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Percussion tools as indicator of domestic activities. Study of the non-knap materials in the central sector of the unit SG at Font del Ros (Berga, Berguedà)

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Abstract

The analysis of the percussion tools in the central sector of Font del Ros Mesolithic unit (SG) characterize in a more precise way the technical gestures and the *chaînes opératoires* in which this objects they met involved. The combination among experimental archaeology, morfo-technological analysis and the macro traces observation has facilitated the characterization of the stigmas produced by the different works. Detected patterns constitute an example of the activities carried out with the percussion tools inside the tecnocomplex of notches and denticulates.

Keywords: Percussion Tools, technology, use-wear analysis, contextual analysis, Mesolithic.

Introduction

In the last years an increasing interest has taken place for the study of the percussion tools (de Beaune, 2000a; 2004; Procopiou & Treuil (*eds.*), 2002). The analysis of this wide part of the material record increases our knowledge on the technical processes that were carried out along the prehistory. These objects are related to a varied number of activities that including the lithic production and the crushing, pounding and grinding of diverse types of materials.

For his study, we raise a methodology for analyse a set of non-knap lithic materials proceedings from the Mesolithic occupation of Font del Ros (Berga, Berguedà). The principal aim of this work is to go into the knowledge of this set of instruments determining the *chaînes opératoires* in that they have participated. Simultaneously we try to contrast if the analysis of these kind of object inside the context that surrounds them allows to detect the domestic activities in which they met involved (de Beaune, 2000a, 2000b).

Archaeological context and Regional setting

Placed inside the municipality of Berga (Berguedà, Barcelona) the Font del Ros[1] deposit locates on an esplanade formed by quaternary coluvial deposits. From the topographic point of view the accession is fitted in the contact of the central Catalonian depression and the foothills of the Pre-Pyrenees (Serra de Queralt) (Pallares, 1999; Martínez-Moreno *et al*., 2006a; Martínez-Moreno & Mora, *in press*) (Fig.1).

The deposit presents occupations that corresponds to the Mesolithic (SG and SGA) and to the Ancient Neolithic (N). This study presents results grounds on material of the archaeological unit SG. At the present we have 7 datations for this level which calibration indicates intervals in the occupations that distribute between 10400-8450 cal. BP. This chronometrical range locates the deposit inside the Boreal cronozone (Martínez-Moreno & Mora, *in press*).

The unit SG has provided the major number of archaeological remains (27.807) inside the sequence. It is a palimpsest that it reflects the succession of diverse occupations linked to the

[1] Coordinates of X=404572 Y=4661194 UTM H31N ED50 and a height of 669 msnm.

exploitation of the resources of the surrounding biotopes. The dispersion of the recovered materials shows a disposition in not homogeneous floor in which there are formed areas of different density (Pallares, 1999; Martínez-Moreno & Mora, *in press*). These zones are characterized by several structures of combustion about which distribute lithic remains principally elaborated on quartz and flint, fragments of fauna and carbonized vegetable macro remains (Pallares, 1999; Martínez-Moreno & Mora, *in press*). This model of management of the space is similar to the pattern identified in near Mesolithic sites as Sota Palou (CRPES, 1985; Pallares, 1995).

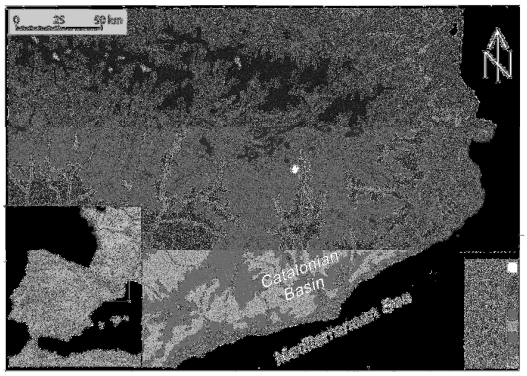

Fig.1. Map with the situation of Font del Ros site.

The study of a part of the percussion material of the archaeological unit SG offers the opportunity to penetrate into the characteristics of the abundant percussion tools that characterizes the facies of notches and denticulates of the Mesolithic in the North-East of the Iberian Peninsula (see references in Alday (coord.), 2006). Simultaneously, we will be able to penetrate into the technical activities carried out by the last groups of hunters-gatherers before going to the producing societies.

Area of study

The great extension that presents the unit SG in plant (1200 m²) it has made necessary to delimit the zone of study to a concrete area that is located on the central sector of the level. From the visual delimiting of sterile spaces on the central surface 5 discreet accumulations of materials has been isolated. From the archaeostratigraphical point of view the observation of the vertical dispersion in the sample by means of cuts in longitudinal and transversal sense allow us to detect strong relations of the materials inside each one of these accumulations (Fig. 2).

This fact stresses two important dynamics. On one hand, we are analysing a palimpsest that it allows to approach to the study of the domestic activities that generated it; for other one that the water course located in the surrounding areas of the deposit has not produced post depositional alterations in the zone of study.

Materials and methods

The work that we are presenting insist in the systems of classification of a type of slightly studied materials and tries to develop an analytical system that studies the techno-morphological characteristics of this objects and allows to establish hypothesis on his functionality.

For it, we have applied a transverse methodology that links the information proceeding from the archaeological record and the inferred one by means of several disciplines tied to the archaeology. Between them they are:

1. The techno-morphological study of the set of instruments,
2. The experimental archaeology,
3. The analysis of the wear patterns like a method that allow to raise hypothesis on the functionality of the objects,
4. The use of the inferential statistics,
5. The orthogonal projections of the studied materials to fit the objects inside the context from which they come (Roda, 2009).

The macroscopic observation of the materials will be complemented by the systematic use of the magnifying glass binocular (Olympus SZ-11). That will allow us the observation in low magnification of the surfaces providing information of signs of use-wear and stigmas. This procedure has been applied habitually in the study of the percussion tools (Adams, 1989; Dubreuil, 2004; Hamon, 2008). The state of the surfaces and the position of the stigmas have been used like discriminate to separate big functional categories with that to relate the type of used percussion and the nature of the worked materials (Roux, 1985; de Beaune, 2000a). These results will serve to link the studied objects to certain technical gestures and if exist sufficient indications to assign them to concrete *chaînes opératoires*.

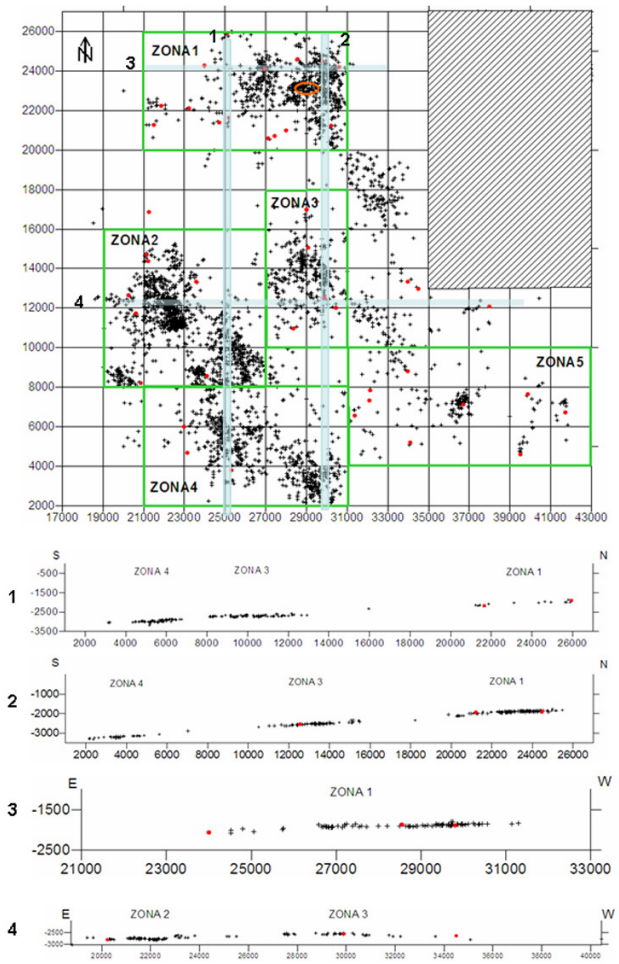

Fig. 2. Plot with the horizontal distribution of the materials in the central sector. The colour stripings indicate the transversal and sagital cuts presented below. The red points correspond to the percussion tools.

Results & Assumptions

Inside the context that we are analyzing some reflections have been realized over the macro-tools of deposits as Font del Ros and Balma Guilanyà (Pallares, 1999; Martínez-Moreno *et al*., 2006a, 2006b; Martínez-Moreno & Mora, *in press*). These studies have indicated the importance of the non-knap lithic materials but his preliminary character has done that quantitative evaluations have not realized. This is one of the aspects that we approach in our work by means of the analysis of the percentage distribution of the weight inside the elements of the *chaîne opératoire*. This variable has been used for valuing the management of the raw materials and in some cases it has served to detect the importance of the percussion materials inside the extractive activities of certain occupations (de la Torre, 2004).

The obtained results indicate that the relative weight of the percussion tools is very much bigger than that of the "useful" products of the deposit (Fig. 3). Whereas the percussion tools represent 29.15 % of the total of the contributed material, categories like the retouched pieces (1.08 %) or the flakes (1 %) present minor percentages. Thus, still bearing in mind that many of the knap materials appear under the form of chunks (20.48 %) due to the low quality of the exploited raw materials, there estimates an important investment of work realized in the supply of the raw materials this one dedicated to materials that are not related to the knapping activities. This factor is remarkable if we bear in mind that both majority categories, percussion

tools (29 %) and mannuports (26.17 %), are inside the materials narrowly tied to the percussion activities.

SG Central sector	n	Weight (Kg.)	F. r.
Percussion tools	38	11,29	29,15
Mannuports	44	9,36	26,17
Chunks	432	7,93	20,48
Booklets	41	3,90	10,06
Cores	30	2,65	6,84
Fragments	482	2,03	5,24
Retouched pieces	58	0,42	1,08
Others	126	0,42	1,08
Flakes	119	0,39	1,00
Total	250	38,73	100

Fig.3. Inventory of the weight in the different technological categories inside the chaînne opératoire. Note the importance of the percussion tools.

Techno morphologic characteristics

The selected area has provided a total of 38 supports inside which we have 11 complete cobles and 27 fragments. From the petrologic point of view the limestone is the majority raw material (31, 5 %) followed by quartzite (21 %) and sandstone (15.8 %). A detailed observation of the set highlights the scarcity on the materials as quartz and flint, this information is relevant since its both rocks are the raw matters preferably knapped in the site (Martínez-Moreno & Mora, in press) (Fig.4).

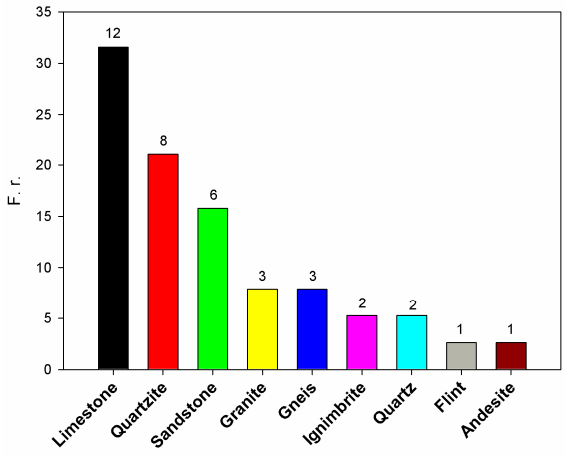

Fig.4. Graph with the lithologic distribution (%) of the percussion tools. On the top of every column is indicated the absolute frequency.

The phase of acquisition of these materials is realized in the environment near the site. As the rest of the materials, the areas of supply have been identified in the terraces of the river Llobregat placed to less than 10 km. from the occupation. These percentages are correlates with the composition of the supply and indicates a slightly selection of these matters (Terradas, 1995).

Metrically the average sizes of the objects not overcome the 100 mm. of length and width and whose average weight places around the 400 gr.. The sections of these objects define oval and semicircular morpho-types. These volumes provide wide active surfaces of platform type (96.7 %) who present for the most part a convex delineation in his two sections (69.5 %). These features seem to indicate that the assemblage possess a characteristics that facilitate the grip of the supports and his manageability to realize different types of activities.

To morphologic level, an interesting characteristic is the high percentage of fracturation that is observed on the set (71 %). The studies realized on the bed of some rivers indicate that the natural fracturation of the cobles is present in very low percentages in these habits (Fallet, 1982, Serrallonga, 1995). This fact added to the scanty taphonomic alterations on the material seems to indicate that great part of the fractures they have an anthropic origin.

Functional hypothesis

The combination of the morphometric characteristics and the type of traces of utilization on the surfaces has allowed establishing a series of functional hypotheses. These have been confirmed by means of the use of the inferential statistics (*Lien Test* and *Chi square*) and the archaeostratigraphic analysis. The obtained results indicate that in many cases the stigmas are related to the materials placed in contexts near to the studied objects (Fig. 5).

Thus, the relation among functionality and spatio-temporal distribution of the objects indicates a scanty interaction between the different accumulations and therefore he notices that the materials were recovered in a position nearby which they were left. These results are agree with the series of obtained refits and the spatial studies realized for the unit SG (Pallares, 1999; Martínez-Moreno *et al*., 2006a, 2006b; Martínez-Moreno & Mora, *in press*) and they demonstrate that the percussion tools are a

significant element inside the archaeological record which study helps to detect areas of activity (Roda, 2009).

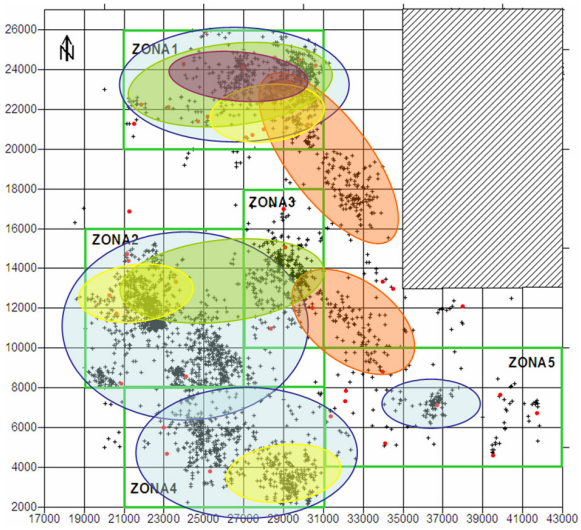

Fig.5. Plant with the different areas of activity detected by means of the use of the statistics and the archeaostratigraphical criteria. These results are strongly related with the hypothesis founded by the study of use wear patterns on the percussion tools. *Interpretation*: Blue ellipsis: knapping areas; Magenta ellipsis: process of faunal remains near to a hearth; Yellow ellipsis: areas related to pounding and grinding of vegetables, Red ellipsis: areas of working of leather; Green ellipsis: activities linked to percussion activities on splintered lithic tools.

Inside the functional classification that we have realized we distinguish two big categories: objects related to the thrown percussion and pieces stigmas of friction.

Most of the percussion tools relates to the activities of thrown percussion. This fact correlates with the high presence of knapping activities and to the process of faunal remains that we have identified in the area of study. The objects related to these activities present stigmas in the peripheral zones of his shapes and consist in pecked areas, points of compression and crushed of the grains (Fig. 6).

Several supports are tied to these *chaînes opératiores* determining a preferential use of several lithologic types. On one hand, the nodules of quartz are clearly related to the lift hand knap, whereas the group of the sandstones seems that it was used preferentially as passive element (anvils) for the faunal processing. This indicates that in spite of the scanty specialization of these instruments some works of thrown percussion are realized with those matters that they present more suitable mechanical qualities.

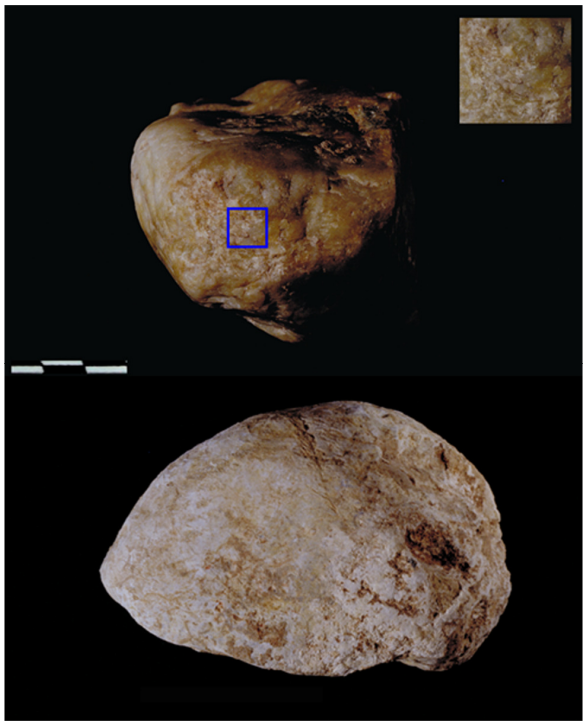

Fig.6. Example of objects related with thrown percussion.

This adequacy of the matters to the realized activities seems to be less marked in the objects in which stigmas are caused by friction, since most of these patterns are located on materials with scanty abrasive power (Schoumacker, 1993; Delgado *et al*., 2009).

Inside the *chaînes opératiores* that are relates to the gestures of friction we identify the work of the leather, the crushing and the grinding of ocres and vegetables. These attributions have been possible thanks to the comparison of our experimental results with the stigmas described in the bibliography (Adams, 1989; Dubreuil, 2004; Hamon, 2008). This second block of tasks is linked to stigmas of use that can be described as *strias*, glossy sheens, levelling of the grains or the appearance of facets of use.

The analysis of residues on these pieces would allow us to go into his use. In spite of it, the possibility of realizing mapping of the chemical components by means of the scanning electron microscope (SEM) or the X-ray Energy Dispersive Analysis this (EDAX) are limited by the small dimensions of the chambers of emptiness of the current microscopes. Thus regardless of the positive results obtained in

experimental pieces, the size of the majority of the archaeological pieces prevents the application of this type of examination.

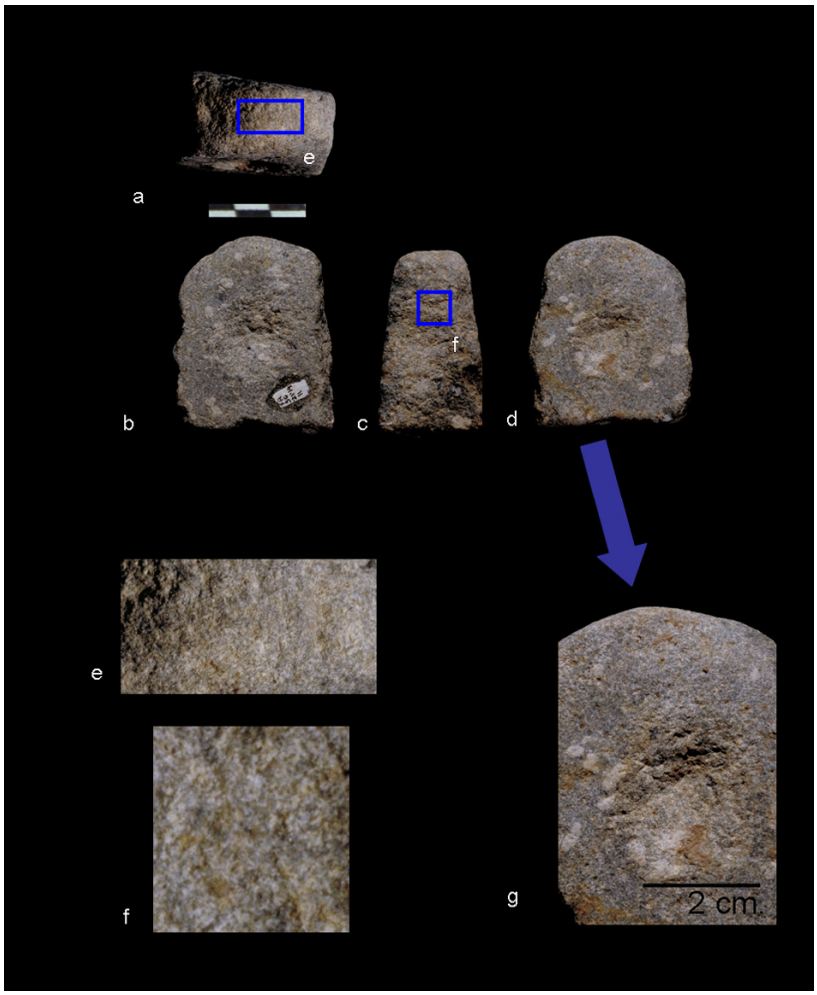

Fig.7. Quadrangular piece of gneis with multiple use-wear patterns. (a) facet of us with convex delineation, (b and d) pit associated with regularized surfaces, (c) facet of use with flat delineation, (d)Detail of the regularized zone where are observed longitudinal strias (20 mm.), (f) detail of the facet of use page with longitudinal strias (10mm), (g) detail of one of the pits.

On the possible multifunctionality of the tools we must stress that despite the diversity of stigmas, many of the pieces present signs of percussion and friction that fit to unique one technological skill. This one is the case of some pieces destined for the work of the leather or the crushing and grinding of ocres. One of the clearest cases is a support of gneiss which polyvalent use groups the percussion on hard materials, the work on anvil that he has contributed to the formation of depressions, the crushing of ocres and the grinding of some type of fruits or vegetables (Fig. 7). These appraisals do that probably it is more suitable to speak about polyvalence than of multifunctionality.

Conclusions

The obtained results highlight the importance of the percussion tools inside the Mesolithic of the peninsular north-east. These objects link themselves to a varied number of activities that are carried out inside not specialized zones of work.

From the functional point of view the realized activities distribute inside the whole sphere of domestic production. Between them we are identified the knapping and the configuration of retouched pieces, the process of faunal remains, fruits and vegetables, the preparation of

leather and the crushing and grinding of the ocres.

These conclusions demonstrate the polyvalence of this type of tools and under a technological perspective they fit with the expedient skills identified inside this tecno-complex. This fact must make us think about the entity that these objects had inside the facies of notches and denticulates. Habitually, it has been considered to be this period as archaic and slightly specialized from the typological point of view (Barbaza et al., 1984; Fullola-Pericot et al., 1995; Utrilla, 2002; García-Argüelles et al; 2005). Nevertheless, since our results demonstrate if the lithic assemblage is analyzed in its entirety it is a question of versatile panoply that it allows to confront a great number of activities.

References

Adams, J. L. (1989). "Methods for improving ground stone artifacts análisis: Experiments in mano wear patterns" In Experiments in Lithic Technology D. Amick & R. Mauldin (eds.). BAR International Series 528: 259-276.

Alday Ruíz. A. (coord.) (2006). El mesolítico de muescas y denticulados en la cuenca del Ebro y el litoral mediterráneo peninsular. Vitoria/ Gasteiz, Diputación Foral de Álava 11.

Barbaza, M., J. Guilaine et Vaquer, J. (1984). "Fondements chrono-culturels du mésolithique en Languedoc occidental. L'Anthropologie 3: 345-365.

CRPES (1985). Sota Palou. Girona, Diputació de Girona.

de Beaune S. A (2004). "The invention of technology: Prehistory and cognition." Current Anthropology, 45-2: 39-162.

de Beaune, S. A. (2000a). Pour une archeologie du geste. Broyer, moudre et piler, des premiers chasseurs aux premiers agriculteurs. Paris, CNRS Éditions.

de Beaune, S. A. (2000b). "Les outils lithiques non taillés comme marqueurs d'activité." XXVe Congrès Préhistorique de France: Approches fonctionnelles en Préhistoire. Nanterre: 97-106.

de la Torre Sáinz, I. (2004). Estrategias tecnológicas en el Pleistoceno inferior de África oriental (Olduvai y Peninj, norte de Tanzania). Departamento de Prehistoria. Facultad de Geografía e Historia. Madrid, Universidad Complutense de Madrid: 620.

Delgado, S.; Gomez-Grass, D. Risch, R. (2009). "The mechanical properties of macrolithic artifacts: a methodological background for functional análisis." Journal of Archaeological Science 36: 1823-1831.

Dubreuil, L. (2004). "Long-term trends in Natufian subsistence: a use-wear analysis of ground stone tools." Journal of Archaeological Science 31: 1613-1629.

Fallet, M. A. (1982) "Les galets utilises de Gombere IB, Melka-Kunture, Ethiopie." Cahiers du Centre de Recherches Prehistoriques 8: 127-161.

Fullola i Pericot, J. M., P. García-Argüelles i Andreu, D. Serrat i Congost and M. M. Bergadà i Zapata (1995). "El paleolític i l' epipaleolític al vessant meridional dels Pirineus catalans." X Col.loqui internacional d'arqueològia de Puigcerdà, Puigcerdà.: 159-176.

García-Argüelles i Andreu, P., J. Nadal i Lorenzo and J. M. Fullola i Pericot (2005). "El abrigo del Filador (Margalef de Montsant, Tarragona) y su contextualización cultural y cronológica en el nordeste peninsular." Trabajos de Prehistoria 62(1): 65-83.

Hamon, C. (2008). "Functional analysis of stone grinding and polishing tools from the earliest Neolithic of north-western Europe." Journal of Archaeological Science 35: 1502-1520.

Martinez-Moreno, J. and R. Mora (in press). "Spatial organization at Font del Ros, a Mesolithic settlement in the south-eastern Pyrenees." Come in...and find out. Opening a new door into the analysis of hunter-gatherer social organisation and behaviour. Gaudzinski, S. et al. (ed). Mainz, Romisch-Germanisches Zentralmuseum.

Martínez-Moreno, J., Martzluff, M.; Mora, R. et Guilaine, J. (2006b). "D'une pierre deux coups: entre percussion posée et plurifonctionnalité, le poids des comportements «opportunistes» dans l'Épipaléolithique-Mésolythique pyrénéen." Normes techniques et pratiques sociales. De la simplicité des outillages pré- et protohistoriques. XXVIe rencontres internationales d'archéologie et d'histoire d'Antibes. L. Astruc, F. Bon, V. Léa, P.-Y. Milcent and S. Philibert. Antibes, Éditions APDCA: 147-160.

Martínez-Moreno, J., Mora Torcal, R. y Casanova Martí, J. (2006a). "El mesolítico de los Pirineos surorientales. Una reflexión sobre las <<facies de fortuna>> del postglaciar." El mesolítico de muescas y denticulados en la cuenca del Ebro y el litoral mediterráneo peninsular. A. Alday (coord.). Vitoria/Gasteiz, Diputación foral de Alava. 11: 161-188.

Pallares, M. (1995). "Cuestiones teórico-metodologicas sobre el estudio de la organización espacial de los asentamientos de comunidades cazadoras recolectoras." Aplicaciones informáticas en Arqueología: Teorías y Sistemas. L. Valdés, I. Arenal and I. Pujana (eds.). Bilbao: 387-408.

Pallares, M. (1999). Teoria i mètode sobre l'anàlisis Espacial en Arqueologia. La gestió de l'espai social a l'interior de l'assentament de la Font del

Ros (Berga, Barcelona). Dpt.d'Antropologia Social i prehistòria. Barcelona, UAB.

Procopiou, H, et R. Treuil (Eds.) (2002). Moudre et Broyeur. L'interpretation fonctionelle de l'outillage de mouture et de broyage dans la prèhistoire et l'Antiquité: actes de la Table Ronde internationale, Clermont-Ferrand, 30 nov.- 2 déc. 1995 Paris, CTHS 2.

Roda, X. (2009) El utillaje de percusión como marcador de actividades domésticas. Estudio de las bases negativas del sector central de la unidad SG de Font del Ros (Berga, Berguedà). Tesis de Master. Tarragona, Universitat Rovira i Virgili.

Roux, V. (1985). Le materiel de broyage à Tichitt (Mauritanie). Étude ethno-archéologique, Paris Recherches sur les civilisations, mém. 58.

Schoumacker, A. (1993). "Apports de la technologie et de la petrgraphie pour la caractérisation des meules." a Anderson, P; Beyries, S.; Otte, M. Plisson, H. (ed.) Traces et fonction: les gestes retrouvés. Colloque international de Liège. ERAUL 50: 166-176.

Serrallonga i Atset, J. (1995). La reconstrucció de la conducta instrumental dels primers homínids amb l'ajut de ll'etoprimatologia, l'etnologia i l'arqueologia experimental Tesi de Llicenciatura, Universitat de Barcelona.

Terradas, X. (1995). Las estrategias de gestión de los recursos líticos del Prepirineo catalán en el IX milenio BP: el asentamiento prehistórico de la Font del Ros (Berga,Barcelona). Treballs d'arqueologia 3.

Utrilla, P. (2002). "Paleolítico y Epipaleolítico en Aragón. De 1993 a 1998" Caesaraugusta 75:115-158.