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Between Atlantic and Mediterranean: Changes in technology during the Late Glacial in Western Europe and the climate hypothesis

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ABSTRACT

During the second half of the Upper Paleolithic, Europe seems to have been divided in two vast techno-cultural entities with their particular chronological sequence: the Western Europe “classical sequence” and the Epigravettian sequence in the South. Essentially because of an imbalance of data and differences in methodologies between these two regions, their Upper Paleolithic sequences have rarely been compared. Thanks to the development of lithic technology in Europe and a recent active research about the Late-Glacial, it is today possible to attempt such a challenging exercise of comparing these two long sequences. In this paper, we solely focus on the Late Glacial. If the rare existing attempts of comparison focused on typology of lithic assemblages, our paper aims for a more global approach of lithic industries, based on recent technological studies. This approach allows highlighting key elements in term of human behaviors. Our data suggest a similar process of change between Western Europe and the Epigravettian during GI-1 (Bølling–Allerød). All the criteria of the so called “azilianization process” are actually present in the Epigravettian evolution sequence. This similar trend within both evolution sequences stopped abruptly, during the GS-1 (Younger Dryas). During this period and the very beginning of the Holocene (Preboreal), a massive return of blades and bladelets with high qualitative standards occurred in Western Europe while the simplification process is still in course in the Epigravettian region. In this paper, we attempt to compare the various responses of vegetation to the major climatic instability of the Late Glacial across Europe using a critical survey of the available environmental data. Considering the boundary that could have represented the Alps between Epigravettian and the Western Europe sequence, two high-resolution environmental sequences from north and south of the Alps are especially examined. Are the differences in terms of environmental changes between these two areas significant? Did they play a role in human behaviors and motivate technological changes? The comparison of palaeoenvironmental data with archaeological results tends to comfort some hypothesis of environmental determinism proposed by scholars, but also provide new elements moderating regional models that cannot really be applied at a continental scale. Climatic correlations with socioeconomic changes highlighted in this paper are no more than one possible way of investigation that will need to be tested and discussed in further research.

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1. Introduction

Prehistoric Europe between ca. 25,000 cal. BP and 11,000 cal. BP is classically divided by scholars into two large geographical and cultural entities after 25,000 cal. BP (end of the Gravettian): 1) North-Western Europe, the area of the Solutrean, Badegoulian,

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Magdalenian, Azilian and post-Azilian techno-complexes, and 2) Southeastern Europe, characterized by the development of the Epigravettian techno-complex. This partition of the continent was very early established by the first prehistorians (Breuil, 1913) even if these studies were initially built only on the basis of typological comparison of industries. This early distinction between two sequences of lithic industries contributed to a continual separation of these regions and the development of distinctive methodological approaches to study lithic industries. This methodological gap is particularly obvious between France and Italy. France was largely influenced in the 1960's by F. Bordes and D. de Sonneville-Bordes (Sonneville-Bordes, 1959, 1968, 1966), while G. Laplace's approach structured prehistoric research in Italy and Spain (Laplace, 1964).

This methodological gap has made it difficult to explain the differences in cultural sequences development between these two regions of Europe. One of the few attempts was proposed by G. Laplace (Laplace and Guilien, 1978; Laplace, 1997), who juxtaposed continuity in the Gravettian to Mesolithic in southeastern Europe against discontinuities in northwestern Europe linked to a greater impact of climatic changes there. For G. Laplace, the northern Mediterranean Basin was more or less preserved from the most radical consequences of climatic events, especially the LGM. Northwestern Europe would have been more impacted by climate changes and especially by cold periods. Cooling might have caused abandonment of these regions whereas warming allowed colonization of these territories by populations with new technical traditions coming from the Mediterranean Basin. Northwestern Europe cultural entities would be then the result of a progressive differentiation of groups coming from the Epigravettian region.

Since the time G. Laplace offered his theory, much more environmental and archaeological data have been collected in France and Italy, and appears to contradict Laplace's hypothesis (see Tomasso, 2014b). Using lithic technological studies as a powerful method to distinguish variability and variation, it is possible to propose a new hypothesis of these two technological sequences (Bracco and Montoya, 2005; Langlais et al., 2014c). This paper finds itself in this movement and aims to propose a wide comparison of the Late Glacial time period between northwestern and southern Europe.

Here, we focus on the cultural changes as reflected from the lithic sequences during the Late Glacial. This period is marked in both areas by major changes in technology, economy and social organization. We compare lithic sequences from both northwestern Europe and the Mediterranean area to seek convergences or divergences in techno-economic behaviors. The aim of this comparison is to investigate differences and similarities and to question the potential influence of environmental changes on the regions's technological changes over time. To that end, we compare the vegetation history of the Late Glacial based on pollen records from both regions. Because of their high-resolution pollen records, we particularly rely on two lacustrine records north and south of the Alps: Lake Lautrey in the Jura Mountains (Magny et al., 2006) and Lake Piccolo di Avigliana in northwestern Italy (Finsinger et al., 2006). These key sequences have been selected because of reliable palaeoclimatic reconstructions based on chironomid assemblages and accurate chronological control based on large sets of radiocarbon dates and tephra layers. Nonetheless, the investigation of Late-Glacial climatic changes and of vegetation histories is not limited to these two records because of the diversified influence of past climatic changes in different regions within Europe. We finally examine how the contrasted responses of the environments to the Late-Glacial climatic oscillations could have played a role in

the emergence of differences in human behaviors between Western and South-Eastern Europe.

2. Material and method

This paper is mainly constructed around data gathered during the technological study of various lithic assemblages. These studies have been developed following the French methodology of *Technologie lithique*. This method addresses lithic tools as the result of a production process rather than as just a cultural object (see among others Tixier, 1980; Bodu et al., 1991; Inizan et al., 1992; Pelegrin, 1995). This approach considers every single artifact of a lithic assemblage (i.e. not only retouched tools but every flake or chip), looking for information about the objective of production (what were the different products desired by the knappers to use as tool or to retouch in tools?) and the methods (what were the methods they developed to produce these particular lithic blanks?). This approach considers all the information from raw materials procurement strategies to discard of the tools, including production methods, tool curation and tool function. This method constitutes a particularly efficient tool to build chrono-cultural organization models (since each technical culture develops particular technologies and strategies) and to investigate in hunter-gatherers socio-economic organization. This approach allows studying spatial and temporal organization of the production. Each step of the production process can be identified. The presence or absence of one of these in different sites indicates how the production is organized across time and space. Because this method is not yet used all over Europe, we decided to focus on a geographical area including France and Italy. Other regions are mobilized for comparisons.

Due to a high number of stratified sites, southwest France is historically the "hot spot" for the study of the Upper Paleolithic of Western Europe. Other regions, however, still play a critical role, including the Paris Basin and northern France (Valentin, 1995, 2008; Bodu and Valentin, 1997; Fagnart, 1997), and western France (Marchand et al., 2004; Naudinot, 2010, 2013a). Recent studies in northwestern Europe had critical consequences for our understanding of the Late Glacial and especially our vision of transition/rupture processes (Valentin, 2008; Langlais, 2010; Mevel, 2010; Naudinot, 2010; Béreiziat, 2011; Weber, 2012).

Similarly, the Epigravettian sequence is progressively reconsidered in the light of recent studies (Montoya, 2004, 2008b; Tomasso, 2014b; Tomasso et al., 2014). Northern Italy and southeast France are the most documented regions due to the development of modern approaches to lithic analysis in these regions. This zone furnishes most of the data used in this paper.

For the Late-Glacial period, relevant climatic records are preserved in ice, lakes, speleothems and marine sediments (Grafenstein Von et al., 1999; Elliot et al., 2002; Rasmussen et al., 2006, 2014; Svensson et al., 2006). The vegetation history is well recorded in both lake and marine sediments (Lotter et al., 1992; Sánchez Goñi et al., 2000). In this paper, we decided to only focus on continental records (lakes, palaeolakes and peat-bogs). Because, they are located at various altitudes, as well in various European areas, they can better deliver the past distribution of vegetation. Moreover, lakes and palaeolakes are located in the Paleolithic territories and might yield local or regional pictures of the past vegetation.

The Late Glacial is a period of major and rapid climatic changes. In northwestern Europe, as well as in southeastern Europe, the major climatic changes (Fig. 1) correspond to a rapid warming at the onset of the GI-1 (Bølling–Allerød (B–A)), a cooling during GS-1 (Younger Dryas (YD)), followed by a rapid warming at the

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