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# Deep pits, large game exploitation and isotopes: converging evidences of very early sedentarism during the Mesolithic

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## Abstract

The site "Le Parc du Château" is located in the central part of the Paris Basin, close to Auneau, about 20 km east of Chartres (Eure-et-Loir - France). Excavations covered an area of 200 m<sup>2</sup>, leading to the discovery of a high density of features with 70 pits dug into the Fontainebleau sands. The typological analysis of microlithic flint arrow-heads and the radiocarbon dates suggest that the site has been occupied at several times between 9500 to 5500 cal BC but a large majority of features is attributed to the Middle Mesolithic (8200-7000 cal BC).

## Features

Among the 70 dug structures excavated on the site, the primary function of about twenty of them is attested by the remains or arrangements still present: 3 burials, several intentional deposits (aurochs skulls, deer antlers), post holes and some fireplaces. Nearly half of the other pits were used as dumps and contain more or less abundant material, corresponding to domestic waste (flint and sandstone artefacts, animal bones, burnt fragments of limestone and sandstone) but their primary function remains to be determined.

A large part of these structures shows a homogeneous filling, but about ten of them display a stratified filling with several distinct layers. After they have been dug and then used, these pits were abandoned and a first phase, maybe relatively short, of anthropogenic dumps took place corresponding to the material located at the base of the filling. One or more phases of erosion and pit walls collapse followed, sometimes during relatively short and brutal episodes, marked by the deposition of layers of almost pure sand. A new phase of anthropogenic garbage, often more significant than the first, is contemporary with the erosion

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of the upper part and edge of the structures. These kind of filling and the dimensions and profiles of these structures make it possible to compare them with the small or medium-sized storage pits like silos well-known in many Neolithic or protohistoric sites.

### **Faunal remains**

Most of the 70 Mesolithic pits yielded very well-preserved faunal remains, forming an assemblage of at least 2500 fragments. Aurochs (*Bos primigenius*) and roe deer (*Capreolus capreolus*) are largely predominant followed by red deer (*Cervus elaphus*) and wild boar (*Sus scrofa scrofa*). Carnivores are less represented with fox, canids, pine marten and wild cat. A few bird bones have also been identified, probably from the anatidae. No fish bone was identified though the site is located on a low mound near a small river.

Seasonality data are particularly interesting in one of the deepest pit with a stratified filling. A young calf was killed in late winter-early spring and a subadult aurochs in early winter. A young 15-month-old red deer was killed during summer, while a young wild boar must have been killed in winter. Such evidence points to different hunting events throughout the yearly cycle. Considering the stratigraphic data, the presence of wild boar and red deer bones at the bottom of the pit suggests first use during autumn-winter, while the main concentration, in the middle of the pit, could reflect discard events from spring to summer. These data could be an argument in favour of a relative long-term use of the garbage pit, maybe throughout the year.

### **Isotopic analysis**

The faunal remains dating from the Boreal period provide values of  $^{13}\text{C}$  in accordance with an open type environment. The remains of large canids gave results close to each other and compatible with the consumption of the remains of large herbivores at the site. The human subject in Grave 6 is distinguished by a  $^{15}\text{N}$  content higher than that of the large canids which is consistent with the consumption of local herbivorous species but in different proportions. In any case, the consumption of aquatic resources does not appear to be significant for this individual.

For the Boreal-Atlantic transition the species show relatively distinct isotopic signatures with deer showing some of the lowest values of  $^{13}\text{C}$  and  $^{15}\text{N}$  and wild boar showing relatively high values of  $^{13}\text{C}$  and  $^{15}\text{N}$ . Roe deer and some aurochs provide  $^{13}\text{C}$  values at or below -22 reflecting dense forest habitat. With slightly higher  $^{13}\text{C}$  values, deer reflect a more open, probably more edge-scoured environment. Wild boar is less likely to reflect a dense canopy effect because it feeds either on fruit from the upper canopy, unaffected by the lower light levels of the undergrowth, or on tubers. The human individual in Grave 7 has a  $^{15}\text{N}$  content consistent with the consumption of large herbivores at the site, and a  $^{13}\text{C}$  content reflecting the consumption of either a mixture of forest species such as roe deer and wild boar, or edge-living species such as deer and some aurochs.

The analysis of  $^{34}\text{S}$  shows similarities between animals and human bones and indicates that its abundance is maintained at the human trophic level. As the isotopic signature of  $^{34}\text{S}$  in plants is linked with the sulphate in the soil and is specific to a given territory, it means that human being have lived sustainably in the same environment as the game they have hunted.

### **Discussion and comparisons**

In this paper we will discuss these data about pits, huge mammals exploitation and isotopic analysis from Auneau and other Mesolithic sites in Europe where such pits were discovered. Then we will examine the hypothesis of nut storage and sedentary lifestyle in hunter-gather societies.

$^{13}\text{C}$  and  $^{15}\text{N}$  analysis show that open landscape game were especially exploited at Auneau during the first Mesolithic. These data are consistent with the palynological analysis carried out in the valley that classically show a strong development of hazelnut during the Boreal. From the end of the Boreal to the ancient Atlantic the environment surrounding is still relatively open although dense forest expand.

The consumption of hazelnuts may have represented a significant part of the human diet. The volume of the deepest structures discovered at Auneau can be estimated at about 1.5

m<sup>3</sup>. If they were used as storage pits they could have contained 800 to 900 kg of hazelnuts each, which corresponds to only a few days of gathering for a human group of about 20 people. But in terms of consumption, the quantity of hazelnuts contained in a single one of these pits could feed the group for a month and a half. Cumulated with other nutritive contributions (one-off hunt, other plants resources...), this allows this population to get through the food-scarce season without any problem. Data from isotopic analysis, especially <sup>34</sup>S, and observations relating to seasonality support the hypothesis of a reduction in the mobility of certain human groups during the Mesolithic.

Hazelnuts were thus able to play a major role in ensuring food security until the following spring and enabling groups of hunter-gatherers to choose locations for permanent settlements, particularly near the hazel-wood. Hazelnuts could provide an abundant seasonal resource, naturally renewing itself each year, without any human intervention, that could be mass harvested and easily stored. The conditions defined by A. Testart for large-scale food storage were in place and linked to the very first sedentarisation of hunter-gatherer groups.

**Keywords:** storage pits, seasonality, isotopic analysis, hazelnuts, sedentary lifestyle