

Vegetation dynamics, human impact and exploitation patterns in the Paris Basin through the Holocene: palynology vs. anthracology.

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Summary: *The comparison between the palynological and the anthracological records of the Paris basin during the Holocene provides congruent pictures. This, despite some differences related to the nature and origin of the investigated samples (e.g., from archaeological contexts or paleochannels). At basin level, both analytical approaches similarly record the taxa characterizing the four principal environmental phases of vegetation history. The first phase, which is uniquely documented on palynological ground, is associated to the presence of extended pine woods between 9200 and 8200 cal BC. The second (8200-6800 cal BC) corresponds to the emergence of hazel woods and to the first development of pioneer plant species of deciduous oak woods at the expense of pine woods. The third phase, corresponding to the long time period 6800-800 cal BC, witnesses the full development and diversification of deciduous oak woods. Finally, the last phase, characterized by an increasing anthropic impact since ca. 800 cal BC, is dominated by deciduous oak-beech woods. However, despite their usual congruence, the palynological-vs. anthracological-based pictures also show some punctual differences, notably in the local representativeness of some woody taxa. At the archaeological site level, these discrepancies may allow a better understanding of the human-related environmental exploitation patterns.*

Key words: *Paris basin, Holocene, palynology, anthracology*

INTRODUCTION

During the last two decades, the development of rescue archaeology in the Paris basin has led to a significant refinement of the archaeobotanical record (Pernaud, 1997; Leroyer, 2004, 2006; Leroyer and Allenet, 2006). While a synthetic picture for the Holocene of this area has been independently provided on palynological and anthracological grounds respectively, so far a direct comparison of the scattered results from these two analytical approaches has not been conducted.

MATERIAL AND METHODS

The present analysis relies upon the anthracological evidence from 44 sites and 91 palynological sequences constrained by a total of 148 radiocarbon (¹⁴C) dates. The anthracological material comes from archaeological sites located both on the plateau (the majority) and the valley bottom (a few), while the palynological record exclusively refers to valley bottom sequences from humid environments, not necessarily related to the archaeological sites.

RESULTS AND DISCUSSION

The palynological picture (Fig. 1) summarizes the Holocene vegetation history through the assessment of seven regional pollen zones (PAZ IV to IX). Zone IV (Preboreal) is constrained between ca. 9200 and 8200 cal BC by 15 radiocarbon dates; zone V (Boreal) between ca. 8200 and 6800 cal BC by 10 dates; zone VI (early Atlantic) between ca. 6800 and 5000 cal BC

by 17 dates. Zone VII (late Atlantic), when evidence of an anthropic impact is only recognizable nearby the archaeological sites, is constrained by 28 dates between ca. 5000 and 3500 cal BC. Zone VIII (Subboreal), when systematic agro-pastoral activities are traceable, is constrained between ca. 3500 and 800 cal BC by 31 ¹⁴C dates. Zone IX (early Subatlantic), between ca. 800 and 50 cal BC (10 dates), testifies a nonlinear increase of the anthropic pressure on the landscape. Finally, zone X, which is constrained by 37 dates, basically documents an increase in the agro-pastoral activities punctuated by episodes of decay following abandonment.

The anthracological picture (Fig. 1) summarizes the vegetation history through three regional zones (BP1 to 3). The anthraco-zone BP1, chronologically constrained between Boreal and early Atlantic, corresponds to Mesolithic levels. Zone BP2, covering from the late Atlantic to most of the Subboreal, is associated to archaeological levels spanning from the early Neolithic to the middle Bronze Age. Finally, zone BP3, which covers the late Bronze Age, the Iron Age, the Classical Antiquity, and the Middle Age, corresponds to the Subatlantic.

Based on the substantially converging evidence from the independent palynological and anthracological records summarized above, four main evolutionary phases can be identified in the vegetation history of the Paris basin through the Holocene (Fig. 1). The first one is uniquely attested on palynological ground (PAZ IV) and corresponds to the presence in the region of extended pine woods. The second phase,

recorded by both disciplines (PAZ V et BP1), is associated to the emergence of hazel woods and to the first development of pioneer plant species of deciduous oak woods at the expense of pine woods, between *ca.* 8200 and 6800 cal BC. The third phase (PAZ VI, VII and VIII, and BP2), when the first effects of anthropization can be found, covers the long period from 6800 to 800 cal BC. It corresponds to the full development and diversification of deciduous oak woods (*Quercus*, *Tilia*, *Fraxinus*), where the still sporadic but growing presence of *Taxus* and *Fagus* also marks the progressive spread of more humid forest *facies* towards the end of this period. The fourth phase (PAZ IX and X, and BP3), testifying an increasing anthropic impact since *ca.* 800 cal BC, is dominated by deciduous oak-beech woods.

In spite of their globally congruent pictures, the palynological and anthracological independent records also show differences in the proportional representativeness of some woody taxa. Notably, while palynology emphasizes the role of *Ulmus*, *Tilia*, *Corylus*, and *Alnus*, the anthracological figures underline the relative role played by Rosaceae, *Quercus*, *Acer*, *Fraxinus*, and *Fagus*. Such differences likely reflect: the heterogeneous proportion in the analysis of contexts sampled on the plateau and the valley bottom, respectively; the random effects of pollen production and spread; the combustion-related taphonomic effects; the anthropic selection of woody taxa according to their fire and/or timber properties; the variable distances of the settlements from the procurement areas. In this framework, as it clearly results from the subtle analysis of the archaeological contexts where both kind of records are available - such as the sites of Paris "Bercy", Varennes "La Justice", Villiers-sur-Seine "Le Gros Buisson" - the impact of the anthropic factors on the vegetation dynamics appears proportionally relevant.

CONCLUSION

In conclusion, certainly at the archaeological site and local level, the discrepancies punctually shown by our large scale comparative analysis between the palynological and the anthracological records currently available for the Holocene of the Paris basin, point to their value as reliable source of information for the assessment of the human-related environmental exploitation patterns.

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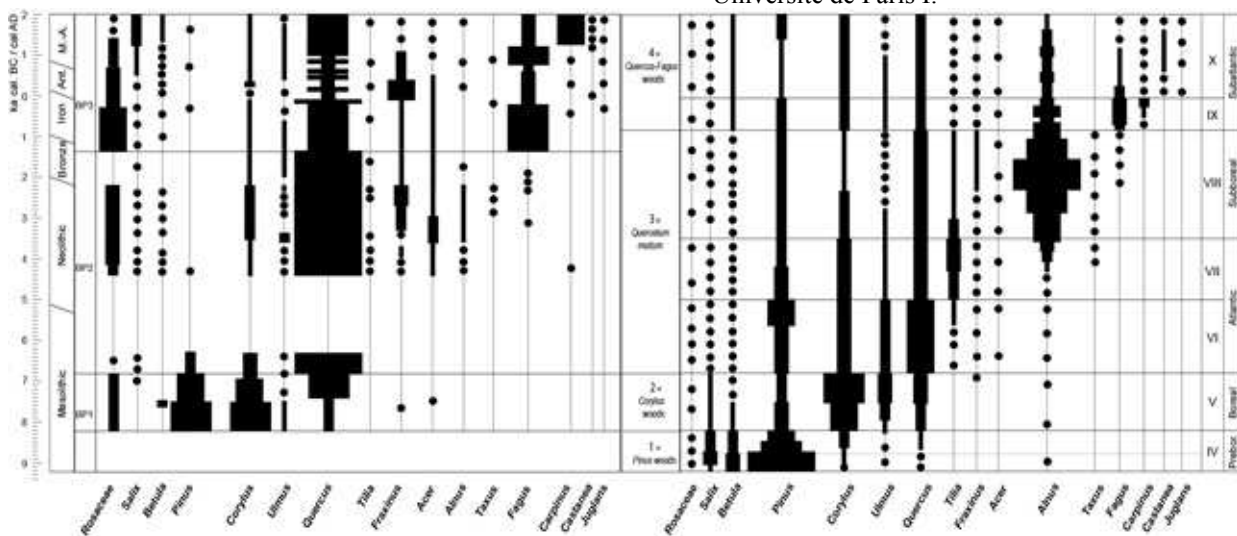


FIGURE 1. Synthetic diagram of the palynological (right) and anthracological (left) records for the Holocene of the Paris Basin.