What relations between North Africa and Europe in the Early Holocne?

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Thomas Perrin*, Tiphaine Dachy**, Esther López-Montalvo***, Claire Manen• and Grégor Marchand••

Abstract

Between the 8th and 5th millennium BCE, human societies in the Western Mediterranean underwent several major changes. One of them took place during the 7th millennium with a profound change in material production, especially in their stone industries. It resulted in a fundamental change in production patterns, operating sequences and technical procedures. The precise origin of these changes is currently unknown, but it is possible that they initially occurred in North Africa before spreading rapidly along the shores of the Mediterranean and reaching Western Europe. This south-to-north expansion could reflect population shifts, at least in the early stages of the expansion of these new technical processes. However, possible contacts between Africa and Europe are not limited to this technical sphere, and exchanges can also be documented in both ceramic productions and graphic expressions. Several recent research programmes have brought new data to these hypotheses, the main results of which are presented here.

Keywords: Mesolithic, Neolithic, lithic industries, ceramic, rock art, Europe, Africa, demic movement, diffusion.

QUELLES RELATIONS ENTRE L'AFRIQUE DU NORD ET L'EUROPE AU DÉBUT DE L'HOLOCÈNE ?

Résumé

Entre le 8e et le 5e millénaire avant notre ère, les sociétés humaines de la Méditerranée occidentale ont opéré plusieurs changements majeurs. L'un d'eux a eu lieu au cours du 7e millénaire avec une modification profonde dans les productions matérielles, en particulier dans leurs industries de la pierre. Il se traduit par un changement fondamental des schémas de production, des séquences opératoires et des procédures techniques. L'origine précise de ces changements nous échappe actuellement, mais il est possible qu'ils se soient produits initialement en Afrique du Nord avant de s'étendre rapidement le long des rives de la Méditerranée et d'atteindre l'Europe occidentale. Cette expansion du sud vers le nord pourrait traduire des déplacements de populations, au moins dans une phase initiale des développements techniques. Les possibles contacts entre Afrique et Europe ne se limitent pas à cette sphère technique, et des échanges peuvent également être documentés dans les productions céramiques ainsi que dans les expressions graphiques. Plusieurs programmes de recherches récents ont permis d'apporter de nouvelles données à ces hypothèses, qui sont présentées dans cet article.

Mots clefs: Mésolithique, Néolithique, industries lithiques, céramiques, art pariétal, Europe, Afrique, déplacements de population, diffusion.

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The western Mediterranean basin is a vast geographical region incorporating the shores of North African and southern Europe, as well as those of the Iberian and Italian peninsulas. The main islands are Corsica, Sardinia and the Balearic Islands. A large number of prehistoric sites have been documented on these shores and islands, making it possible to carry out detailed studies of the population dynamics, cultural developments, interactions and exchanges between different groups. This is particularly true for the early Holocene. Between the 8th and 5th millennium BCE in particular, the human societies of the Western Mediterranean underwent a major shift in their material productions, as well as their cultural identities, including the Neolithization of their overall socio-economic organization. This evolution and upheaval took place in parallel, but not in synchrony (see for example Marchand and Perrin, 2017), with sometimes very abrupt climate and environmental changes. This conjunction of a relative abundance of data with major cultural developments and environmental changes makes this relatively closed geographical area an ideal space for researching links and contact between the shores, particularly between north Africa and southern Europe. We know that these populations were all very mobile and involved in long-distance exchanges, with a clear mastery of navigation. However, the question of possible south–north interactions in the western Mediterranean is often ignored in favor of processes whose origins, in the case of Europe, are systematically sought to the east, in a traditional *ex orient lux*. The contribution of north Africa to the construction of the cultural identities of prehistoric groups in western Europe has, however, been evoked by several authors. It was the case, for example, for the Second European Mesolithic, then termed "Tardenoisian". Following the observation made by Breuil (1912) regarding the similarities in the microlithic industries throughout the Mediterranean, Vignard (1923) proposed that the Tardenoisian had originated from the "Egyptian Sebilian". Intense debate ensued from these proposals, which were ultimately rejected, above all because "all the geometrical microliths and even the microburin existed and were

* CNRS UMR5608 TRACES. Université de Toulouse Jean-Jaurès, Maison de la Recherche, 5, allées Antonio-Machado, F-31058 Toulouse cedex 9. *E-mail*: thomas.perrin@cnrs.fr, telf.: +33 5 61 50 41 88. *Auteur correspondant*.

** UMR5608 TRACES. Université de Toulouse Jean-Jaurès, Maison de la Recherche, 5, allées Antonio-Machado, F-31058 Toulouse cedex 9. *E-mail*: tiphaine.dachy@gmail.com.

*** CNRS UMR5608 TRACES. Université de Toulouse Jean-Jaurès, Maison de la Recherche, 5, allées Antonio-Machado, F-31058 Toulouse cedex 9. *E-mail*: esther.lopez-montalvo@univ-tlse2.fr.

◆ CNRS UMR5608 TRACES. Université de Toulouse Jean-Jaurès, Maison de la Recherche, 5, allées Antonio-Machado, F-31058 Toulouse cedex 9. *E-mail*: claire.manen@univ-tlse2.fr.

◆◆ CNRS UMR 6566 CNRS-CReAAH. Centre de Recherche en Archéologie Archéosciences Histoire, Campus Beaulieu-CS 74 205, F-35042 Rennes Cedex. *E-mail*: gregor.marchand@univ-rennes1.fr.

sometimes common in the European Upper Paleolithic" (Barrière, 1955: 205; cf. also Sheppard, 1987). From the 1950s, the question of an African origin was simply no longer raised, and researchers sought instead to demonstrate the local grounding of the industries of the Second Mesolithic. From an epistemological point of view, it is rather interesting to note that the rejection of any North African influence on the development of the Mesolithic in Western Europe occurred simultaneously with decolonization. Could it be the reflection of a subconscious form of intellectual retaliation? Whatever the case, in 1971, Rozoy went on to propose the existence of a transitional facies between the First and Second Mesolithic in southern France: the "*Sauveterrien à trapezes*" (Rozoy, 1971), originally identified by Escalon de Fonton, based on data from Layers 15 and 16 at the site of Montclus (Gard; Escalon de Fonton, 1966). While it has since been demonstrated that this hypothesis was based on the mixing of two occupations from very distinct time periods, and that the site of Montclus cannot therefore support this hypothesis (Perrin and Defranould, 2016), it clearly reflects the desire to search for permanent occupations and local developments.

Similar questions arise with the spread of Neolithic agro-pastoral systems, which at first seem to avoid North Africa. However, several indices show the existence of a North African impact on the construction of the identity of Early Neolithic communities in both Spain and Portugal (Manen *et al.*, 2007). Here too, however, while this contact is suggested by a great deal of evidence, some researchers continue to downplay the possible influences of North African societies on Western Europe, against all archaeological and chronological evidence (see for example Zilhao, 2014) .

This article therefore aims to assess the nature and intensity of these interactions between North Africa and Southern Europe over the long term (between the 8th and 5th millennium BCE) in order to shift the paradigms established during the postcolonial period, which are still too dominant in the most common historical scenarios.

1. CONTEXT

From a geographical point of view, the rise in sea levels following the last glacial maximum had a relatively contrasted impact across the western Mediterranean basin. Most of the retreat of the coastline must have taken place before the Holocene, since the sea level has been estimated at about -25m at the beginning of the 8th millennium BCE and about -8m in the 5th millennium BCE (Lambeck *et al.* Bard, 2000). The number of potentially submerged sites for the period concerned must therefore generally be fairly limited. For the most part, the coastline has indeed changed very little, many of the shores being made up of steep rocky coasts bordered by relatively short coastal plains. The most significant changes mainly concerned the northern half of the Adriatic and eastern Tunisia, between the Gulf of Gabès and the Strait of Sicily, where large areas were flooded, and there must have been a significant loss of sites (fig. 1). Although less extensive, this retreat of the coastline was also considerable in the Gulf of Lion and along the coasts of Spain.

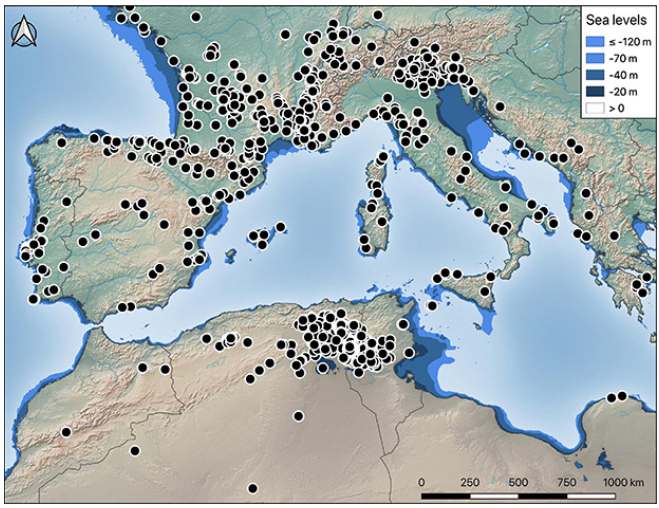

Fig. 1. Map of the known sites in the Western Mediterranean between the 8th and 5th millennium BCE and indication of the rise in sea levels. Background map: Natural Earth https://www.naturalearthdata.com/; Bathymetry: The GEBCO_2014 Grid, version 20150318, http://www.gebco.net; list of sites taken from the BDA archaeological database https://bda.huma-num.fr/ (Perrin, 2019a).

Despite all this, many sites are known of throughout the western Mediterranean coast, with nearly 3,000 settlements documented over these three millennia[1]. Their geographical distribution is very uneven, with some areas showing a high density of sites, such as the eastern Maghreb, on the border between Algeria and Tunisia, Catalonia, the lower Rhône valley, northeastern Italy, and so forth. In other areas, far less sites have been documented, including the Italian Piedmont region, most of the interior of the Iberian Peninsula (the *Meseta*) and the majority of western Algeria and Morocco. This contrast may reflect real differences in the density of prehistoric populations during these periods, but it also reflects the research history, and it is not possible to establish the true influence of this parameter. The densest areas are thus those which have undergone the greatest amount of research and excavations. The intensity of the taphonomic processes is also a factor that must be taken into account region by region. We must therefore remain cautious about interpreting these differences.

[1] An inventory and list of all these sites can be consulted in the free, collaborative BDA Archaeological database, "*Base de données archéologiques*", accessible online: https://bda.huma-num.fr/ (Perrin, 2019a).

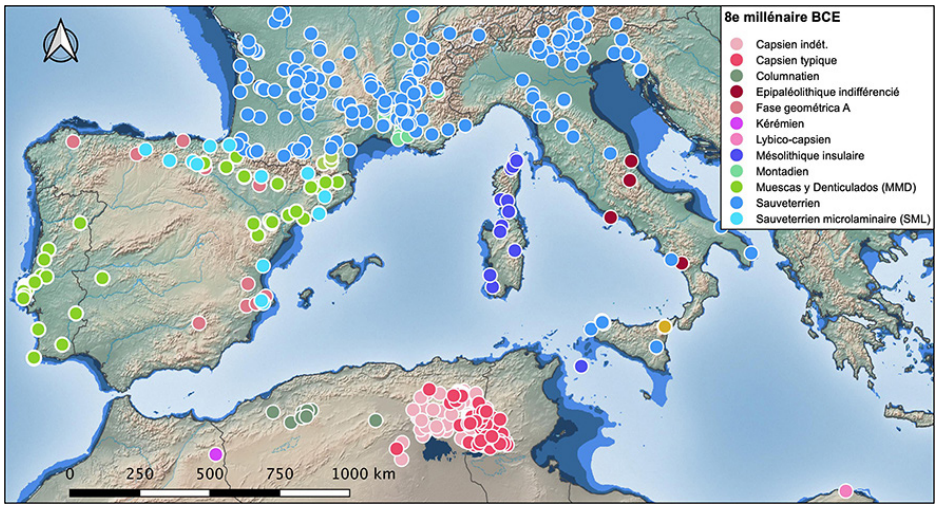

Fig. 2. Map of the main cultural facies and groups identified in the Western Mediterranean during the 8th millenium BCE.

In any case, the large number of known sites makes this period favorable for research into contact and exchanges between the different shores of the Mediterranean at a time when the last groups of indigenous hunter gatherers were gradually disappearing in the face of Neolithic expansion (Perrin and Manen, 2021).

2. MESOLITHIC TECHNOCOMPLEXES AND LITHIC INDUSTRIES AROUND THE 8TH MILLENNIUM BCE

In the 8th millennium BCE, only groups of hunter gatherers populated the western Mediterranean basin. Many cultural facies have been identified, generally based on the typological characteristics of the chipped stone industries (fig. 2). Some of these cultures, such as the Sauveterrian of southern France and northern Italy, show a regional, or even supra-regional geographical scope (Valdeyron, 2008; Visentin, 2018). Others remain limited to a particular region, such as the Typical Capsian which was mainly located in the Tebessa region or the *Mesolítico de Muescas y Denticulados* in the Ebro Valley. Finally, some only had a micro-regional scope, such as the Columnatian in Western Algeria or the Montadian in the Provence, the pertinence of the latter group being questionable.

Beyond this apparent significant regional variability, a comparison of these industries from the 8th millennium suggests that we can simplify this table by identifying three main groups or three supra-regional trends (Perrin, 2019b).

In all the northern part of the western Mediterranean, from the middle of the 9th millennium BCE, the industries evolved towards microlithism, or even hypermicrolithism, from the traditions of the late Paleolithic: the Azilian and the Microlaminar Epipaleolithic in Spain, the Laborian and the Epilaborian in France, and the Epigravettian in Italy.

In northern Spain, the Ebro Valley and the Pyrenees above all, these industries have been attributed to different facies: the Sauveterrian, the microlaminar Sauveterrian, and the microlaminar Epipaleolithic. However, the precise typological and technological criteria for distinguishing between them is rather unclear in publications to date, and it would certainly be useful and instructive to compare these three entities point by point in order to establish whether or not this distinction is pertinent.

In France, most of the sites have also been attributed to the Sauveterrian. Only in the Provence has a relative specificity been observed with the Montadian, however the real existence of this facies cannot currently be affirmed. It is supposed to be distinguishable from the Sauveterrian above all by its rarity or even absence of microliths, however this hypothesis is mainly based on ancient excavations, and it cannot be excluded that the scarcity of microliths is related to an absence of fine sieving that could have led to an artificial under-representation of small sized microliths.

In Italy, most of the sites known for this phase are located in the north of the country, but a few have also been documented in the south. They have all been attributed to the *Sauveterriano*, with the exception of four sites located in the "heel of the boot" which have been attributed to the Epiromanellian. Here again, we can question the pertinence of this distinction, which is only based on typological arguments which deserve to be reviewed more objectively.

In fact, if we disregard this ill-defined Montadian, the entire northern half of the Mediterranean basin was occupied by groups of hunter gatherers whose chipped stone industries were based on a common toolkit involving flakes and geometrical armatures, which were most often triangular in shape and made on narrow bladelet blanks. The techniques used in this production process involved hard hammer percussion, while the generally unipolar methods did not involve extensive shaping and concerned all kinds of blanks (flakes, pebbles, plaquettes, etc.). The Sauveterrian is in a way the foremost representative of this, as already pointed out by Kozlowski, who linked all these assemblages with his "Component S" (Kozlowski, 1976). This notion of "component" is difficult to apply however, particularly due to its lack of connection with the anthropological reality of these prehistoric populations. It is certainly interesting from an epistemological point of view since it clearly illustrates the fact that it is only based on archaeological data constructed by researchers, but which remains completely theoretical. In contrast, the notion of the technocomplex developed by Clarke (1978) is much more relevant in this context, since it underlines the relationship and the co-evolution between all these industries, which may present regional technical specificities. In this sense, we can propose that all these facies from the 8th millennium in the northwestern Mediterranean are grouped together under the same Sauveterrian technocomplex.

One of the main interests of this notion is that it lead to a dual questioning, regarding both the origins of this technocomplex and the networks involved at such a geographical scale. Knowing where such a set of typological and technical traits originated from is a problem that can only be solved by a precise, combined analysis of the productions from the Late Epipaleolithic and Early Mesolithic over this entire geographical area, a task that goes beyond the scope of this article. Identifying the networks in any relevant way would also require a finer chronological resolution than that currently available to us for this period, in which the plateaus in the calibration curve follow on from each other. The only thing we can say with certainty today is that these networks did exist and that they were undoubtedly highly dynamic. It does not seem very credible to put the similarities between all these productions down to a simple phenomenon of convergence and even less to put them down to functional or environmental determinism. Admittedly, the forest developed over these millennia, but certainly not in a homogeneous way over the entire geographical area, which experienced a strong disparity in its ecosystems according to altitude and latitude. We must therefore assume a transregional and probably transcultural tendency –a sort of "trend phenomenon", which by nature induced long-distance contact and exchanges. It would be interesting to develop these questions from an entirely anthropological point of view: what human and social realities can we imagine might have generated such technocomplexes? And how can such networks have remained so active in a relatively closed (due to the presence of the forest) and sparsely populated environment? Rozoy has estimated the Mesolithic population at around 50,000 people in present-day metropolitan France (Rozoy, 1978: 1066), corresponding to a population density of less than 0.1 inhabitants per square kilometer. The reality of this figure is of course highly debatable, but it appears relatively likely that the population density was on average very low, if one is to judge by the number of known sites per chronological stage and the relatively small surface area of these sites. Shouldn't this relative contradiction between the low population density and the possible existence of highly dynamic networks make us question the degree of mobility of all or part of these populations, which we have always considered relatively limited? Carrying out a real network analysis, with as much detail and quantifiable data as possible, would undoubtedly be an extremely useful line of research that would probably significantly improve our perception of these populations.

In the lower Ebro valley and Catalonia in particular, as well as in the south of Portugal, the productions are totally different, even completely opposite both in their conception and in the techniques used, with industries based on large notched flakes and thick denticulates, and completely devoid of microliths and armatures. It was the *Mesolítico de Muescas y Denticulados* (MMD) that quickly formed the majority of the Iberian Mesolithic in terms of the number of known sites. During the first half of the 8th millennium, the Atlantic coast of Spain saw the appearance of the Asturian, which can be considered a regional and/or functional facies of the MMD, oriented around the exploitation of coastal resources. In Portugal, these industries, composed of denticulate flakes and choppers made from coarse-grained rocks, are recognized both on the coast and further inland (Araújo and Almeida, 2013).

From 8,500 BCE, Corsica and Sardinia, which had so far remained untouched by human occupation, also started becoming populated, thus indirectly attesting to a mastery of deep-sea navigation. These groups of the "insular Mesolithic" (Lanfranchi (de), 1998) also manufactured lithic industries which completely contrasted with the Sauveterrian and Epipaleolithic traditions in their total absence of microliths. This phenomenon appeared in southern Italy at the same time with the "undifferentiated Epipaleolithic", which can also be found in Sicily (Lo Vetro and Martini, 2016).

Here again, how can we understand this appearance of industries so similar to each other in their conception but so distant geographically? Should we envisage extensive, repeated population displacements over such great distances or should we envisage technical convergences resulting, for example, from environmental constraints? Once more, the question remains unresolved. The similarities between these industries seem sufficient in any case to suggest here too, the expression of a large-scale technocomplex, which could be qualified as an "MMD technocomplex", which emerged around 8,500 BCE and which was fully expressed throughout the 8th millennium.

The situation is far less clear in North Africa. The Iberomaurusian was long thought to have been situated directly prior to the Typical Capsian, but a critical analysis of the dates has shown that there is a significant gap between the two, from 10,500 to 9,000 BCE (Perrin *et al.,* 2020). There is no obvious reason why there would be a total absence of occupations over the whole of North Africa during this period, so it is more likely a matter of a lack of data. Few of the Iberomaurusian sites have been studied recently, and even fewer of these sites have been correctly dated. As a result, the detailed chronology for this period is completely unknown to us. It is theoretically possible that sites which have been more or less affiliated with the Iberomaurusian existed at the very end of the Pleistocene, but this cannot be objectively proven. To date, we therefore known nothing about the human occupation of the Maghreb between 10,500 and 9,000 BCE. Only in recent years have a few Moroccan sites been documented with occupations from this period, such as Hassi Ouenzga, Ifri el-Baroud "the Gunpowder cave", and Ifri Oudadane (Linstädter, 2016). However, the lithic industries are scarce and are therefore poorly characterized. At Ifri Oudadane, "the lithic material is sparse and consists mainly of unspecific flakes. However, besides some notched flakes and blades, scrapers and typical Epipaleolithic backed points are present" (*ibid.:* 66).

While a few sites appeared in the first half of the 9th millennium, it is above all in the second half of this millennium that the Typical Capsian began to develop strongly on the high plateaus on either side of the Algerian-Tunisian border. The lithic industries include narrow retouched backed bladelets and "common" tools (end-scrapers, side-scrapers, burins, denticulates, and so forth) on large blades and flakes. In view of the chronological gap between the Iberomaurusian and the Typical Capsian, it is not currently possible to draw any conclusions regarding any possible affiliations between the two of them. In western Algeria, a few sites attributed to the Columnatian present a microlithic industry (Dachy *et al.,* 2018) reminiscent of the productions of the relatively nearby sites of the Mediterranean Epipaleolithic in Morocco.

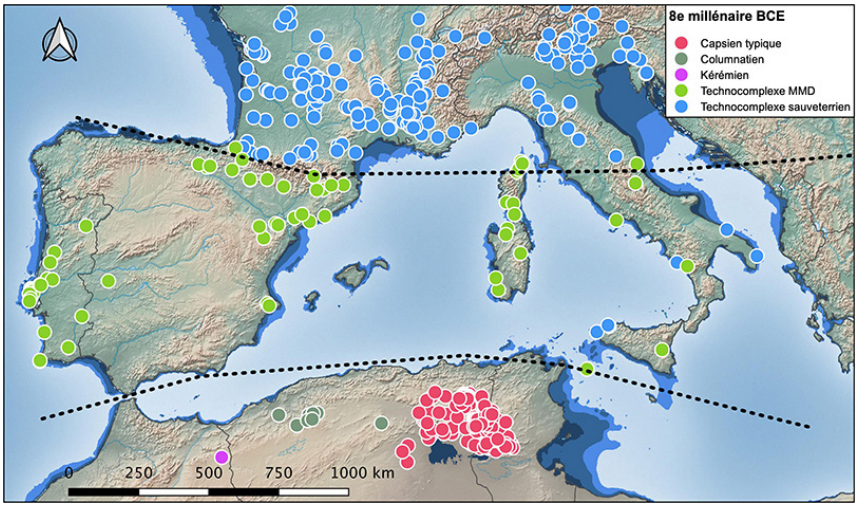

Fig. 3. Proposal for a tripartition of the western Mediterranean basin according to the main trends in the chipped stone industries.

North Africa therefore appears to show a dual tendency with industries like those of the Typical Capsian, based on the production of large blanks (flakes and blades) obtained by percussion for common tools, while the varied projectiles points evolve from narrow backed bladelets to triangles, and include many segments. They can be small in size, without ever reaching the hyper-microlithic dimensions that can be seen in certain stages of the Sauveterrian. In the western Maghreb, the trend was thus more towards microlithic productions. The relationship between these two main groups remains to be clarified.

From 8,600-8,500 BCE, the western Mediterranean basis was thus divided into three distinct zones, along a south-north axis (fig. 3):

1. From 8,600-8,500 BCE, the vast majority of sites in northern Spain, France and Italy can be attributed to the Sauveterrian technocomplex,
2. The rest of the Iberian Peninsula including Portugal, the islands and central-southern Italy can be attributed to the MMD technocomplex,
3. In North Africa, the coexistence can be observed of the Typical Capsian and the Mediterranean Epipaleolithic/Columnatian.

The limits between these three zones are obviously rather vague, but appear to be organized along a south–north axis: the "border" between the MMD and Sauveterrian technocomplexes being situated at a latitude of around 42° north, while that between the MMD and the North African groups is situated around 37.5° north. The most surprising and intriguing element of this observation is

the MMD technocomplex. Indeed, the Sauveterrian technocomplex presents a certain geographical coherence, or at least a proximity in all its sites, such as it is found "classically" in most archaeological cultures. Likewise, the groups identified in North Africa each occupy limited geographical areas. However, the MMD technocomplex, stretches from the Atlantic shores of Portugal to the Tyrrhenian Sea, and perhaps even beyond, since phase VII at Franchthi in Thessaly (Greece) presents industries that are not without similarities, with very few microliths and a significant increase in the number of large denticulate-type tools on flakes over a chronological period situated in the second half of the 9th millennium (Perlès, 1987, 1995). The precise coherence of this MMD technocomplex remains to be established, of course, since differences exist between all these industries, however the trend towards a lithic production devoid of microliths and a toolkit based on flakes and large blades is nonetheless clear. It also becomes difficult at this scale, to exclusively evoke methodological biases in the excavation of the sites, since they were theoretically the same for all the regions considered. Moreover, the most recent excavations should then have contrasted with the older research, which does not seem to be the case. We must therefore consider other reasons, which are certainly the reflection of a prehistoric reality.

This tripartition of the Mediterranean region remained generally stable throughout the 8th millennium, underlining these strong technical identities. The very marked differences in the operational sequences underlying the lithic productions in each of these zones shows that they had little or no influence on each other: each of the three zones presents an internal coherence and a specific evolution. This lack of reciprocal contact is particularly evident between the Sauveterrian technocomplex and the Maghreb, the two of them being located on either side of the MMD technocomplex throughout the whole of the 8th millennium. Exchanges become much more evident during the 7th millennium however.

3. A POPULATION DISPLACEMENT IN THE 7TH MILLENNIUM BCE?

During this period, we can observe a sudden, major shift in the lithic industries of Western Europe, corresponding to the emergence of what has recently been termed as the Second Mesolithic (Marchand, 2008). Around the middle of the 7th millennium BCE, the lithic industries show the emergence of productions of wide blades obtained by indirect percussion and pressure techniques, which were then shaped into trapezes to be hafted, here again, in a radically different manner from previous productions. This profound upheaval in the industries can be observed along all the shores of the western Mediterranean (Perrin *et al.,* 2009). Depending on the region, it has led to the recognition of various cultural entities, such as the Upper Capsian in North Africa, the Castelnovian in Italy, Croatia and the south of France, and the late Mesolithic in the Valencian region.

About ten years ago, an inventory of the very first occurrences of this Second Mesolithic in the western Mediterranean and the performance of numerous

radiocarbon datings allowed us to ascertain that the oldest productions of wide blades and trapezes could be identified in southern Italy and Sicily, around 6,800-6,600 BCE (*ibid.*). Immediately after this, between 6,600 and 6,400 BCE, these productions were found across all the northern shores (Italy, France, and Spain), so rapidly that we can term this process a "Mediterranean flash". This rapid diffusion then underwent a pause before continuing further northward and westward.

During the initial stages and the "Mediterranean flash", it is particularly notable that the conceptual sequences underlying the *chaînes opératoires* and the technical choices involved were extremely similar across the entire area concerned. Knappers thus preferentially sought small volumes of good quality siliceous material, most often pebbles, on which they then carried out pressure blade debitage on the wide face of the cores with barely any preparation. These blanks were then divided using the microburin technique to produce trapezes which, initially, were relatively short and symmetrical.

The strong dichotomy between this sequence and previous productions in all three of the zones previously identified, the extreme speed with which it spread, its similarity across all the Mediterranean shores, and the absence of any correlation with climate or environmental changes, suggests that these first two stages could reflect population displacements (Marchand and Perrin, 2017). Furthermore, the slowdown in the rate of diffusion between 6,500 and 6,400 BCE could suggest a time of assimilation and adaptation of these new techniques by the indigenous populations. This hypothesis would thus explain the greater variability in the productions which is then encountered in the following phases, after 6,400 BCE (i.e. stages 3 and 4 of Marchand and Perrin, 2017) whose expansion rather suggests a phenomenon of diffusion of concepts.

This scenario, which needs to be confirmed, obviously raises the question of the area of origin of these upheavals and possible migratory populations.

In order to identify it, we have proposed to track one of the major characteristics of these changes, namely the use of pressure techniques (Binder *et al.,* 2012). Pressure techniques are well known of in the Near East and Anatolia, but at much older dates, almost two millennia prior to those of the Second Mesolithic in the western Mediterranean. Furthermore, these operational sequences are completely different, so it is unlikely that there is a direct link between them.

The hypothesis of a Crimean origin has also been regularly suggested (Biagi and Starnini, 2016). Some recent dates show that the use of pressure techniques appeared there in the first half of the 7th millennium. However, a review of the literature does not allow the operational sequences to be identified, making comparisons difficult. In addition, the lack of any links between Crimea and southern Italy, due to the general absence of any intermediate sites, also renders the hypothesis of such a dissemination route quite uncertain. Perhaps this is simply due to the current state of research and new investigations will help bridge the geographical and chronological gaps between Crimea and southern Italy? Furthermore, this is perhaps what some recent paleogenetic analyses have implied, suggesting the identification of possible lineages between Sicilian and Central European groups or even groups from the Near East (van de Loosdrecht *et al.,* 2020). Based on just a few

skeletons from the site of Grotta de l'Uzzo, it is nonetheless difficult to generalize this particular case to a vast Mediterranean phenomenon, including the Balkans here too. The suggestion of a Crimean origin to the Second Mesolithic therefore remains a possible hypothesis, but one which cannot be demonstrated with the currently available data.

At present, the most convincing and parsimonious hypothesis is that of the origin of these upheavals in North Africa since the Upper Capsian is well known there for its generalized use of pressure techniques (Tixier, 1963).

In the advanced stages of this Upper Capsian, pressure knapping also allowed for the production of very regular, large blades, as well as very specific cores, known as "mitre" cores, which evolved at the end of the sequence toward even more regular pieces known as "rifle bullet" cores. However, some other sites show the use of small pebble cores and a much less regular form of pressure knapping. The recent collective research program MeNeMOIA "From the Mesolithic to the Neolithic in the Western Mediterranean: the African impact" ("Du Mésolithique au Néolithique en Méditerranée occidentale: l'impact africain") has allowed us to better characterize these first pressure knapping productions and to refine their chronology. This last point was made possible above all by a critical examination of all the radiocarbon dates available for this period in North Africa (Perrin *et al.,* 2020). We thus examined nearly 300 dates, but many of them were unreliable, because they were too old and had large standard deviations, because their links with the contexts were often questionable, or because they were performed on shells, etc. We thus had to reject 60% of them, although this was partially offset by the performance of around forty new measurements on short-life materials that were well contextualized.

This work has made it possible to considerably refine our chronological perception of the different groups, demonstrating a much less continuous succession, but one that is much more credible than previously (*ibid.*). For the part that interests us here, the Upper Capsian is relatively well dated between 6,600 and 5,500 BCE, a chronological range similar to that of the appearance and development of these industries in Western Europe.

As a result, we can affirm that there is a co-evolution throughout the Western Mediterranean between 6,600 and 6,400 BCE, attesting to the existence of strong links and contact between all the shores of the region.

To return to the question of the origin of this Second Mesolithic, we cannot however demonstrate that the origin lies in the Maghreb, for while the reliable dates clearly show a contemporaneity between Europe and the Maghreb, they do not attest to the anteriority of North Africa. However, insofar as the new dates that we have performed mainly concern sites situated very close to each other –for the most part, in the regions of Tebessa and Oum el Bouaghi– it is quite possible that older sites exist elsewhere. It is therefore necessary to continue researching and dating reliable contexts throughout the Upper Capsian area before any definitive conclusions can be drawn.

While it is therefore not yet currently possible to locate the origin of the upheavals of the Second Mesolithic, and while the two areas of North Africa and

Crimea are both possible, this new data nonetheless clearly shows the existence of strong links between Africa and Europe around the middle of the 7th millennium.

4. EXCHANGE AND CONTACT DURING THE NEOLITHIZATION PROCESS

The second phase of contact that can be demonstrated took place a few centuries later, during the Neolithization process.

The Neolithic reached southern Italy and Sicily from 6,100-6,000 BCE and then spread along the northern shores of the western Mediterranean basin, reaching Gibraltar and southern Portugal around 5,400 BCE (Guilaine, 2001; Perrin and Manen, 2021). While a diffusion towards North Africa from Sicily via Cap Bon would seem an obvious natural route however, this is not the case, and all the eastern part of the Maghreb was untouched by this early diffusion. Perhaps the large number of Upper Capsian sites reflects a high population density and an economically and socially stable society, which was not very open to innovation and the Neolithic upheavals? Evidence of exchanges between these Upper Capsian hunter gatherers and neighboring Neolithic groups is very rare, and is limited, for example, to a few pieces of obsidian from Pantellaria at the site of SHM-1 in Tunisia (Mulazzani, 2013).

On the other side of the Maghreb on the other hand, in northern Morocco and the region of Oran, the immediate proximity of the Iberian Peninsula makes this region a key area for identifying possible transfers and exchanges (Manen *et al.,* 2007).

While the spread of the Early Neolithic took place along the coasts in an easterly to westerly fashion, there are nonetheless regional adaptations of technical traditions, which can, in certain cases, be linked to exchanges and contact with the local populations of Mesolithic hunter gatherers. This is the hypothesis envisaged for the Early Neolithic in Portugal and Western Andalusia, which shows technical and stylistic breaks from the Franco-Iberian Cardial culture (*ibid*.). In the lithic industries, the simultaneous development of segments in both the Mesolithic and Neolithic communities is a good reflection of such exchanges and borrowings (Marchand, 2005). However, this Early Neolithic also shows the existence of specific characteristics, such as heat treatment and pressure knapping, which are found neither in regional Mesolithic traditions, nor in those of the groups of the early Mediterranean Neolithic. Once again the hypothesis of a possible North African origin arises. This seems relatively evident in terms of pressure knapping, which is well attested in the Maghreb, as we have seen, but perhaps a little less evident in terms of heating, the appearance and use of which is relatively rare in North Africa and needs to be documented in more detail.

These Portuguese and Andalusian specificities in relation to the Franco-Iberian Cardial culture are also found in the ceramic productions, with their frequent use of "bag-like" shapes, a greater variety of decorative techniques, a diversity in the impressed ware, the rare use of shells with toothed edges, the abundance of incised

decorations, and the common use of *almagra* –a method consisting in coating the vases with a mixture of clay and ocher.

Some of these characteristics thus have echoes in North Africa, such as the thermal preparation of flint blocks, the use of pressure techniques, the ocher surfaces of ceramics, and certain decorative styles. However the conical-based vessels and backed bladelets did not cross the strait for example. In the other direction, the significant development of segments in the Late Mesolithic and Early Neolithic in Portugal does not have any direct, contemporary references in North Africa either. The two main Neolithic facies in northern Morocco and the Oran region do not therefore present a strict resemblance with the Portuguese or Andalusian facies, and we can probably set aside the hypothesis of a population migration and instead assume that of reciprocal influences and hence of contact and exchanges. Interactions between the communities on either side of the Strait of Gibraltar and the Alboran Sea are thus evident over the course of the 6th millennium, without this having involved any filiations or dependencies. Despite all this, the scarcity of well-documented and correctly dated contexts in North Africa hinders the detailed analysis of these interactions.

5. ARTISTIC PRODUCTIONS AND STYLISTIC CONVERGENCES

The final point of convergence that we can examine is that of the graphic expressions of rock art documented in the mountains of the central Sahara and the Levantine art in the Iberian Mediterranean basin. The exceptional nature of Levantine art in European prehistory and its well-defined territorial distribution in the interior of the Mediterranean region caught the attention of prehistorians from very early on, who evoked a possible African origin (Capsian) for these paintings (Obermaier and Wernert, 1929). Without any direct or obvious contact between north Africa and the Iberian Mediterranean basin however, the search for its roots was subsequently limited to the regional context.

Nonetheless, the strong similarities cannot be overlooked between the Saharan and Levantine art in terms of their stylistic and technical methods, as well as their narrative and thematic schemes. The naturalistic character of the depictions and the strong narrative component of the scenes make these Iberian and Saharan horizons prime graphic resources for better understanding the socio-cultural dynamics of the communities established in these territories during the Holocene. Various constraints nonetheless condition the study and contextualization of this Levantine and Saharan art, and hence a solid and in-depth analysis of their graphical convergences: firstly, the absence of absolute datings for these paintings (Gallinaro, 2013; López-Montalvo, 2017); secondly, their complex stylistic sequencing, characterized by strong elements of continuity and rupture at the stylistic, technical, and thematic levels (Muzzolini, 1986; Le Quellec, 1998; López-Montalvo 2007); and finally, the difficulties in integrating the decorated sites into their regional archaeological contexts (Di Lernia and Gallinaro, 2010; García Puchol *et al.,* 2004). Although the chronological debate remains open, a broad chronological sequence is

accepted for the Saharan art, which is considered to extend from 19,000 BP until the emergence of the first states, between the 1st millennium BCE and the 6th century CE. The Neolithic period corresponds to the Pastoral phase (7,400-6,400 BP), which is associated with the Bovidian style in the graphic spectrum, and which is thought to have extended until 2,700 BP. Data on the Levantine art is more diffuse, both in terms of its origin and its duration. Although it began at an imprecise moment during the Neolithization process (6th millennium BCE), its cultural attribution has generated opposing hypotheses (Martí and Juan-Cabanilles, 2002). The analysis of the archaeological contexts and the distribution of the decorated shelters across the region has nonetheless led to suggestions that it began in the advanced stages of Neolithic expansion, and was thus unrelated to Neolithization (García Puchol *et al.,* 2004; Villaverde *et al.,* 2016). Despite these difficulties, certain elements allow us to note some graphical convergences which will need to be refined as we progress both in the definition of the contexts of these paintings and the possible routes of contact between the two regions.

The Saharan and Levantine art was thus generally expressed on rock faces at open air sites or more often in rock shelters. The location of some of these rock shelters in high places, at natural crossing points or close to water sources, has been associated with the practice of transhumance and pastoralism (Di Lernia and Gallinaro, 2010; Villaverde *et al.*, 2016). The art mainly involves pictorial depictions, although in the case of the Saharan horizon there is a greater presence of engravings in some styles, while they are practically absent in the Levantine art (Ruiz López, 2012). The greatest point of similarity between these two horizons is the strong presence of human figures, particularly male figures in their roles as hunters and warriors. In both cases, the emergence of the human figure implies a break with previous graphic horizons –the "Bubalian" in the Sahara (Lhote *et al.,* 1989) and the rare linear geometric manifestations associated with the last hunter gatherers in Iberia (Fortea, 1975).

The human figure appears in Saharan art from the time of the "Round Head" tradition, even if it is only from the "Bovidian" tradition that these representations take on a greater dynamism and a more naturalistic format. In the case of Levantine art, in the northern zones of the Levantine regions and the province of Valence the stylistic sequences show an initial phase, known as the "Pachypodous" horizon, which was also characterized by large human figures depicted in a clearly naturalistic and dynamic format (López-Montalvo, 2007; Martínez Rubio, 2010). This phase then gave way to large figures tending towards a stylistic stereotype that was less naturalistic and disproportionate (the "Cestosomatic" phase). It is these initial phases –the Bovidian, Pachypodous and Cestosomatic– that allow us to note the significant graphical convergences between the Saharan and Levantine art: figures painted in solid red ocher, profile views, and muscular bodies which respect the anatomical proportions. Internal details are generally absent, especially in the Levantine paintings. White pigment is used in both horizons to represent either hairstyles, clothing or body paintings.

Regarding the themes represented, it is male figures that dominate the scenes in all cases. Such figures appear in scenes depicting social and economic activities,

such as hunting and violent confrontations. It is notable that the themes depicted in the Saharan regions are much richer and the importance of social and community dynamics appears far greater than in the Levantine art. The depiction of grazing scenes from the Bovidian phase, and the introduction of carts and domestic horses and weapons such as swords and shields heralding the existence of metallurgy from the "Bitriangular" stylistic phase, reflect a long chronology of depictions in the Sahara. In contrast, the themes of the Levantine art appear to be limited to hunting scenes, and (though to a lesser extent) scenes of violence, while other economic activities, such as harvesting honey, and social activities are clearly anecdotal (López-Montalvo, 2007). We do not observe such a marked change either in the activities or in the material culture represented in the Levantine art as to give it a broad chronology ranging beyond the Chalcolithic. In social terms, group confrontations and violence are rarely depicted in these two regions, and in both cases scenes with a violent component seem to become more important during later phases of the sequence. In terms of social structures, the presence of women is less significant in both these horizons than that of men, although depictions of women are even less notable in the Iberian horizon. In general, they appear in social scenes and are not armed-weapons being a distinctive feature reserved for men (Escoriza, 2002; López-Montalvo, 2018). Both male and female worlds seem to have been quite distinct and separate from each other in the two regions. The human figures therefore appear to have been constructed through filters of gender and social identity.

When compiled together, all these common elements can make us question the idea of a simple convergence. Beyond the stylistic, technical, and even thematic aspects, which are very dependent on the social and economic dynamics specific to each region, what must be noted is that the emergence of pictorial forms of naturalistic expression and narrative at open air sites, in which human figures played a major role, seem to be associated with the beginning or the early phases of Neolithic expansion both in north Africa and the Iberian Mediterranean basin. These avenues of research need to be explored more deeply however, with large-scale research programs to determine whether this is a matter of real cultural transfer, one-off influences, or simple graphical convergences.

6. CONCLUSION

This rapid overview of potential contact and influences between Africa and Europe in the early Holocene suggests a variable and shifting situation (fig. 4).

As far as we know, there is no clear evidence of such contact before the middle of the 8th millennium. It is possible that exchanges took place in the second half of this millennium, but this remains to be confirmed and seems at most to concern only a few typological characteristics of flint projectile points. In contrast, this period seems to have undergone a tripartition of the Mediterranean region according to latitude, perhaps due to specific climate conditions (Perrin, 2019b).

Whatever the case, much more intense contact appears to have taken place between 6,600 and 6,400 BCE, with the spread of the blade and trapeze industries,

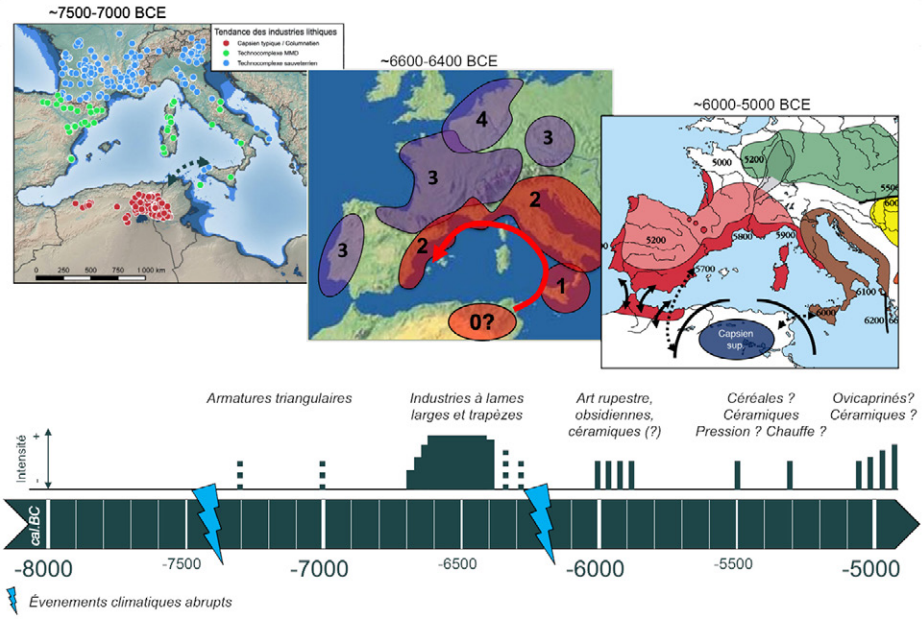

Fig. 4. Overview of the main moments of contact between North Africa and Europe and their estimated intensity.

which several arguments suggest could have resulted from a population displacement, but whose origin remains to be defined. This contact seems to have ended more or less at the same time as the 8.2 kyBP climate event, without it being possible to establish any causal link for the moment (Marchand and Perrin, 2017). The geographical expansion of the Second Mesolithic then continued mainly through processes of transfer, adoption and reinterpretation of these innovations by the populations of indigenous hunter gatherers.

Subsequently, in the 6th millennium, ad hoc contact seems to have taken place on a regular basis, allowing for reciprocal exchanges and influences, but over relatively short geographical distances and only involving a few specific elements (ceramic styles, pressure knapping, and so forth).

This initial overview obviously remains to be refined, both from a chronological point of view and by broadening the analytical focus to other categories of remains and resources. It does, however, clearly show that North Africa played an integral part in the set of influences at work in recent prehistory and that it must, as such, be incorporated in a standardized manner into all our reasoning and scenarios.

REFERENCES

Araújo Ana-Cristina et Almeida, Francisco (eds.) (2013): *Barca do Xerez de Baixo: um testemunho invulgar das últimas comunidades de caçadores-recolectores do Alentejo interior,* Memórias de Odiana, 2.ª Série n.º 3, Beja / Evora.

Barrière Claude (1955): «Les civilisations tardenoisiennes en Europe occidentale», *Bulletin de la Société préhistorique française*, vol. 52, n.º 34: 204206.

Beltrán, Antonio (1968): *Arte Rupestre Levantino*, Monografías arqueológicas, 4, Seminario de Prehistoria y Protohistoria, Zaragoza, Universidad de Zaragoza, Facultad de Filosofía y Letras.

Biagi, Paolo et Starnini, Elisabetta (2016): «The Origin and Spread of the Late Mesolithic Blade and Trapeze Industries in Europe: Reconsidering J.G.D. Clark's Hypothesis Fifty Years After», in Ţerna, Stanislav, Govedarica, Blagoje (dir.), *Interactions, changes and meanings. Essays in honour of Igor Manzura on the occasion of his 60th birthday*, Kishinev, University of High Anthropological School: 3345.

Binder, Didier, Collina, Carmine, Guilbert, Raphaëlle, Perrin, Thomas et García Puchol, Oreto (2012): «Pressure Knapping Blade Production in the North-Western Mediterranean Region during the 7th millennium cal B.C.», in Desrosiers Pierre M. (dir.), *The Emergence of Pressure Blade Making: From Origin to Modern Experimentation*, Heidelberg, Springer Verlag: 199218.

Breuil, Henri (1912): «Les Subdivisions du Paléolithique supérieur et leur signification», *Actes du 14ème Congrès international d'Anthropologie et d'Archéologie Préhistorique, Genève 1912*: 174.

Clarke, David L. (1978): *Analytical archaeology*, 2nd edition, London, Methuen.

Dachy, Tiphaine, Guéret, Colas, Campmas, Émilie, Simonnet, Robert, Bon, François et Perrin, Thomas (2018): «Saint-Trivier/Chabet el Houidga (Mascara, Algérie): nouvel éclairage sur un faciès méconnu du début de l'Holocène: le Columnatien», *Bulletin de la Société préhistorique française*, vol. 115, n.º 2: 215251.

Di Lernia, Savino et Gallinaro, Marina (2010): «The date and context of Neolithic rock art in the Sahara: engravings and ceremonial monuments from Messak Settafet (south-west Libya)», *Antiquity,* 84: 954-975.

Escalon de Fonton, Max (1966): «Du Paléolithique supérieur au Mésolithique dans le Midi méditerranéen», *Bulletin de la Société préhistorique française*, vol. 63, n.º 1: 66180.

Escoriza, Trinidad (2002): «Representations of women in Spanish Levantine rock art: an intentional fragmentation», *Journal of Social Archaeology,* 2 (1): 81-108.

Fortea, Javier (1975): «En torno a la cronología relativa del inicio del arte levantino (avance sobre las pinturas rupestres de la Cocina)», *Papeles del Laboratorio de Arqueología de Valencia,* 11: 185-197.

Gallinaro, Marina (2013): «Saharan Rock Art: Local dynamics and wider perspectives», *Arts,* 2: 350-382.

García Puchol, Oreto, Molina Balaguer, Lluis et García Robles, María Rosa (2004): «El arte levantino y el proceso de neolitización en el arco mediterráneo peninsular: el contexto arqueológico y su significado», *Archivo de Prehistoria Levantina,* 25, 61-90.

Guilaine, Jean (2001): «La diffusion de l'agriculture en Europe: une hypothèse arythmique», *Zephyrus*, vol. 5354: 267272.

Kozlowski, Stefan Karol (1976): «Les courants interculturels dans le Mésolithique de l'Europe occidentale», in Kozlowski, Stefan Karol (dir.), *Les civilisations du 8e au 5e millénaire avant notre ère en Europe: paléoenvironnement, structures d'habitat, outillages, économie. Colloque XIX, Nice, mardi 14 septembre (1976), IXe Congrès*, Paris, Centre national de la recherche scientifique: 135160.

Lanfranchi, (de) François (1998): «Prénéolithique ou Mésolithique insulaire?», *Bulletin de la Société préhistorique française*, vol. 95, n.º 4: 537546.

Lambeck, Kurt et Bard, Edouard (2000): Sea-level change along the French Mediterranean coast for the past 30 000 years, *Earth and Planetary Science Letters,* 175, 3, 203222.

Le Quellec, Jean Loïc (1998): *Art rupestre et préhistoire du Sahara, le Messak Libyen,* Paris, Editions Payot et Rivages.

Lhote, Henri, Camps, Gabriel et Souville, Georges (1989): «Art rupestre», *Encyclopédie berbère,* 6. http://journals.openedition.org/encyclopedieberbere/2599 ; DOI: https://doi.org/10.4000/encyclopedieberbere.2599.

Linstädter, Jörg (2016): «Climate induced mobility and the missing Middle Neolithic of Morocco», in Reindel, Markus, Bartl, Karin, Lüth, Friedrich et Benecke, Norbert (dir.), *Palaeoenvironment and the Development of Early Settlements Proceedings of the International Conferences Palaeoenviroment and the Development of Early Societies (Şanlıurfa / Turkey, 5-7 October 2012) The Development of Early Settlement in Arid Regions (Aqaba / Jordan, 12-15 November 2013)*, Rahden/Westf.–Leidorf, Verlag Marie Liedorf GmbH: 6380.

Lo Vetro, Domenico et Martini, Fabio (2016): «Mesolithic in Centrale-Southern Italy: Overview of lithic productions», *Quaternary International*, vol. 423: 279302.

López Montalvo, Esther (2007): *El análisis interno del arte Levantino: la composición y el espacio a partir de la sistematización del núcleo Valltorta-Gassulla,* Publicacions de l'Universitat de València, Valencia.

López Montalvo, Esther (2018): Hunting scenes in Spanish Levantine rock art: An unequivocal chrono-cultural marker of Epipalaeolithic and Mesolithic Iberian societies? in García, Inigo, López-Montalvo, Esther et Manen, Claire, *The Neolithisation of the Western Mediterranean: New Debates about an Old issue,* Special Issue of Quaternary International 472 (B): 205-220.

López Montalvo, Esther, Roldán, Clodoaldo, Badal, Ernestina, Murcia-Mascarós Sonia et Villaverde, Valentín, (2017): *« Identification of plant cells in black pigments of prehistoric Spanish Levantine rock art by means of a multi-analytical approach. A new method for social identity materialization using* chaîne opératoire », PLoS ONE 12(2): e0172225. https://doi.org/10.1371/journal.pone.0172225.

Manen, Claire, Marchand, Grégor, Carvalho (de), António Faustino (2007): «Le Néolithique ancien de la péninsule Ibérique: vers une nouvelle évaluation du mirage africain?», in Évin, Jacques (dir.), *Un siècle de construction du discours scientifique en préhistoire, volume III*, Paris, Société préhistorique française: 133151.

Marchand, Grégor (2005): «Contacts, blocages et filiations entre les aires culturelles mésolithiques et néolithiques en Europe atlantique», *L'Anthropologie,* vol. 109: 541-556.

Marchand, Grégor (2008): «Dynamique des changements techniques sur les marges du Massif armoricain de l'Azilien au Premier Mésolithique», in Fagnart, Jean-Pierre, Thévenin, André, Ducrocq, Thierry, Souffi, Bénédicte et Coudret, Paule (dir.), *Le début du Mésolithique en Europe du Nord-Ouest : Actes de la table ronde d'Amiens, 9 et 10 octobre 2004*, Paris, Société préhistorique française: 5164.

Marchand, Grégor et Perrin, Thomas (2017): «Why this revolution ? Explaining the Late Mesolithic the technical shift in Southwestern Europe during the 7th millennium cal. BC», in Kelly, Robert L. et Naudinot, Nicolas (dir.), *79th Annual Meeting of the Society for American Archaeology, Austin (Texas, USA)*, Oxford, Quaternary International, vol. 428: 7385.

Martí Oliver, Bernat et Juan-Cabanilles, Joaquim (2002): «Les decoracions ceràmiques neolítiques i la seua relació amb les pintures rupestres dels abrics de la Sarga», in Hernández, M. et Segura Martí, J.M. *La Sarga. Arte rupestre y territorio*, Alcoy, Ayuntamiento de Alcoy y Caja de Ahorros del Mediterráneo: 147-170.

Martínez Rubio, Trinidad (2010): *Evolució i pautes de localització de l'art rupestre post-paleolític de Millares (València) i el seu entorn geogràfic comarcal. Aproximació al territori des de l'art*, Tesis doctoral inédita, Universitat de València.

Mulazzani, Simone dir. (2013): *Le Capsien de Hergla (Tunisie). Culture, environnement et économie*, Kiel, Africa Magna Verlag.

Muzzolini, Alfred (1986): *L'art rupestre préhistorique des massifs centraux sahariens,* British Archaeology Reports, Cambridge, Monographs on African Archaeology 16, B.A.R. International series, 318, Oxford.

Obermaier, Hugo et Wernert, Paul (1929): *La edad cuaternaria de las pinturas rupestres del Levante Español,* Memoria de la Soc. Esp. de Historia Natural XI, Madrid.

Perlès, Catherine (1987): *Les industries lithiques taillées de Franchthi, Argolide, Grèce*, Bloomington, Indiana university press.

Perlès, Catherine (1995): «La transition Pléistocène / Holocène et le problème du Mésolithique en Grèce», in Villaverde Bonilla, Valentín (dir.), *Los últimos cazadores: transformaciones culturales y económicas durante el Tardiglaciar y el inicio del Holoceno en el ámbito mediterráneo*, Alicante, Instituto de Cultura Juan Gil-Albert-Diputacion de Alicante: 179209.

Perrin, Thomas (2019a): «BDA: une Base de Données Archéologique collaborative en ligne», *Bulletin de la Société préhistorique française*, vol. 116, n.º 1: 159162.

Perrin, Thomas (2019b): *Le temps des derniers chasseurs. Aspects chronoculturels des sociétés des débuts de l'Holocène en Méditerranée occidentale*, Thèse d'habilitation à diriger des recherches, Université Toulouse Jean-Jaurès, Toulouse, 387 + 81 + 171 pp.

Perrin, Thomas, Dachy, Tiphaine, Guéret, Colas, Lubell, David, Chaïd-Saoudi, Yasmina et Green, William (2020): «Pressure knapping and the timing of innovation: new chrono-cultural data on prehistoric groups of the early Holocene in the Maghreb, northwest Africa», *Radiocarbon*, vol. 60: 151.

Perrin, Thomas et Defranould, Elsa (2016): «The Montclus rock shelter (Gard) and the continuity hypothesis between Ist and IInd Mesolithic in southern France», *Quaternary International*, vol. 423: 230241.

Perrin, Thomas et Manen, Claire (2021): «Potential interactions between Mesolithic hunter-gatherers and Neolithic farmers in the Western Mediterranean: The geochronological data revisited», *PLOS ONE,* 16 (3), https://doi.org/10.1371/journal.pone.0246964.

Perrin, Thomas, Marchand, Grégor, Allard, Pierre, Binder, Didier, Collina, Carmine, García Puchol, Oreto et Valdeyron, Nicolas (2009): «Le second Mésolithique d'Europe occidentale: origines et gradient chronologique (The late Mesolithic of Western Europe: origins and chronological stages)», *Annales de la Fondation Fyssen*, vol. 24: 160169.

Ripoll, Eduardo (1964): «Para una cronología relativa del arte levantino español», in *Prehistoric art of the Western Mediterranean and the Sahara,* New York/Barcelona: Wenner Green Foundation for Anthropological Research: 167-175.

Rozoy, Jean-Georges (1971): «Tardenoisien et Sauveterrien», *Bulletin de la Société préhistorique française*, vol. 66, n.º 1: 345374.

Rozoy, Jean-Georges (1978): *Les derniers chasseurs : l'Epipaléolithique en France et en Belgique : essai de synthèse*, Reims, Société archéologique champenoise.

Sheppard, Peter J. (1987): *The Capsian of North Africa : stylistic variation in stone tool assemblages*, Oxford, B.A.R.

Tixier, Jacques (1963): *Typologie de l'Epipaléolithique du Maghreb*, Paris, Arts et Métiers graphiques.

Valdeyron, Nicolas (2008): «Sauveterrien et Sauveterriano : unité ou diversité du premier mésolithique en France méridionale et en Italie du nord», *Pallas,* 76, 247-259.

Vignard, Edmond (1923): «Une Nouvelle industrie lithique: le Sébilien», *Bulletin de l'Institut français d'Archéologie orientale*, vol. 22: 176.

Villaverde, Valentín, Martínez, Rafael, Guillem, Pere Miquel, López-Montalvo, Esther et Domingo, Ines (2012): What do we mean by Levantine rock art ? in Garcia, Julio, Collado, Hipólito et Nash, George, *The Levantine Question,* Archaeolingua, Budapest: 81-116.

Villaverde, Valentín, Martínez Rubio, Trinidad, Guillem Calatayud, Pere Miquel, Martínez Valle, Rafael et Martínez Álvarez, José Ángel (2016): Arte rupestre y hábitat en la prehistoria del Riu de les Coves: aproximación a la cronología del arte Levantino a través de la red de caminos óptimos, in *Del Neolític a l'edat del Bronze en el Mediterrani occidental. Estudis en homenatge a Bernat Martí Oliver,* Trabajos varios del SIP, 119: 501-520.

Visentin, Davide (2018): *Early Mesolithic Technical Systems of Southern France and Northern Italy,* Oxford, Archaeopress.

Zilhao, João (2014): «Early Prehistoric navigation in the Western Mediterranean: implications for the Neolithic transition in Iberia and the Maghreb», *Eurasian Prehistory*, vol. 11, n.º 12: 185200.