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Handaxes and leafpoints of eastern France: Spatial patterns and role of the raw materials

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ABSTRACT

In the Haute-Saône department, studies of surface collections and the few rare preserved stratified open air-sites demonstrate the presence of handaxes whose typology indicates Lower and Middle Palaeolithic. Here, raw materials are mostly high quality and characterized by its diversity and availability across the landscape. In this one small region 125 km by 75 km, one can find many geological formations containing metamorphic, igneous, and sedimentary formations rich in both siliceous (Triassic, Jurassic, Cretaceous, Oligocene) and non-siliceous (Carboniferous, Permian, terraces contexts, fluvio-glacial contexts) rocks. In this context, hominids occupied the region and established complex relationships with the diverse raw materials.

Five major sedimentary complexes provide at least 17 different types of raw materials such as flint, chert, quartz, quartzite, radiolarite and sandstone that have been knapped since the beginning of the Palaeolithic. Among these, 11 were chosen and appropriated for handaxe shaping, while only three were selected for leafpoint shaping. Although prehistoric knappers were adapted to the morphometric constraints of their raw materials; among leafpoints, a clear selection was made towards tabular, ovular, and plano-convex flint nodules and flake blanks.

1. Introduction

1.1. General aspects of the landscape

The Franche-Comté is located in the northern part of eastern France. The region is a contact zone between the Parisian sedimentary basin and other neighboring regions such as the Vosges and the Massif-Central that contain abundant metamorphic and sedimentary rocks. The Franche-Comté comprises four departments: Belfort, the Jura, the Doubs and the Haute-Saône, where our research on open air-sites has taken place for the last eight years (Fig. 1). In the Haute-Saône department, plateaux around 200–500 m are numerous. They are mainly located in the boreal part of the Bressan depression that connects the Burgundian corridor with southern Germany (Cholley, 1939). Most of the rivers in this area (Salon, Vannon, Romaine, Morte, Lanterne, Gourgeon) are fed by numerous small tributaries (close to one thousand in total for the department).

The biggest river is the Saône, that originates in the Vosges Mountains and flows south to join the Rhône in Lyon. The second largest river is the Ognon, which delimits the southern border of the Doubs department. During the Quaternary, the Saône River carved out stepped terraces that can be linked to the glacial/interglacial cycles (Théobald, 1972; Campy and Contini, 1973; Campy, 1983). The entire Haute-Saône has also been affected by tectonics due to surrounding older and younger mountains such as the Jura. Tectonics also dictate the direction of the river's flow (Journaux, 1956).

The northern part of the department is topographically the highest (around 1100 m). It decreases southward to the Oligocene sedimentary formations around the city of Gray, where the topography is less dynamic (around 230 m). Between those two mains sub-regions, the Saône River has many meanders. Some of these are large, while some are decoupled and others are abandoned. They all exhibit dissymmetric hillslopes with steep or gently inclined valley sides depending on the level of erosion or the quantity of fluvial deposits.

Unfortunately, for the archaeological context of our sites, the region is in the periglacial area of the Vosges and Jura Mountains

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and as a result, Quaternary deposits are rare and there are numerous sites with unclear stratigraphy (Théobald, 1973; Campy, 1983). There are no known loess deposits and the open-air sites are usually palimpsests of interglacial soils and hot interstadial soils. Glaciation and erosion have largely destroyed most of the local stratigraphies (Hallégouët et al., 2008). Only two open-air sites were stratified, and allowed comparisons with neighbouring regions: Pont-de-Planches (Lamotte et al., 2012), Villers-Chemin (Lamotte, 2009 and article in preparation). The other archaeological data come from many surface collections from the Lower Palaeolithic to Mesolithic and other younger periods.

1.2. Geology and the connection with raw material procurement areas

In this region, Palaeolithic populations benefited from numerous raw material sources. Those sources come from three main types of formations that reflect the geomorphology and landscape of the Haute-Saône. Generally speaking, there are 17 types of raw material that were frequently knapped during the Palaeolithic in the region (Lamotte, 2012; Table 1) where 10 are different types of flint (Contini, 1991a, 1991b) (Table 2).

"Non-flint" sources like quartz, quartzite and sandstone come from the Palaeozoïc formations in the northern part of the region. In the middle part of the region, there are different Jurassic formations that are rich in flint varieties (i.e., Bathonian, Bajocian, Callovian, Sequanian, Kimmeridgian) and chert. Flint and chert are often considered the same by many archaeologists, but we make a distinction between them. A chert is a calcareous piece without cortex (equitable diffusion of silica), porous, yellow-brown and reactive (George, 1993) (Fig. 7, n°3).

1.3. General aspects of biface and leafpoint cultures

In the Franche-Comté, 90% of Palaeolithic sites are found in the Haute-Saône (Thévenin and Huguenin, 1966). A preliminary study shows that rockshelters represent less than 10% of the known settlements (Campy, 1982) while the rest are open-air sites (Séara et al., 1990; Dubois, 1993). Open-air sites are often located near a river, but also found in areas devoid of water where there are abundant or high-quality raw materials.

Handaxe industries are located throughout the region (Huguenin, 1987; Dubois, 1992) where the number of handaxes found at individual sites ranges from less than 10 to more than 300 (Lamotte and Huguenin, 2008; Lamotte et al., 2012) for a total of more than 500 handaxes at 91 open-air sites (Lamotte, 2011, 2012). Leafpoint culture sites are fewer, accounting for less than 10 sites for the entire region all of which are in or close to the Mont-lès-Etrelles basin (Lamotte et al., 2006; Lamotte and Huguenin, 2009).

The Lower Palaeolithic is poorly represented. The end of the Middle Palaeolithic is more detailed with handaxes industries such as the MTA (*Moustérien de Tradition Acheuléenne*) (Bordes, 1950, 1953; Sorressi, 2002), the Mousterian with Bifacial Tools (MBT: Ruebens, 2006, 2014) or the *Keilmessergruppe* (KMG; Bosinski, 2004, 2006). Some other industries in the region are without bifaces, and are described by their debitage methods and their

Table 1
Inventory and availability of the main raw material and handaxes and leafpoints selection for shaping: the case of Haute-Saône sites.

	Type of raw material	Handaxe selection Nb-%	Leafpoints selection Nb-%	Landscape location
Quaternary Period	Quartz	x	–	Alluvial terraces
	Quartzite	x	–	
Tertiary Period	*Oligocene*			Alluvial plain, hillside
	Sannoisian flint	311–68%	8–61.6%	
Mesozoic Era	*Cretaceous*			
	Coniacian flint	–	1–7.7	
	Jurassic			Alluvial plain, hillside, slope
	Kimmeridgian flint	4–0.8	–	
	Argovian flint	–	–	
	Sequanian flint	–	4–30.7	
	Callovian flint	6–1.3	–	
	Bajocian flint	27–5.9	–	
	Cherts	64–13.9	–	Plateaux, slope
	Radiolarite	1–0.2	–	
	Jasper	1–0.2	–	
	Triassic			
	"Bigarré" sandstone	–	–	
	Quartz	1–0.2	–	
	Buntsandstein: Vosges sandstone	–	–	Slope Stream alluvial deposits
	Quartz milky or white	–	–	
	Quartzite	32–6.9	–	
	Chalcedony	1–0.2	–	
	Carnelian	1–0.2	–	
	Undeterminate	9–1.9	–	
Palaeozoic Era	Granite	–	–	Hillside, plain, slope
Total of artefacts		458	13	
Total of raw material	17 main types	11/17 64.7%	3/17 17.6%	

Table 2
Raw material availability and the relationships to those selected for handaxes shaping.

	Handaxes	Main raw material available in the landscape	Raw material selected for handaxes
Zone 1	0	4	0
Zone 2	16	7	4/7
Zone 3	442	12	8/12
Total Haute-Saône	458	17	11/17

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