

# Middle Pleistocene Microlithic Tool production at Bolomor Cave (MIS 9-5, Valencia, Spain)

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## INTRODUCTION

Excavations developed in recent times shows that the lithic microlithism existing in some Middle European Palaeolithic sites is a wide field of study. Some authors propose the presence of ramification or *débitage* ramification processes where the lithic elements produced turn into production elements, and finally are sometimes transformed in a microlithic retouched tools [1]. This ramification process of production sequences would include any type of support and could be linked to the products from the recycling and reuse processes and the associated economic aspects of raw materials and production [2]. Parallel to this production, it could occur an exclusive and predetermined *débitage* process for obtaining microlithic tools, a *micro-débitage* process. Another important issue is to analyze the adaptations to the availability of lithic resources and the typometry of the supports.

## ARCHAEOLOGICAL SETTING

Bolomor Cave is located on the eastern Mediterranean coast of Spain, 100 m above sea level, on the southern foothills of the Vallidigna valley and Mondúver Mountain (Valencia, Spain). The stratigraphic sequence has 14 m height and has been dated by AAR and TL series between MIS 5e and MIS 9 (350-100 kya); other methods extend up the chronology of lower levels to 400-500 kya. The sedimentological studies allow dividing lithostratigraphy into eighteen units and four paleoclimatic phases. Human presence is recorded as intermittent occupation along the stratigraphic sequence. The recovered archaeological material is composed of a wide faunal and lithic record, as well as human fossils and some of the earliest evidences of controlled use of fire [3][4][5].

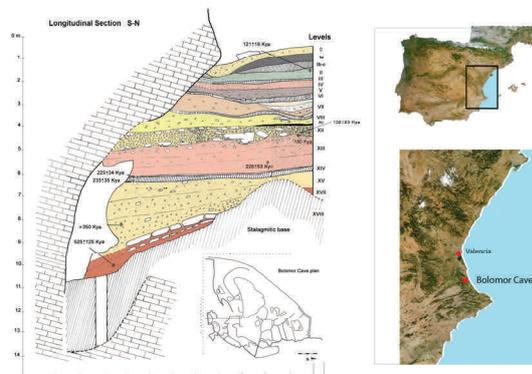


Figure 1. Bolomor Cave location and stratigraphic sequence.

## METHODS

The presence of small tools in Bolomor Cave lithic assemblage allows us, regarding its abundance and chronology, to address this behavioral process, its origins and its diachronic perspective, along the Middle Pleistocene. The study of this behavioural aspect is complex, and multiple variables are involved as the supply and lithological characteristics of the raw materials, technological processes of recycling, reshaping, ramification, *micro-débitage*, etc; it can be analyzed as well how predetermined, opportunistic or circumstantial management processes. At the same time, its presence can be shown frequently in contrast to a macro tools production, with its own characteristics. All these aspects are relevant to address the future debate on the definition and function within the techno-complexes of the Middle Pleistocene.

In this study, we analyze the microlithic presence in Bolomor Cave stratigraphic sequence (MIS 9-5e), over a 14.369 lithic remains (flint, limestone, quartzite) on the 37.148 total lithics recovered. The typometric consideration is fundamental, and is defined, with respect to two determining variables: the majority statistical production and the raw material. The maximum value of 20 mm has been considered, both in length and width, the limit under which to place the lithic population of analysis. We must also point out that the assemblage here analyzed can be considered as considered microlithic industry in general terms (retouched tools = 2.100, mean 27x24x9.5 mm). Technological, typological and stylistic aspects are addressed to better try to define the differences and techno-functional convergences of this Palaeolithic human behaviour.



Figure 2. Different retouched lithic tools with dimensions less than 20 mm.

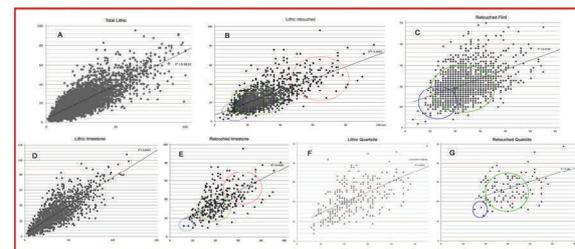


Figure 3. Tipometric dispersal analysis of the lithic studied.

## DISCUSSION AND CONCLUSIONS

The study of 2.100 retouched tools shows a main selection of flint (97,2% for  $\leq 20$  mm) versus other lithic materials as limestone (1,5%) or quartzite (1,2%). Core morphology does not determine presence of microlithism that can be quantified about 10% of the production. It is not laminar technologically (IL = 1.1) and does not indicate the existence of a microlithic facies. Typologically, it reproduces the same morphotypes that are common in the standard industry.

Technologically, tools related to recycling, reshaping and *débitages ramifiés* represent 15.5% in the study compared to 84.5% (81% flakes and 3.5% cores). The industry would point to a predominance of *micro-débitage* and a verified microlithisation process.

The microlithism as an intentional technological production of small retouched products in Middle Pleistocene palaeolithic societies is fully developed as demonstrated by the long sequence of Bolomor Cave (MIS 9-5e).

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