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LATE MESOLITHIC AND EARLY NEOLITHIC COASTAL ENVIRONMENTS IN SOUTH-EASTERN FRANCE:

the Contribution of Pollen Data
from the Loup and Cagne Plains (Alpes-Maritimes)

Sébastien GUILLON

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LATE MESOLITHIC AND EARLY NEOLITHIC COASTAL ENVIRONMENTS IN SOUTH-EASTERN FRANCE:

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Sébastien GUILLON

Abstract

*During the first half of the Holocene, climatic conditions, anthropogenic conditions and sea levels underwent numerous and significant modifications. To qualify the response of the coastal alluvial vegetation to these changing conditions between the end of the 8th and the 5th millennia, a high-resolution pollen analysis of two sedimentary alluvial sequences (Le Loup and La Cagne basins) was realized. The results, obtained through a multidisciplinary approach, show the precise evolution of the coastal and alluvial ecosystems. The rise in sea level and climatic forcing played a fundamental role in this evolution. While anthropogenic forcing during the Mesolithic was not significant, the Neolithization of the region also contributed to shaping the coastal landscapes. From the first decades of the 6th millennium onwards, the recurrence of the *Cerealia* pollen type shows the importance of coastal alluvial plains in the production economy of the first Neolithic groups.*

Keywords

Palynology, Mediterranean coast, Mesolithic, Neolithic, sea level rise, climatic variations.

Introduction

The region of the Liguro-Provençal arc is of great interest for understanding the societies of the end of the Mesolithic and the Neolithic, in terms of both the diffusion of techno-cultural complexes in the north-west quarter of the Mediterranean (Binder *et al.*, 2008; Binder *et al.*, 2012; Binder, 2013), and the management and occupation of natural environments (Thiébaud, 2001). In this context, the palynological recording of the evolution of the vegetal environment of the Le Loup and La Cagne coastal plains (Alpes-Maritimes) (figure 1) during the Mesolithic / Neolithic transition is highly useful.

To achieve this aim, a multidisciplinary approach was applied to two coastal sedimentary sequences collected from the Le Loup and La Cagne plains. Based on several radiocarbon dates and the realization of an age depth model (Guillon, 2014) it was possible to record the evolution of the coastal vegetation during the 7th and 6th millennia cal BCE. The variations occurring in this biogeographic evolution can be divided into three categories: eustatic variations, paleo-hydrological and climatic variations, and anthropogenic variations.

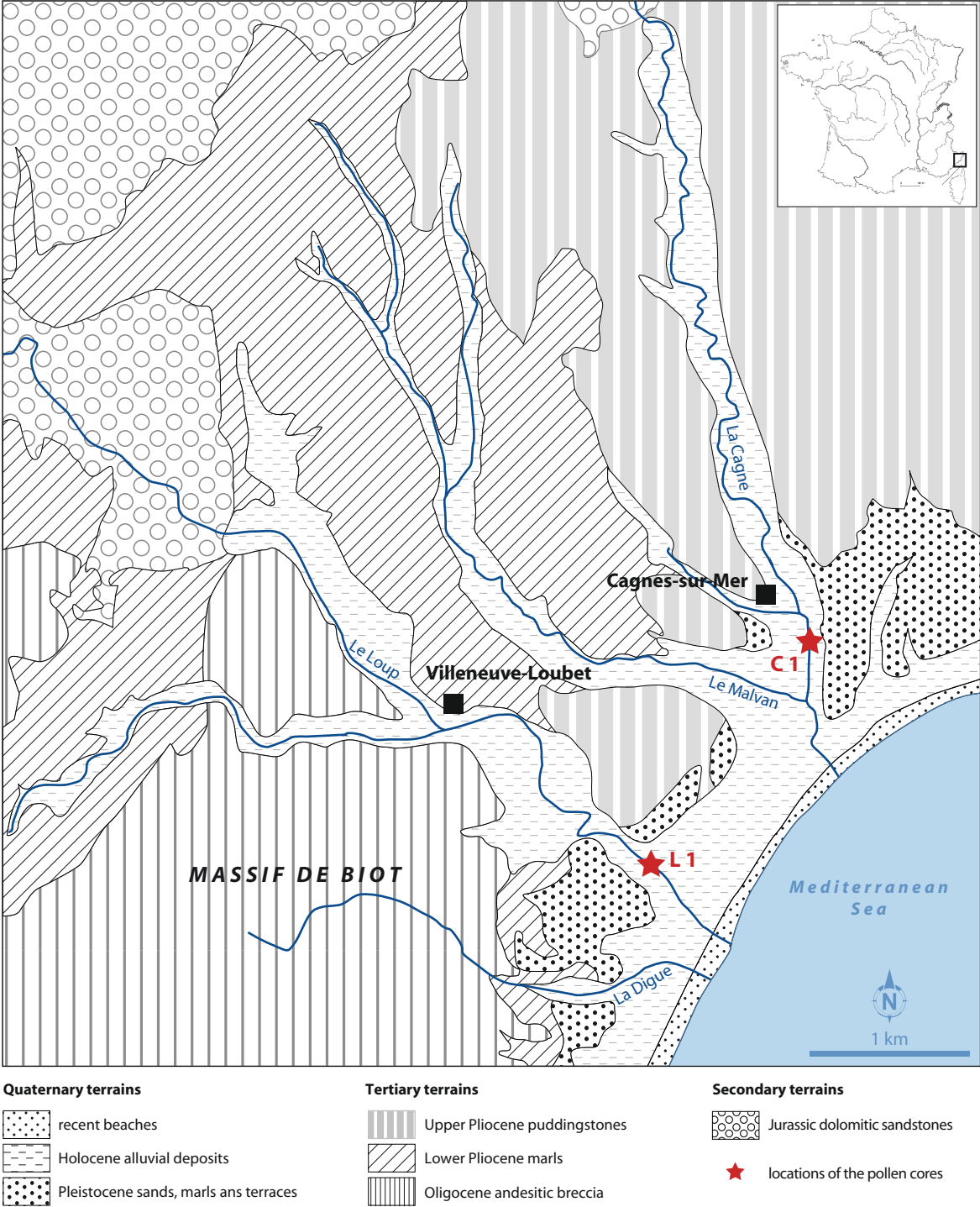


Figure 1 - Locations of the pollen cores.

1 - Geomorphological forcing

The geomorphological forcing of the coastal plains is mainly dictated by the balance between the eustatic mechanisms and the fluvial detrital energy (Dubar, 2003). From this balance emerge the transgressive and prograding processes that define the coastline and result in its mobility. The analyses of the pollen cores of Le Loup and La Cagne showed that numerous variations recorded by the pollen spectra are defined by the eustatic forcing. This is the case for the appearance of alder in the pollen cores of both sites (figure 2), as well as on the plains of La Brague (Alpes-Maritimes) (Nicol-Pichard, Dubar, 1998) and Rapallo on the Ligurian coast (Bellini *et al.*, 2009), for example. This appearance reflects the installation of a lagoon and the development of an alder swamp following a rapid rise in sea level. These lagoon environments appear in the diagrams of Le Loup and La Cagne between 6 400 and 6 200 cal BCE.

2 - Climatic and paleohydrological forcing

The influence of the paleohydrological process and, on a larger scale, that of the climatic variations between the 7th and 5th millennia BCE also had an impact on the composition of the pollen spectra of Le Loup and La Cagne. Using high-resolution analysis, it was possible to observe within the evolution of pollen recordings, different stages in the vegetal succession, linked to flood regimes. When floods increased in frequency, the riverine vegetation underwent several regression or renewal phases that are characterized by the development of a herbaceous pioneer stratum, identified in the diagram (figure 2) by the increasing values of miniature cattail (*Typha minima*), included in the curve of helophyte plants and Cyperaceae (Rameau *et al.*, 2001). When the flood regime diminished in intensity, or when the active canal course moved away from the location of the test-pit during the process of deflection, the association of *Thyphetum minima* was replaced by post-pioneer and mature aborescent taxa, including alder (*Alnus*), willow (*Salix*) and ash (*Fraxinus*), whose sum is represented in the diagram by the riverine forest curve (*ripisylve*) (figure 2). This succession was observed several times in the Le Loup and La Cagne sequences and should be used as a direct marker of the paleohydrological dynamic. The drought and atmospheric humidity conditions also played a structural role in the coastal alluvial vegetation. Here the increasing values of Fir (*Abies*) indicate an increase in humid conditions during the 6th millennium BCE, compared to the 7th and 5th millennia BCE. This humidity is not linked to the annual flood regime, but enables us to record the seasonal variations of atmospheric humidity, as well as the summer drought conditions (Guillon, 2014). When we compare the increasing values of fir in the Le Loup and La Cagne valleys with the pollen data of La Brague at Biot (Nicol-Pichard, Dubar, 1998) and those of Accesa on the Tuscan coast (Finsinger *et al.*, 2010), it is possible to show that during the 6th millennium there was a regional climatic trend characterized by warmer and more humid summers. By decomposing the pollen spectra, it is thus possible to distinguish the different determinant ecological factors: eustatic, geomorphological, paleohydrological and climatic. The last one, human activity, is probably the most difficult to identify.

3 - Anthropogenic forcing

While during the Late Mesolithic, there is no evidence for anthropogenic forcing of the vegetal environment, from the very beginning of the Early Neolithic, practices linked to grain cultivation resulted in several successive phases of Mediterranean oak-elm forest regression (figure 2).

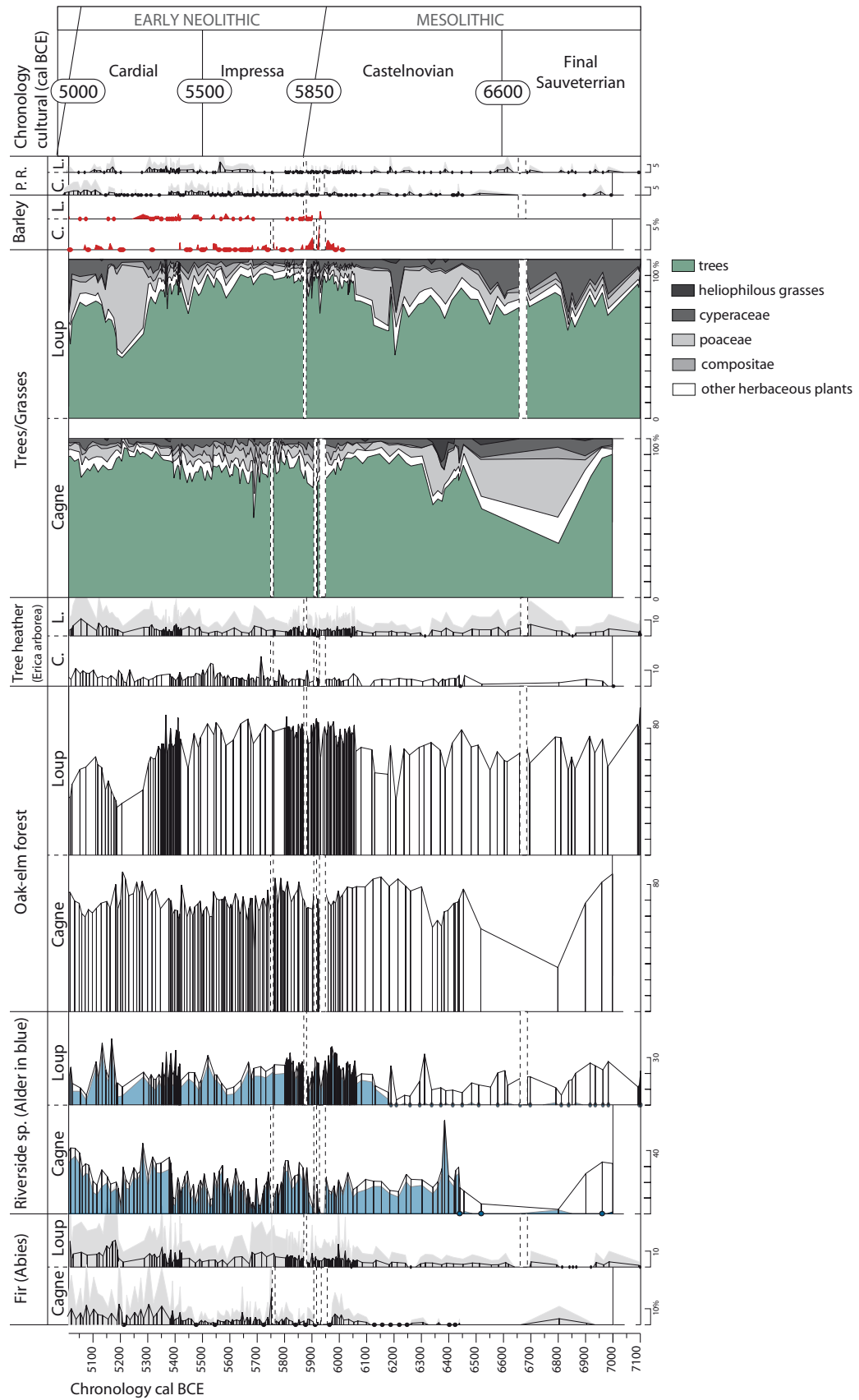


Figure 2 - Synthetic pollen diagrams of the Loup and Cagne cores (Alpes-Maritimes).
C.: La Cagne; L.: Le Loup; P.R.: ruderal plants.

When the first Early Neolithic groups (Impresso-Cardial) settled on the Azur coastline, the appearance of *Cereal* types (*Hordeum*) in the diagram is accompanied in both river basins by an expansion of ruderal plants (especially at La Cagne), and a regression of the deciduous forest cover (figure 2). This continues for around a century at La Cagne, between 6 000 and 5 900 cal BCE. It also occurred at Le Loup, but more variably, and concentrated in two episodes. The first was at around 5 925 cal BCE, and the second at around 5 875 cal BCE. This parallel evolution of paleo-ecological evidence tends to show that the Impresso-Cardial settlements of the Alpes-Maritimes were associated with a management of the alluvial zones. This rapidly extended to the mature oak-elm forest, which for the first time shows signs of human impact in the middle-term. This double observation made at Le Loup and La Cagne also shows that as soon as the first agro-pastoral groups settled there, the coastal/alluvial zones were occupied and exploited, and thus considered as favorable locations for a Neolithic economy.

Conclusion

This comparison of pollen data with the archaeological record of the river basins has proven to be very useful. Even if the archaeological record in this area is very poor, in terms of both chronology and the surveyed and /or excavated sectors, the confrontation of these data appears to be very relevant.

The absence of anthropogenic forcing during the final phase of the Sauveterrian and the Castelnovian on the alluvial vegetation of Le Loup and La Cagne could be explained by two main observations. The first concerns the absence of Mesolithic sites in the river basins, even if some indications of a Castelnovian occupation were recently observed on the Biot massif (oral communication D. Binder). The second concerns the predation economy of Mesolithic societies, which in contrast to the production economy of Neolithic groups, in theory has only a minor impact on the vegetation in which they evolved.

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