène A2/B1 site could then reflect changes in the methods of supplying firewood.

	Floodplain vegetation	Regional Vegetation	Erosion	Archaeological remains	14C age
S6	No data	No data	severe erosion	High density of villages	688 / 728 cal. AD
S5	Wet and open environment, pasture	Open landscape in Kochersberg with cereals and pasture	Little slope erosion	High Middle Age: Settlements in Kochersberg and close to the watershed	530 / 650 cal. AD
	Peat bog with alder	Totally closed landscape			
S4	Open wetland with birch and maple	Reconquest of the forest (S3a)	No erosion	Antiquité : Settlements in Kochersberg and close to the watershed	246 / 335 cal. AD
S3	Open wetland and meadow anthropized	Indices of human impact, cereals, ruderal and microfossils associated with livestock (S3b)	Slope erosion	Halstatt : Settlements in Kochersberg and close to the watershed High density of settlements in Kochersberg and inside the watershed	
S2	Wet environment occasionally flooded, partly open	Weak data, little human impact	No erosion	Bronze Age: very little evidence in Kochersberg	810 / 740 cal. BC
S1	Weak data	Poor data	Little slope erosion	Michelsberg : Settlements in Kochersberg and inside the watershed	3960 / 3770 cal. BC

TABLE 1: Sedimentology, pollen and macro-fossils analyses

CONCLUSION

Intense human impact is only noted from the beginning of the early Iron Age (800 BC) onwards. A change in the exploitation of the environment could have taken place in the younger Iron Age (La Tène A2/B1). Further studies in the Kochersberg region will be necessary to verify and to refine the proposed hypotheses. The work performed in the Kochersberg region does underline that the comparison of charcoal, pollen and micro-fossil data is an essential approach to study the human impact on the forest environment during prehistoric times.

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