



Contribution of two malacological successions from the Seine floodplain (France) in the reconstruction of the Holocene palaeoenvironmental history of northwest and central Europe: vegetation cover and human impact



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ABSTRACT

Malacological sequences from two archaeological sites on the floodplain of the Seine, Northern France, provide new data on the palaeoenvironmental development of this region during much of the Holocene. Both sites, situated ~100 km apart, have broadly similar sedimentary archives with comparable malacological successions. These Holocene malacological assemblages shed light on the development of the vegetation cover. From the late Neolithic, they reflect open environments, possibly resulting from increasing use of the floodplain for agropastoral activities. These developments are reminiscent of those observed from molluscan assemblages in other regions of northwest and central Europe. The landscape is cleared of trees between 4500 and 1200 cal BC. At the end of the Subboreal, it is dominated by agricultural land.

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1. Introduction

Rescue archeology has developed considerably in France over the last thirty years. In this context, the Paris Basin, which is a geological region centered on the city of Paris, has been the subject of numerous investigations due to its significant economic development in recent decades. The extensive fieldwork undertaken during this period has resulted in broad multidisciplinary studies of ancient landscapes combining geomorphology and several biological proxies (Pastre et al., 1997, 2000, 2001, 2002a, 2002b, 2003). In northern France, the study of important malacological sequences dating from the Lateglacial (Limondin-Lozouet and Antoine, 2001; Limondin-Lozouet, 2012) and from the first half of the Holocene (Limondin-Lozouet and Preece, 2004; Limondin-Lozouet et al., 2013), has led to the construction of a series of regional malacozones, which provide a temporal framework into which other

sites can be fitted. In the Paris Basin, despite the recent proliferation of malacological studies undertaken on archaeological sites dating from the second half of the Holocene, no synthesis has yet been attempted. As a result, the palaeoenvironmental developments of this period are reconstructed only using pollen analyses, which have been integrated with geomorphological data (Leroyer, 1997, 2003, 2004, 2006; Leroyer and Allenet, 2006; Leroyer et al., 2012). Pollen is generally preserved in waterlogged horizons, which are best developed in close proximity to river channels. The shells of molluscs occur in many types of calcareous sediment, both in waterlogged locations, and in places where oxidation has destroyed the pollen, as is the case on many floodplains. Floodplain sequences are complex because of their discontinuous nature, necessitating the sampling of several profiles at each site in order to reconstruct the full stratigraphical succession. However, in many places, the repeated deposits of alluvium in floodplains have favoured the formation of stratified sequences, which are conducive to a chronological approach of palaeoenvironmental changes recorded by the malacological successions. In addition, floodplains are frequently more closely associated with archaeological settlements than are most pollen sampling locations. The alluvial floodplain of the Seine, the main river that crosses Northern France, has been

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extensively investigated in recent years. We will focus on two specific areas: the first is located in the Paris region, in the mid-section of the Seine; the second is situated ~100 km downstream, at the confluence of the Seine and the Eure, in the Upper-Normandy region (Fig. 1). Do the malacological sequences follow a common ecological trajectory in both regions? Do they show similar trends with other European malacological successions?

2. Stratigraphy and chronology

The two case studies reported here are quite different: one is located in a dense urban zone, the Paris region, whereas the other is situated in a rural area, at the confluence of the Seine and one of its tributaries. The sampled profiles represent the Lateglacial and Holocene fine-grained sediments that overlie sands and gravels dating from the Upper Pleistocene. These alluvial deposits are several metres thick and yield some archaeological layers dating from the Epipalaeolithic to the Middle Ages.

2.1. Paris, Héliport/Farman

The site of Héliport/Farman is situated on the left bank of the Seine, in a place where the floodplain width is ~1 km from east to west and between 25 and 30 m asl (Fig. 2a). It covers ~1 ha in the 15th district of Paris and is actually the combination of two adjacent excavations (Fig. 2b) that have been undertaken, in 1996, at the Héliport DGAC (Watrin et al., 1996) and, in 2008, at the 62 rue Henry Farman (Souffi and Marti, 2011; Souffi et al., 2013). Despite the fact that the Héliport DGAC site is located on a small mound (profile S1), the altitudinally lower 62 rue Henry Farman site (profiles 601 and 201) displays the same sedimentary succession and similar archaeological archives (Fig. 2c).

Coarse sands and gravels from the Pleniglacial are directly overlain by archaeologically sterile marly silts (profiles S1 and 201), which become sandy in a lateral depression (profile 601). These silts, which are more than 1 m thick, are overlain by orange–brown clays containing Mesolithic industries distributed in six concentrations of lithic and bone remains. At Rue Farman, two radiocarbon dates obtained from bones collected at the base of this clayey layer have given ages of 9285 ± 40 BP and 8805 ± 40 BP, i.e. between 8633–8349 and 8197–7728 cal BC (Table 1). However, the flint arrow-head typology suggests the occurrence of several diachronic settlements at least until

~7000 cal BC. Locally, the orange–brown clayey layer containing Mesolithic artefacts is thicker and contains some ceramic remains (profile 201). Despite the absence of associated radiocarbon dates, the typology of these remains suggests their attribution to the middle Neolithic, i.e. between 4200 and 3500 cal BC. An abrupt stratigraphic boundary is then marked by the development of dark brown clayey silts attributed to the late Neolithic and early Bronze Age (from 2500 to 1500 cal BC) on archaeological evidence. In the upper part of these silts, several concentrations of charcoals and a human cremation give ages between 3735 ± 185 BP and 3020 ± 60 BP, i.e. between 2835–1660 and 1420–1059 cal BC (Table 1). These radiocarbon dates are consistent with a broad cultural attribution of this layer to the Bronze Age. In the southern part of the site (profile 201), an important lateral lithostratigraphic variation is formed by a thin sandy silt layer (Fig. 2c). This layer is overlain by clayey silts containing some fragments of pottery dating from the Hallstatt period. At the Héliport DGAC site (profile S1), despite the absence of this marker layer, similar ceramic evidence are found in the dark brown clayey silts (Fig. 2c). Three radiocarbon dates are associated with this archaeological layer (Table 1): two of them are consistent with the cultural attribution based on artefacts (Poz-5473 and UPS C 4427) but the third is anomalously old (8590 ± 40 BP; BETA-326102), indicating the substantial reworking of charcoals dating from the early Holocene. Homogeneous light brown sandy silts lastly mantle the entire site. This layer is archaeologically sterile but is incised by a channel that is still discernible in the cartographic archives until the eighteenth centuries (Watrin and Gaillard, 1995).

2.2. Alizay, Le Port au Chanvre

In recent years, several archaeological sites have been found on the banks of the Seine River in Upper Normandy. Most of these sites are associated with the aggregate industry, the development of which has provided the opportunity to explore floodplain sites in a rural setting, on larger plots than in urban area. Several archaeological sites have recently been found in Alizay (Marcigny et al., 2013). Approximately 15 ha have already been investigated and the exploration of further 15 ha is planned before the end of this decade. The results presented here are thus a part of an on-going work. The site is located on the right bank of the Seine, at an elevation between 5 and 10 m asl, on a flat-land exceeding 1 km width from north to south (Fig. 3a). Three malacological profiles have been analysed in this area: two come from a sandy mounds and the third from a bank of a palaeochannel (Fig. 3b). The stratigraphic succession observed at Alizay is largely uniform, although some lateral variations of sedimentary facies are apparent, as well as some hiatuses (Fig. 3c).

The Weichselian gravels are overlain by grey clayey sands, which are in turn covered by thick light grey silts. The first archaeological layer, involving Epipalaeolithic artefacts dating from the turn between the Younger Dryas and the Preboreal (BETA-317897, BETA-333638, BETA-333640, BETA-322721; Table 2), occurs at the transition between these silts and a silty clay. The Epipalaeolithic settlement consists of more than 4500 flints and bones distributed over a circular area of approximately 70 m² (Marcigny et al., 2013). The overlying silty clay locally contains artefacts dating from the middle Mesolithic (BETA-317893, BETA-322719; Table 2). Above this layer, brown clayey silts, getting more clay-rich (and consequently heavier) in the close proximity of palaeochannels (profile C2-25), contain artefacts dating from the middle Neolithic to the early Bronze Age (between 5440 ± 20 and 3755 ± 30 BP; Table 2). The middle Neolithic remains are organized into several knapping spots and hearths set up along channels. The remains dating from the late

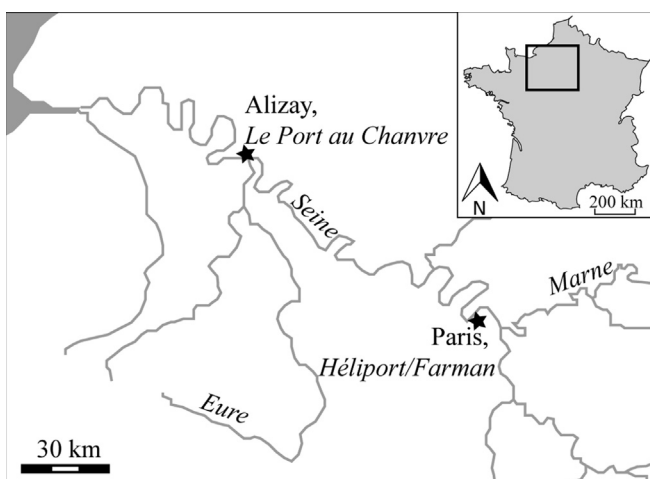


Fig. 1. Location of Paris Héliport/Farman and Alizay Le Port au Chanvre.

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