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Jean Guilaine, Claire Manen

► **To cite this version:**

Jean Guilaine, Claire Manen. From Mesolithic to Early Neolithic in the western Mediterranean. Going over: The Mesolithic-Neolithic Transition in the North-West Europe, 2005, Cardiff, United Kingdom. pp.21-51. hal-00721114

HAL Id: hal-00721114

<https://hal.science/hal-00721114>

Submitted on 26 Jul 2012

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From Mesolithic to Early Neolithic in the western Mediterranean

JEAN GUILAINE & CLAIRE MANEN

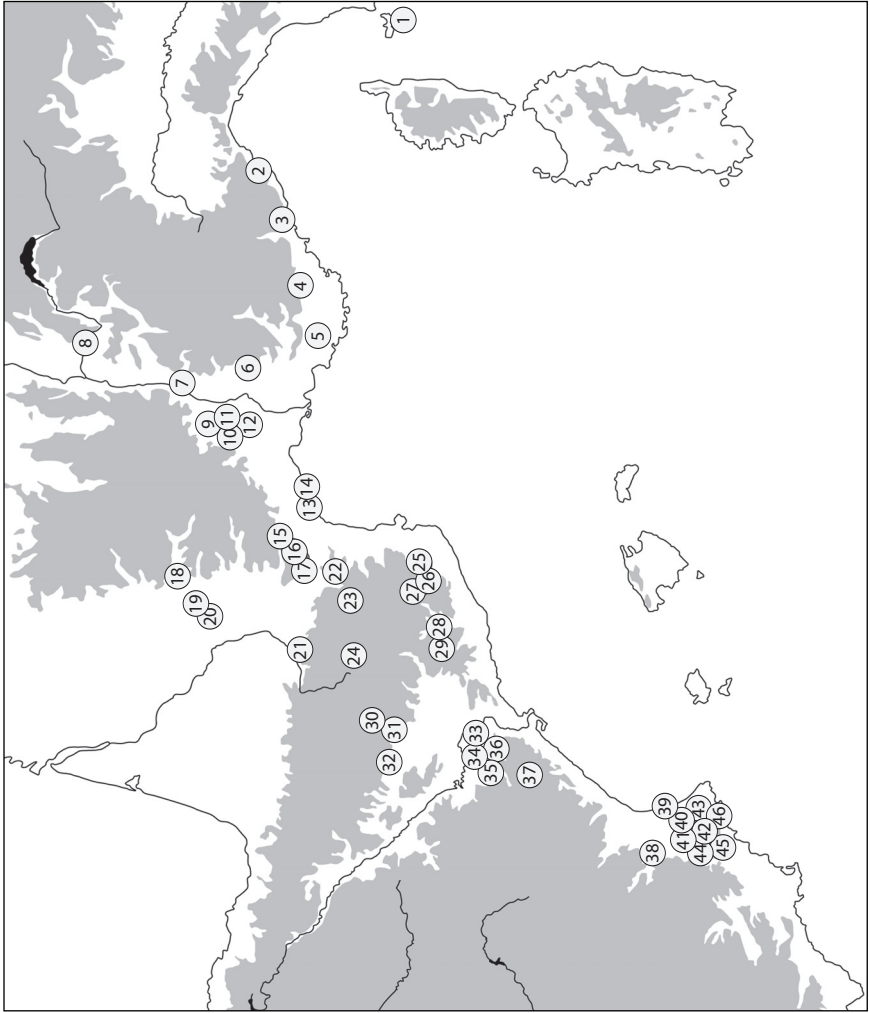
INTRODUCTION

THE TRANSITION FROM the Mesolithic to the Early Neolithic in the western Mediterranean is a stimulating subject for more than one reason. First, the region's geographic position means that it is a case of 'distant Neolithisation' (between 2000–3500 km) from the presumed epicentre of Neolithisation in south-east Asia, around the Turko-Syrian border. Attempting to grasp the economic, social or symbolic differences compared with the 'parent region' is in itself a challenging exercise. Indeed, this remoteness, associated with the idea of a substantial and dynamic indigenous substratum, has frequently fostered the idea that this zone could have 'toppled' into the Neolithic by a process of acculturation of the native populations. For many years debates have in fact opposed upholders of a process of colonisation by maritime routes and those in favour of a transition merely due to cultural dissemination and local adaptation of farming or other aspects of the Neolithic. How, on the basis of archaeological data and their interpretation, can these diverse questions be approached today, and what conclusions can be drawn from them?

The geographical context taken into consideration here is that of the broad western Mediterranean (Fig. 1), from Liguria (northern Italy) to the Valencian region (Mediterranean Spain). The French regions will be more specifically examined, but there will be frequent comparisons with the Mediterranean shores of the Iberian peninsula.

THE LAST HUNTER-GATHERERS

Only the Final Mesolithic will be considered here, with no attempt to explain the genesis of the cultural complexes involved.



Geographical distribution: a state of research, or ecological selection?

The Mesolithic populations are still poorly known. Along the coast from Liguria to Valencia there are relatively dense concentrations of sites (Lower Ebro and southern Catalonia, Valencia) and zones completely empty of any settlements (Liguria and coastal Catalonia). Is this due to an ecological selection of certain sectors to the detriment of others? It has often been observed that sites of contacts between valleys and medium-altitude mountains are privileged: the heart of the Causses region, or the Upper Segre for instance. However, coastal or sub-coastal (Châteauneuf) occupations are also known. The distribution map of Iberian sites grouping all those dated to between 6500 and 6000 cal BC points to a mainly peripheral, but fairly even, distribution (Juan-Cabanilles & Martí Oliver 2002). While the notion of systematic 'poles' seems plausible, it is certainly likely to be qualified under the effects of a more balanced research policy. Indeed, there are areas where Mesolithic and Cardial populations co-exist (such as western Provence and Valencia), and others where they are mutually exclusive.

In addition, the effects of a contrasted, unevenly spread research background cannot be neglected. The destruction of coastal sites due to the Versilian transgression should also be envisaged. Other possible culprits are erosive crises which may have led to the truncation of deposits in caves or rockshelters (such as Balma Margineda), and *a fortiori* on open-air sites. The latter are, moreover, very poorly known; most of the evidence comes from

Figure 1. Location of the main sites mentioned in text. 1. Secche, Isola del Giglio, Italy 2. Arene Candide, Finale Ligure, Italy 3. Pendimoun, Alpes-Maritimes, France 4. Fontbrégoua, Salernes, Var, France 5. Font des Pigeons, Châteauneuf les Martigues, Bouches du Rhône, France 6. Unang, Malemort de Comtat, Vaucluse, France 7. Lalo, Espeluche, Drôme, France 8. Grande-Rivoire, Sassenage, Isère, France 9. Montclus, Gard, France 10. Oullins, Le Garn, Gard, France 11. L'Aigle, Méjannes-le-Clap, France 12. Bourbon, Cabrières, Gard, France 13. Peiro Signado, Portiragnes, Hérault, France 14. Pont de Roque-Haute, Portiragnes, Hérault, France 15. Camprafaud, Ferrières-Poussarou, Hérault, France 16. Abeurador, Félines-Minervois, Hérault, France 17. Gazel, Sallèles-Cabardès, Aude, France 18. Cuzoul, Gramat, Lot, France 19. Le Martinet, Sauveterre-la-Lémence, Lot-et-Garonne, France 20. Borie-del-Rey, Blanquefort-sue-Briolance, Lot-et-Garonne, France 21. Buholoup, Cazères, Haute-Garonne, France 22. Jean Cros, Labastide-en-val, Aude, France 23. Dourgne, Fontanès-de-Sault, Aude, France 24. Balma Margineda, St Julia, Andorra 25. La Draga, Banyoles, Gerona, Spain 26. Pasteral, La Cellera del Ter, Gerona, Spain 27. Avelanner, Les Planes d'Hostoles, Gerona, Spain 28. Lladres, Vascarisses, Barcelona, Spain 29. Frare, Matadepera, Barcelona, Spain 30. Forcas, Graus, Huesca, Spain 31. Moro, Olvena, Huesca, Spain 32. Chaves, Casbas, Huesca 33. Costalena, Maella, Aragon, Spain 34. Pontet, Maella, Aragon, Spain 35. Secans, Aragon, Spain 36. Botiqueria, Mazaléon, Aragon, Spain 37. Cingle del Mas Nou, Ares del Maestre, Valencia, Spain 38. Carasol de Vernissa, Valencia, Spain 39. El Collado, Oliva, Valencia, Spain 40. Cova de l'Or, Beniarrés, Valencia, Spain 41. Barranc del Castellet, Valencia, Spain 42. Cova dels Pilars, Valencia, Spain 43. Coveta del Moro, Valencia, Spain 44. Cova de la Sarsa, Bocairente, Valencia, Spain 45. Mas d'Is, Penàguila, Valencia, Spain 46. Cova del Cendres, Teulada, Valencia, Spain.

deposits in shelters and cavities. The great dearth of Final Mesolithic sites often remains enigmatic. What should be thought of the fact that Mesolithic series often end in caves and shelters during the Middle-Late Mesolithic (such as Fontbrégoua c51, or Abeurador c3)? The total absence of any Final Mesolithic in certain islands which were otherwise fairly well frequented during the ninth and eighth millennia cal BC, such as Corsica, may be explained by the interruption of visits by mobile groups based on the continent. It is therefore on the continent that the explanation of this halt in insular exploration should be sought.

Techno-cultural aspects

The Final Mesolithic in the north-western Mediterranean presents some general characteristics: good knowledge of flint deposits, the obtaining of standard blades, use of the microburin technique, and trapezoidal or triangular microliths.

Some slight differences can, however, be observed with respect to the principal complexes identified. The western version of the Castelnovian (as opposed to the eastern Castelnovian from the karst, the Adige valley, Emilia or the Alpine forelands in Lombardy) is known in Provence, along the Rhône route and in the western Alps. The known sites are few and far between. Whole areas are lacking in any data (western Liguria: the region of Early Neolithic Ligurian impressed ware sites; eastern Provence). The characteristic technical features are a standardised blade production technique, asymmetric trapezes (Châteauneuf trapezes)—sometimes practically triangles due to reduction of the small base—and rhombuses (Binder 1987; 2000; Escalon de Fonton 1956; 1971).

The ‘Gazel-Cuzoul’ group stretches from the Pyrenees (Gazel, Dourgne, Buholoup) to the Aquitaine borders of the Massif Central (Le Martinet, La Borie del Rey, Le Cuzoul de Gramat). In Languedoc and the Pyrenees, the poor quality materials (Thanetian flint, Pyrenean rocks, quartz) explain the low proportion of blades. The most original pieces are the ‘Gazel points’: triangular points with abrupt crossed retouch on the back, flat inverse retouch on the base and thinning retouch on the faces (Barbaza 1993; Guilaine 1973).

In the Iberian peninsula, where the contemporary Mediterranean facies have long been designated by the general term of ‘Geometric Complex’ (Fortea Perez 1973), the following groups can be distinguished for the final phases of the Mesolithic:

The Segre Basin group. At Forcas II, the levels for the end of the Epipalaeolithic (III, IV) contain triangular and trapezoidal abruptly retouched microliths with use of the microburin (Utrilla 2002).

The Lower Ebro group (Botiqueria, Costalena, Pontet, Secans). Trapezes, short or asymmetric, often with one or two concave sides, are associated with scalene triangles also presenting one or two concave sides (Costalena c3). ‘Thorn’ triangles are sometimes present (Botiqueria c4; Pontet e) (Barandiaran & Cava 1981; 1989; Utrilla 2002).

The ‘Cocinian’ group in the region of Valencia/Alicante. This is sometimes subdivided into two cores: Central Valencian and Lara-Arenal (Bernabeu Aubán 2002). The ‘Cocina II’ group is characterised in particular by trapezes and triangles with concave edges (Cocina-type triangles), use of the microburin technique, and Montbani bladelets (Fortea Perez 1971; Juan-Cabanilles 1990; 1992).

Economy

The seventh and sixth millennia cal BC (a period which, in the western Mediterranean, includes the last hunter-gatherer populations and the first farmers) are characterised by the maximum development of the post-glacial forest. The image of a generalised oak forest can sometimes be moderated; naturally open spaces could also exist, for example at Lalo (Drôme: Beeching 2003). Hunting was essential; red deer, boar and roe deer were the most frequent prey. Ibex were also stalked in high-altitude zones. There is little evidence concerning plant gathering, mainly attested on earlier sites (Abeurador, Fontbrégoua: lentil, chickling vetch, pea, vetch, chick pea); it must, however, have continued (Courtin 1975; Vaquer & Barbaza 1987). Recently, taxa of *Fabaceae*, *Lens sp.*, *Vicia cf. tetrasprema* and *Vicia/Lathyrus* have been identified in the Mesolithic levels of the cave at Gazel (Laurent Bouby, *pers. comm.*). Dried fruits (hazelnuts) are often attested (Dourgne), as are the remains of pulpy fruits (La Margineda: blackberry, sloe, pistachio, fruit of the dogwood-tree) (Marinval 1995). Mollusc collecting was common, whether from the sea (as at Châteauneuf) or land (as at Dourgne and Gazel).

The question of the possible ‘rearing’ of ovicaprins during the Final Mesolithic, proposed for a time (for example at Gazel and Dourgne), has been reconsidered, with probable Neolithic ‘pollution’ or ‘palimpsest strata’ telescoping as it were the contents of successive occupation levels (cf. Dourgne: Guilaine 1993). It often turns out, indeed, that in caves and rock-shelters the ‘archaeological strata’—or those observed as such—in fact only represent the outwardly homogenous compaction of a certain number of successive visits. Brochier’s observations at Balma Margineda are edifying in this respect; each ‘layer’ proved to be the telescoping of several ‘floors’.

The temporal homogeneity of the evidence obtained from a given stratigraphic unit therefore often remains relative. Moreover, the idea that a technique (breeding) was borrowed or hunks of meat exchanged between

predators and producers is an agreeable picture, but one which is difficult to prove.

It is interesting to note that a few years after the discussion concerning possible 'Mesolithic animal husbandry', the concept of 'pre-Neolithic' agriculture appeared in France. Pollen analyses carried out in filled-in depressions or in marshy coastal areas, from the Rhône to the Ebro, have indicated clearing of the landscape with the development of ruderal plants and, sometimes, the presence of cereal pollens in horizons dated to between 6400 and 5800 cal BC, i.e. earlier than the first Neolithic settlements (for a survey see Richard 2004): Etang de Berres (Triat-Laval 1982), Embouchac (Puertas 1998), Capestang (Jalut 1995), Petit Castelou (Guenet 1995). Should the presence of fires on certain sites (Drassanes 1) be interpreted as the result of natural phenomena, or as attempts at clearing the forest by hunters (Riera i Mora 1996)? The chronology of the Neolithic spread through the Mediterranean region is today sufficiently well established with regard to its general features to consider such clearing (with cereals) as difficult to accept. The phenomenon arises in more general terms since these possible traces of pre-Neolithic human activity appear in several regions of France (Dordogne, the Loire basin, Vosges and Jura), which reveal an obvious divergence between palynological data and archaeological facts.

Chronology

The chronological distribution of dates between Italy and Spain for the various facies of the late Mesolithic is clear; they are all situated between 6600 and 6000 cal BC (Fig. 2). Without anticipating the discussion which follows, we must also observe the very clear gap between dates for the late Mesolithic and those for the Early Neolithic; the two series run side by side *c.* 6000 cal BC with practically no overlapping. It must thus be recognised that the various hypotheses regarding Mesolithic/Neolithic interaction refer to a historic reality even though the lack of precision of radiocarbon dating does not yet allow this to be demonstrated.

THE MESOLITHIC INHERITANCE

The world of the dead

One domain in which the Mesolithic and early Neolithic populations in the western Mediterranean had common features, and which thus allows the hypothesis of a possible filiation to be proposed, is that of funerary contexts and mortuary rites. In both cases, the dead are rare and inconspicuous, and

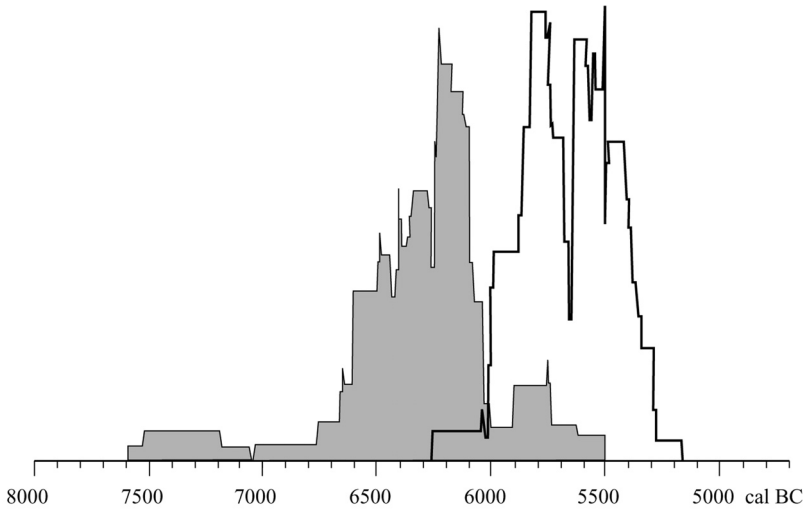


Figure 2. Comparisons of the histograms of the late Mesolithic and early Neolithic datings. In grey, late Mesolithic datings; in white, early Neolithic datings. After Manen & Sabatier 2003.

do not seem to be part of the ‘landscape’ of the living. The deceased of Impressed Ware groups remain few and far between, unlike, for example, the Neolithic of the Near East. There, from a very early date, sometimes in the PPNA, necropolises appear (Kortik Tepe, Turkey) or, in the PPNB, ‘houses of the dead’ with multiple or collective burials (‘Skull Building’, Çayönü, Turkey; ‘house of the dead’, Djade, Syria), or individual burials in dwellings, under the floors of houses (Halula, Syria). In southern France a few individuals have been found buried in caves or shelters used as temporary dwellings during the Cardial or Epicardial (e.g. Pendimoun, Unang, Baume Bourbon and Gazel: Binder *et al.* 1993; Coste *et al.* 1987; Duday & Guilaine 1980; Paccard 1987). The phenomenon also existed in the Iberian peninsula where certain individuals were buried in dwelling-caves (La Sarsa), or in small peripheral cavities: El Carasol de Vernissa, El Barranc del Castellet, Cova Negra, Coveta del Moro, Cova dels Pilars, Cova del Frontó in Valencia, and Avellaner and Cova dels Lladres in Catalonia (Bernabeu Aubán *et al.* 2001; Bosch i Lloret & Tarrus i Galter 1990; Pla & Junyent 1970). It was not until the Catalanian Postcardial that the first Neolithic necropolis appears in that geo-cultural zone: ‘Caserna de San Pau’ (Barcelona).

This type of situation echoes a model observed previously in the Late or Final Mesolithic in France, where practically no Castelnovian individuals have been found: one in the Epi-Castelnovian at Montclus (Ferembach 1976), and another at Le Rastel (Barral & Primard 1962).

In Spain, the burial at Cingle del Mas Nou was that of an individual interred in a supine position in a narrow pit with, at the level of his legs, the incomplete and disconnected remains of five other persons. This tomb is dated to 5875–5650 cal BC, i.e. the Final Mesolithic-Neolithic transition (Olària *et al.* 2005). The existence, in Valencia, of the El Collado ‘necropolis’ represents a case which is so far unique: 14 pit burials, with bodies in the flexed position and accompanied by stone objects and shell ornaments (Arias & Alvares-Fernandez 2004). It obviously calls to mind the graves in shell middens at Muge (Portugal). This short survey suggests the hypothesis of a relatively thin population density for the Mesolithic. However, assuming that the human groups during the Early Neolithic were more numerous, we also have to note the small amount of evidence available for that period. Whence the idea, proposed by Chambon (*in press*), that the bodies found so far do not represent the norm, but rather reprobates or outcasts. An archaeological argument can be added to this hypothesis; the Early Neolithic individuals found are rarely accompanied by any significant grave goods. In fact, they very often have none at all (such as Pendimoun: Binder *et al.* 1993). It therefore seems that, in the Early Neolithic, the norm could have been deliberately making bodies disappear, either by natural means (abandoning to wild animals, abandoning in rivers, and so on) or by anthropic means (dismembering, breaking of bones, cannibalism, and so on). The deceased members of the Cardial population seem to have been ‘excluded’ from the cultural landscape. As the same seems to be the case for the Final Mesolithic populations, the hypothesis of a continuance of funerary rites among the early farmers can be proposed. Basically, the Neolithisation of the western Mediterranean may not have destabilised a well established tradition among the native populations. It was only with more marked territorial claims and the appearance of more stable dwellings, and perhaps too with the emergence of social differences, that the signalling of certain deceased individuals became more obvious and that the dead became integrated, in one way or another, in the cultural landscape.

Personal ornaments

Some typical items of adornment are common to the last hunters and the Cardial populations. There are, first, perforated *Columbellae rusticae*. These shells are found on several sites, both Mesolithic (e.g. Châteauneuf, Dourgne, Costalena, Botiqueria dels Moros, El Collado, and others) and Early Neolithic (e.g. Châteauneuf, Camprafaud, Cova de l’Or, Chaves, and others). The same observation is valid for unworked, merely pierced, cardium shells.

In addition, in Cardial and Epicardial contexts, beads made of shell, stone or bone have been found which manifestly imitate the upper eyeteeth of

red deer. They are oval beads with a swollen base. They are also found in Valencia (Or and Cendres), Catalonia (Cova Pasteral and Lladres), Aragon (Chaves and Moro de Olvena) and southern France (Jean Cros, Châteauneuf and Oullins). In a context where the environment was subject to the effects of human action, this tradition underlines the continuing existence of a reference to the domain of ‘the wild’ and hunting. Of course the Cardial culture also developed at the same time items of adornment unknown to the Mesolithic populations: for instance, stone bracelets and circular beads made of shell.

Cardial art and Mesolithic art?

This problem, which would on its own merit greater development, will merely be mentioned. The debates concerning the chronology of the famous ‘Levantine art’ in the Iberian peninsula are well known. Some authors, in view of its favourite theme—hunting—have considered it to be an iconography of hunters and initially dated it to the Mesolithic, or even to the Upper Palaeolithic (Breuil, Cabré and Obermaier). Others perceived it as a long-term output, straddling the world of the hunter-gatherers and that of food producers (Almagro, Ripoll and Beltran). Finally, more recently, it has been attributed to the Neolithic and considered, due to the stylistic superpositions observed in certain shelters (such as La Sarga), to have begun after the macro-schematic art, itself envisaged as a typically Cardial production (Martí & Hernandez 1988; Hernandez Perez & Segura Marti 2002).

Bernabeu recently proposed an interesting hypothesis. In the perspective of the ‘dual’ Neolithisation model (intrusive Cardial/acclutured Mesolithic populations), he attributed Levantine art to the neolithicised native populations of the sub-continental zones (Geometric Complex with pottery). This naturalistic art would essentially have emerged during the Epicardial, as a sort of cultural statement or even one of resistance to the Cardial environment with its foreign origin. This perpetuation could explain why the native populations, although neolithicised, asserted their own artistic culture. Schematic art and macro-schematic art, stamped by a certain degree of conceptualisation or abstraction, would thus be the vectors of a Cardial iconography promoting anthropomorphism (Bernabeu Aubán 2002). It is interesting to note that this dual model, applied to the artistic domain, is also echoed in Aragon (Utrilla 2002).

Another point, of more general interest, concerns the absence of figurines in the Western Mediterranean Early Neolithic (Guilaine 1996); they are scarcely found beyond the Italian peninsula. We suggest that these objects are linked to the social functioning of the fully sedentary communities of the Near East or of south-eastern Europe. In central and western

Mediterranean zones, this stage was generally attained only in the Middle Neolithic (fifth/fourth millennia cal BC). Finding figurines in Cardial dwellings cannot of course be excluded; it would be surprising if any were found on neolithised Mesolithic sites.

The question of microliths

It is interesting to note that it is often arrowheads which serve to raise the question of tradition or rupture between hunters and farmers. This could underline the role still played by hunting in farming populations (and even if the arrowheads are sometimes microliths serving other uses). It should be recalled that in the Valencian Cardial, the microliths are for the most part trapezoidal with abrupt marginal retouch; they are obtained from laminary supports broken by flexion or percussion (Juan-Cabanilles 1990; 1992). In the Cardial at Chaves, Upper Aragon, however, the microliths are mainly double-bevelled ('doble bisel') segments (Cava 2000). In France, arrowheads from the Cardial in Provence, trapezoidal or triangular, often have abrupt or semi-abrupt retouches, sometimes associated with covering retouch on one face (Châteauneuf, Grotte de l'Aigle: Binder 1987; Roudil *et al.* 1979). A certain morphological diversity reigns (Fig. 3).

It is the development, in France, of Montclus arrowheads and, in Mediterranean Spain, of double-bevelled microliths ('doble bisel'), which gives rise to several theories.

They may be items resulting from a technical process deriving from a native practice: the presence of inverse flat retouch on the base of the triangular points of the Final Mesolithic in Languedoc, thinning retouch on the faces of the same implements (Barbaza 1993), and use of the 'double bevel' technique among some Epipalaeolithic 'Geometric Complex' populations in Mediterranean Spain (Stage C of Juan-Cabanilles and Martí). They would thus, in both cases, be a legacy from a pre-Neolithic population. Or it may be a question of Neolithic types (Montclus, segments) secondarily adopted by the hunter-gatherer cultures who had come into contact, directly or indirectly, with farmers (Marchand 1999). Their presence among predatory groups would thus reflect late horizons, contemporary with farming settlements. This argument can be supported by the increase of these types during the Mesolithic-Neolithic transition.

The problem is all the more acute in that often the chronology of the Montclus and double-bevelled segments ('doble bisel') is determined from sites in shelters or caves—i.e. locations often frequented during hunting activities—where the Mesolithic/Neolithic succession is legible. However, this type of site also presents some risks; mixed or disturbed levels may lead to questionable scenarios.

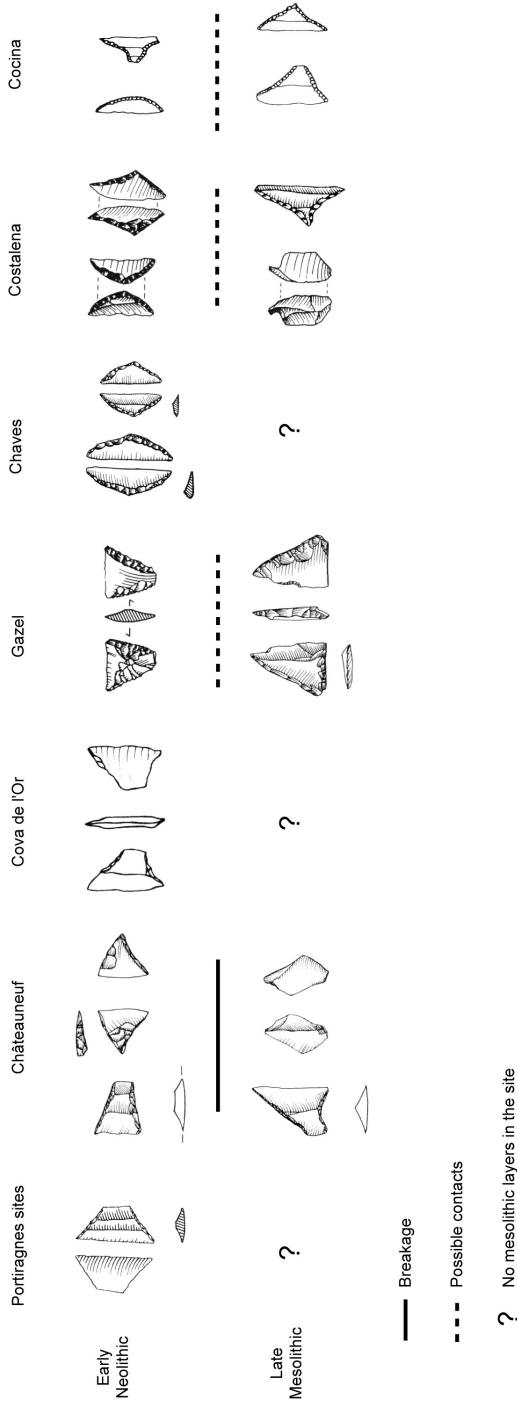


Figure 3. Some geometrical arrowheads and microburin present in Mesolithic and/or early Neolithic sites in western Mediterranean. After Briois 2000; Binder 1987; Juan-Cabanilles 1990; Barbaza 1993; Cava 2000; Utrilla 2002; Barandiaran & Cava 1989.

It should be noted, however, that on sites such as Gazel or Dourgne, the setting in place of the Early Neolithic is accompanied by a rapid redeployment pattern for microliths; the Montclus/Jean-Cros technique (direct semi-abrupt retouch, covering retouch of the convex section) replaces the Gazel points. These transformations seem to occur in a broader context of modifications to hafting techniques when Neolithisation arrives; the triangular point, or one used as a barb, is replaced in farming communities by microliths with a cutting edge.

This observation does not, however, settle the question of the origin (or origins) of these microliths. A diffusionist hypothesis is unlikely; Montclus points exist both in the Final Mesolithic and Early Neolithic levels of Franchthi Cave (Argolis, Greece) where they are, in an early period, evidence in favour of a possible native Neolithisation with borrowed technology during the seventh millennium cal BC (Perlès 1990). They do not, on the other hand, exist in either the Mesolithic (Latronico 3 cave) or the Early Neolithic (Impressa) in southern Italy, the geographical relay of the westward advance of Mediterranean Neolithisation.

No microliths of this type are known in the various Neolithic groups of central Italy (Marmotta). Finally, these microliths are unknown in the small settlements of Portiragnes where the stereotyped model is that of symmetrical trapezes obtained by the bitruncation of bladelets (Briois 2000). On the other hand, bifacially retouched microliths are known in the Impressa at Pendimoun. Arrowheads with covering retouch are found sporadically in the Tyrrhenian Cardial (Caroppu di Sirri).

Lastly, the hypothesis of a western Mediterranean genesis for these two types of microliths (Montclus, mainly known to the west of the Rhône, and double-bevelled ('doble bisel') segments, well represented in Iberian Mediterranean regions) is thus the most likely explanation, whether invented by the late Mesolithic or the early Neolithic populations in which they will proliferate.

NEOLITHISATION IN THE SOUTH OF FRANCE: ITALIC INFLUENCES

One of the lessons learnt from research over the past twenty years is that the development of the Cardial Neolithic, previously considered to be the earliest culture of the southern French Neolithic, had been preceded chronologically by small settlements of populations with a clearly Italic origin. This anteriority seems to be confirmed by the radiocarbon dates of these sites which converge around 5800–5600 cal BC. From a cultural point of view these sites, still few in number, while presenting some shared features, are not indis-

putably homogeneous. That could indicate varied origins and not ‘colonisation’ from a single locality. The impression gained from excavation of the two sites at Portiragnes is one of small dwellings, probably of limited duration, linked to a first attempt at exploiting and utilising arable coastal environments. Although a certain amount of evidence attributable to this horizon has been recorded between the Côte d’Azur and Roussillon, three sites have provided more representative information. They are the lowest level at Pendumoun, Castellar (Alpes-Maritimes) and the two open-air sites of Pont de Roque-Haute and Peiro Signado, Portiragnes (Hérault). We will describe now their principal cultural aspects, which in spite of certain similarities are far from being consistent.

Peiro Signado (Portiragnes, Hérault)

Discovered and excavated first in the late 1970s, the site of Peiro Signado completely disrupted the classical schema of the Cardial/Epicardial succession by offering direct comparisons with the famous site of Arene Candide (Liguria). The resumption of excavations by Briois has allowed the nature of the occupation to be more precisely defined.

The pottery production at Peiro Signado presents shapes of the flat-based basin type, but also bowls, bottles and cooking pots (Fig. 4). Handles are very little used: vertical or horizontal ribbon handles, knobs (sometimes perforated), tongues or strips and nipples. The great majority of the sherds studied present a decoration made by the ‘impressed groove’ technique. Other decorative techniques are used, but to a lesser degree (less than 10%): impressions made with a cardium shell, short vertical or curved incisions, some rare furrows, various impressions, more or less circular, elongated or half-moon shaped and, lastly, finger-pinched decorations. The ‘impressed groove’ technique is used to construct varied overall, extremely geometric, decorative themes: vertical or horizontal chevrons organised in bands, vertical or horizontal zigzags, or simple lines. The short impressions made with cardium shells form horizontal, vertical or oblique lines spreading in parallel across the belly of the pot. The longer impressions give structured themes of blank or hatched triangles near the lip and on the belly. The same themes are found made from circular impressions, with fingers, or grooves which are sometimes used to outline hatched triangles. From the lithic production point of view (Briois 2000, fig. 4), the raw materials used consist almost exclusively of small pebbles probably from secondary fluvial formations of the Lower Rhône. Small quantities of obsidian from the Tyrrhenian region, however, were exploited on the site. This lithic industry has a very high proportion of blades and uses the pressure technique. Tools include bladelets with lateral retouch, borers and symmetrical trapezes produced by bitruncation.

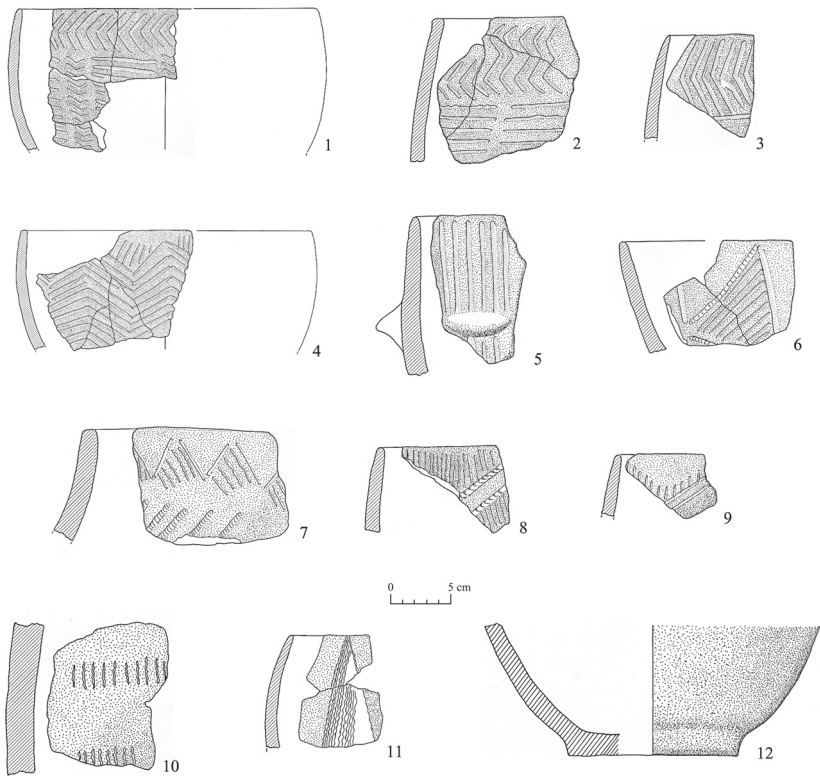


Figure 4. Shapes and decoration of the pottery production at Peiro Signado, Portiragnes, Hérault. After Manen 2002.

Pont de Roque-Haute (Portiragnes, Hérault)

Excavation of the site of Pont de Roque-Haute, also located at Portiragnes, about 3 km from Peiro Signado, has revealed a dozen pits, mutilated by ploughing, presenting, as a secondary deposit, fills of discarded rubbish. The pottery production on this site presents shapes similar to those at Peiro Signado (Fig. 5): flat-based basins, bowls, cooking pots and bottles. Handles seem to have been little used: ribbon or rolled handles, knobs, lugs and tongues; none are perforated. Among the decorative techniques, the use of the cardium shell is well represented. As a complement, various other types of impressions, but also incisions, impressed grooves and relief modelled adornments are used. The decorative themes are predominantly simple, composed of lines or parallel bands. Observation of the fragments and more complete shapes shows that the decoration generally covers the pot to a large extent. In a few rare cases, a more geometric decoration (triangles or angles)

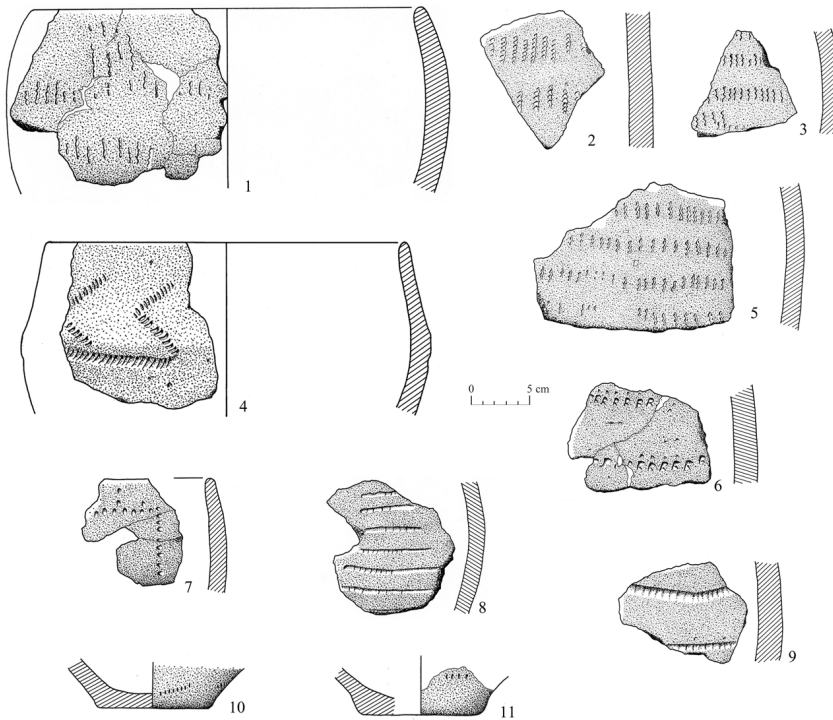


Figure 5. Shapes and decoration of the pottery production at Pont de Roque-Haute, Portiragnes, Hérault. After Manen 2002.

adorns the upper section of the pot. The lithic industry is identical to that of Peiro Signado, except for the many remains of macro-tools (grinding implements) at Pont de Roque-Haute. The blade knapping is carried out on local raw material, but also on a few pieces of obsidian from the island of Palmarola. Analysis of the faunal remains attests to well-mastered animal husbandry with in particular some specialisation in sheep. In this very early context of the first Languedoc Neolithic, it may be presumed that the occupants of Pont de Roque-Haute had acquired a long experience in animal production elsewhere (Jean-Denis Vigne, *pers. comm.*). Einkorn, emmer and barley have been identified. There is evidence of accessory predatory activities.

Pendimoun, Castellar, Alpes-Maritimes

In the Pendimoun shelter, the bottom of the stratigraphy has yielded, alongside largely monochrome ceramics, pots characterised by a decoration made with nail impressions, pinched patterns, and some discontinuous impressions of

various shells (cardium, patella, and so on). The decorative themes form horizontal bands or panels filled with lines. The ceramic shapes include spheroid or truncated conical open pots, bottles with narrow necks and small pots in the shape of a flattened dome. Flat bases are attested. Handles are mainly tongue-shaped, unperforated or with a vertical perforation. The excavator considers that Pendimoun I demonstrates connections with Apulia, the Marches and Abruzzi (Binder *et al.* 1993). However, these comparisons require refinement since the Neolithisation of the Marches and Abruzzi presents a probable chronological difference compared with the early Neolithic in Apulia. In the lithic industry, the presence of triangular geometric pieces with flat bifacial retouch and sickle elements is observed. The mammal fauna is mainly composed of domesticated species: sheep or goats and cattle. The remains of cereals point to the cultivation of emmer and barley. Gathering activities are attested. Chronologically, the early horizon of Pendimoun seems to be located between 5800 and 5600 cal BC. Above this horizon, levels related to the Cardial context have been compared, for the earliest, with the Tyrrhenian zone ('geometric Cardial') and, for the more recent, with the Cardial in Provence (zoned Cardial ware).

Discussion

What can be concluded from these data? Although all three are related to the Italian domain, these sites include a ceramic production with parallels in diverse geographic areas. Peiro Signado presents ceramic similarities with the series from the Arene Candide cave. It may thus be considered that it represents a sort of Ligurian 'bridgehead' towards the west. Pont de Roque-Haute has stronger relationships with a more southern site in the Tuscan archipelago: Giglio Island (Manen 2000). There are also resemblances to the vertical layout of the shell decoration with separate impressions to be found in southern Italy (Guilaine & Crémonesi 2003). At Pendimoun, a strong 'monochrome' element is associated primarily with 'spike' motifs and with pinched decorations and impressed edges. Thus, from a ceramic point of view, there is no cultural unity. From a lithic point of view, a certain diversity also seems apparent. As previously mentioned, the Pendimoun microliths with cutting edges are for the most part triangular, and call on flat bifacial retouching. On the contrary, arrowheads at Portiragnes are trapezoidal, made from bitruncated bladelets. The presence of obsidian from Sardinia and Palmarola points to contacts with islands in the Tyrrhenian Sea. At Pont de Roque-Haute, the abundant fauna indicates animal husbandry based for the most part on goat, associated with some cattle, whereas predatory activities remain restricted to a low level. Agriculture is shown by numerous millstones and the presence of emmer, einkorn and barley.

The impression gained is thus one of a productive system based on a well developed agro-pastoral economy. In that sense, we can speak of a 'colonisation' process. Lastly, dwellings on the Portiragnes sites seem to call largely on cob as a building material. The remains of a circular building with wooden posts have been identified at Peiro Signado (Briois & Manen in press). Seeking the chronological articulation between these different currents has become an essential approach for understanding the settlement of the first Neolithic societies in southern France.

GENESIS AND DEVELOPMENT OF THE FRANCO-IBERIAN CARDIAL

In France

Distribution and chronological evolution. In comparison with the preceding 'settler' or 'colonised' sites, the constitution of the Cardial culture in southern France seems to be, rather, the result of a more structured process of development and demographic expansion, provoking a rapid transformation of the scope of identity references. Recent research puts the accent on the variety of economic systems adopted but also on an organisation based on a mobile system of resource exploitation.

The Cardial in southern France is well installed in coastal territories, but several indications attest to its early penetration into more continental domains, in particular along the main fluvial routes, and even into highland environments (Beeching 1999; 2003). Apart from these general considerations, it has to be admitted that we have insufficient knowledge of the siting criteria for Cardial settlements and that it is difficult to identify the geo-ecological features which may have determined settlement choices for these communities. The relationship with water (coastal regions, ponds and lakes, fluvial routes, marshy or swampy zones) is, however, evident.

The chronology of the French Cardial is still subject to debate (Manen & Sabatier 2003). We are advocates of an early chronology, with the first phase of the Cardial between 5600 and 5400/5300 cal BC. Coordinated study of radiocarbon dates and ceramic styles has allowed the Cardial to be subdivided into two phases. The modalities of this evolution were identified at an early date thanks to the stratigraphy at Châteauneuf (Escalon de Fonton 1967; Courtin *et al.* 1985), and later refined (Beeching 1995; Binder 1991; Manen 2002).

Generally speaking, Cardial pottery was made with local clay to which particles of chamotte (fire-clay) were added (in particular for the early phase). The characteristic shapes are small and medium-sized pots:

basins, cooking pots, bottles, bowls and small globular pots (Figs 6 and 7). Fragments of storage jars are rare. Among the main categories of decoration, impression dominates to a large extent, followed by relief moulding. In the impression category, cardium shells represent the dominant decorative technique (over 60%). The decorative themes of the early Cardial consist of various types of impressions organised in well defined ribbons. They are frequently filled with geometric motifs (crosses, zigzags, chevrons, oblique strokes, and so on) and framed or interrupted by a border. More rarely, the

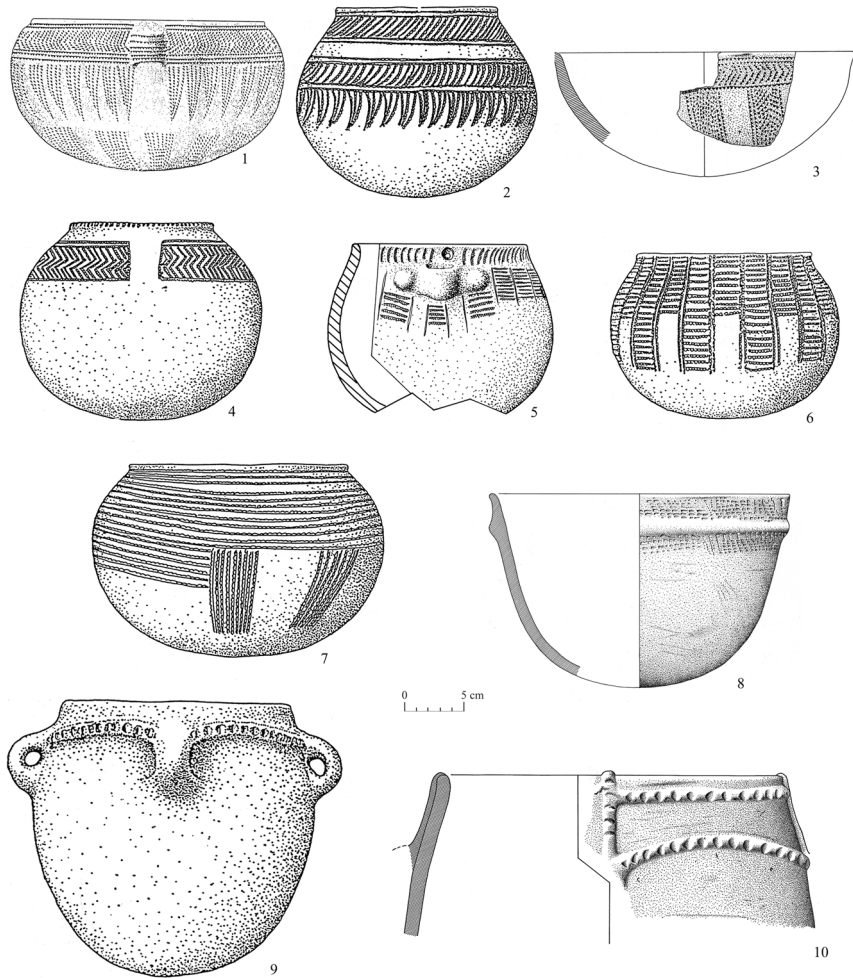


Figure 6. Pottery styles from Cardial in south of France. 1, 5: Grotte de l'Aigle; 2, 4, 6–7, 9: Baume d'Oullins; 3: Leucate; 8, 10: Grotte Gazel. After Manen 2002.

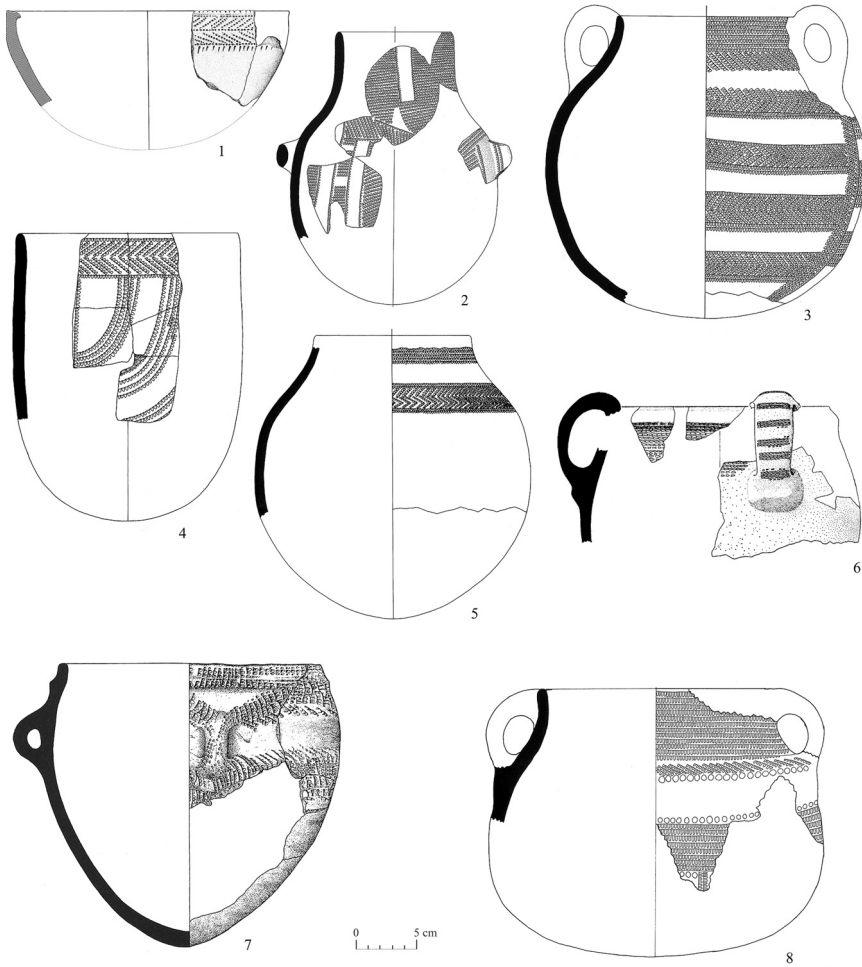


Figure 7. Pottery styles from Cardial in Catalonia. 1: Cova del Frare; 2: Cova Freda; 3: Esquerda Roques del Pany; 4–5, 8: Cova Gran; 6: Guixeres de Vilobi; 7: Cueva de Chaves. After Manen 2002.

ribbons are accompanied by ‘pendants’. The relief-moulded decorations form themes which are often simple: a horizontal cord circling the pot and repeated in parallel from top to bottom. The cords are often covered with a band of impressed motifs, and may then serve as framing or dividing features. In a more recent phase of the Cardial, the cardium shell loses its value, to the advantage of other impressed implements: finger, comb and smooth shell. The decorative themes are still structured in horizontal bands which may or may not be repeated from top to bottom of the pot. Themes of vertical bands

and areas covered with decoration are also well represented. It is above all in the filling of the bands that differences with the earlier style can be observed. This filling consists mainly of simple lines of impressions; geometrical motifs are less frequent.

The evolutionary sequence of the Cardial, which covers nearly 700 years, remains to be defined, as does the question of regional variability.

The Cardial industry associates laminary production (sickles, knives) obtained by indirect percussion with a flake industry providing denticulates and sturdy endscrapers. The characteristic geometric pieces are trapezoidal arrowheads with abrupt and also covering retouch. Distribution circuits ensured the spread of polished stone: eclogites from Piedmont and Liguria reached the Rhône, glaucophanites from the Durance region are found in Languedoc up to the borders of Roussillon (Leucate), and calcic amphibolites, probably from the Pyrenees (Ricq-de Bouard 1996).

The economy presents a fairly broad diversification. Settlements on plains, centred on agro-pastoral production, are found alongside a sector focused on exploiting ecological niches more favourable to pastoral activities and hunting. These last activities imply a mobile aspect in the economy, probably with networks structured at an early date and the use of caves for shepherding activities. Agriculture (wheat and barley) was preferentially focused on *Triticum aestivum compactum* (Marinval 1988). The long-lasting occupation of sites has not been demonstrated and there could have been frequent moves.

Formation of the Cardial

The relegation of the appearance of the Cardial to a secondary position after the Italic sites, vectors of the Neolithic 'package' (agriculture/animal husbandry/pottery/adzes), means that it has lost part of the innovative aspect attributed to it until now. Long considered by many authors as intrusive, at the head of new technologies, it has now 'come down in the world' and is henceforth envisaged as a second phase culture. Its interest is not any the less, however, for it displays a power of expansion which goes far beyond the coastal strip affected by the earliest sites of Italic inspiration, so that inland, especially, the Cardial remains the true vector of Neolithisation. As the idea of an intrusive neolithising wave borne by the Cardial has weakened, several hypotheses can be proposed for the genesis of that culture (Fig. 8).

It can be considered as consisting of a second wave of populations of external origin. By its partly coastal geographical distribution, the Cardial remains a fully Mediterranean culture, in spite of its continental breakthroughs. The only cultural horizon set on its eastern flank and likely to have provided a certain influx remains the Tyrrhenian Cardial (Latium, Tuscany,

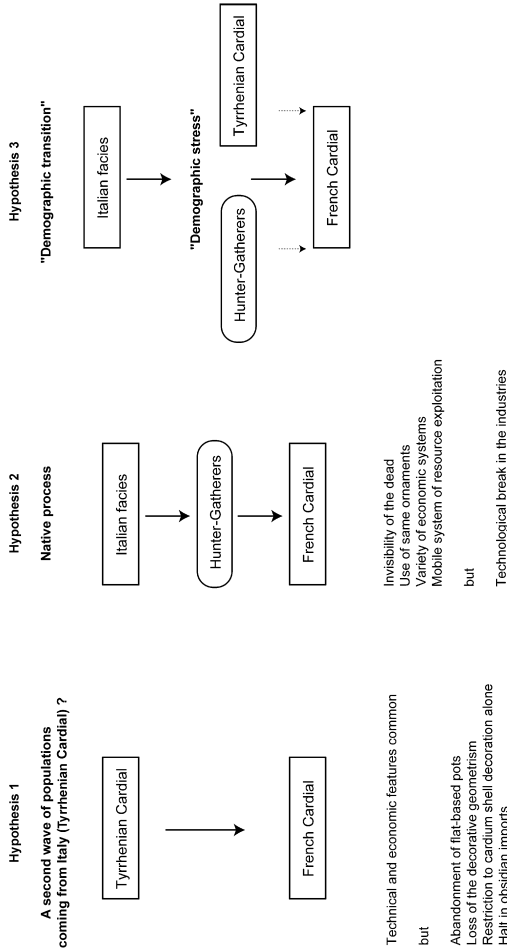


Figure 8. Hypotheses for the genesis of the Cardial culture.

Sardinia and Corsica). Apart from spatial proximity, it shares with it the taste for decoration in bands treated with shells, but the Cardial in southern France differs from that of the Tyrrhenian region in several aspects: a halt in obsidian imports, the almost complete abandonment of flat-based pots, decoration on pottery restricted to the cardium shell alone, and loss of the decorative geometrism specific to the Tyrrhenian region. It should be noted, however, that these two facies share a fairly similar management of meat resources (sheep/goat and hunting well represented), a 'light' installation on the ground, or in any case of short duration, and the non-signalling of the dead. Without excluding contacts (areas of geographical overlapping exist in eastern Provence), it seems difficult to consider the Cardial as globally imported from the Tyrrhenian zone.

The Cardial can be envisaged as a native process resulting from the conversion of local populations to the new economy introduced by the 'Italics'. In Provence, technological interruptions or breaks between the Castelnovian and the Cardial industries do not argue in favour of this option (Binder 1987). On the other hand, in western Languedoc, we have seen that 'transit terms' could exist between Gazel points and Jean-Cros or Montclus arrowheads (Barbaza 1993). More generally, certain cultural features of the Cardial—'invisibility' of the dead, use of *Columbellae* shells, and imitation deer's teeth—seem to be inscribed in a sort of native tradition. Our knowledge of the Mesolithic substratum is still too scanty and barely allows us to go beyond these generalities.

A third hypothesis could rest on a process of the 'demographic transition' type. By introducing an agro-pastoral economy, settlers of Italic origin could have provoked demographic stress, with a rapid population increase, a process encouraged by the production economy. In a few generations, a new culture would have emerged under the effect of several factors: earlier Italic influence conveying the Neolithic 'package', contacts with the Tyrrhenian zone promoting the acquisition of decorations with bands of shell impressions, and the maintenance of the native traditions (*Columbellae* and exclusion of the dead). Unlike the Italic settlements, localised and of short duration, the Cardial is organised around large interactive territories (circulation of polished tools, flint materials and certain pots, bracelets, pastoral activities), which explain its geographic extension and its long duration.

In Mediterranean Spain

Cardial and Neolithisation. The question of the Iberian Cardial will be considered more rapidly, for this culture is intrusive here and the question of its genesis does not arise in the same manner as in southern France. We do not know whether, in the Iberian peninsula, settlements of Italic origin exist as

we have seen between Liguria and the Pyrenees. The Cardial is thus in Spain the vector of Neolithisation, a prolongation from the southern French core (Fig. 9). Its distribution shows that it took root preferentially in some well defined zones (occupied at an early date during the sixth millennium cal BC): the Barcelona region, the area around Cabo de la Nao. At this early stage—c. 5500 cal BC, i.e. in the context of a rapid spread from France—it seems obviously contemporary with the Mesolithic populations strongly implanted in certain neighbouring or continental regions: Upper Aragon, Lower Ebro, Maestrazgo, the central Valencian group, and the Lara-Arenal sector (stage 3 of the evolutionary model of Juan-Cabanilles & Martí Oliver 2002).

In a second phase—the latter half of the sixth millennium cal BC—we note, as happened in the southern French evolution, the geographic (and probably also demographic) progress of the farmers, but also the setting in place of a Late Cardial/Early Epicardial duality (stage 4). Initiated at the very start of the Cardial implantation, interaction with the native populations of the ‘Geometric Complex’ led to their progressive conversion to a production economy.

At stage 5 of the previously mentioned model (Epicardial), during the first half of the fifth millennium cal BC, the farmers had completely assimilated the native populations and no isolated Mesolithic groups remained. Neolithic colonisation then spread to various points on the Meseta.

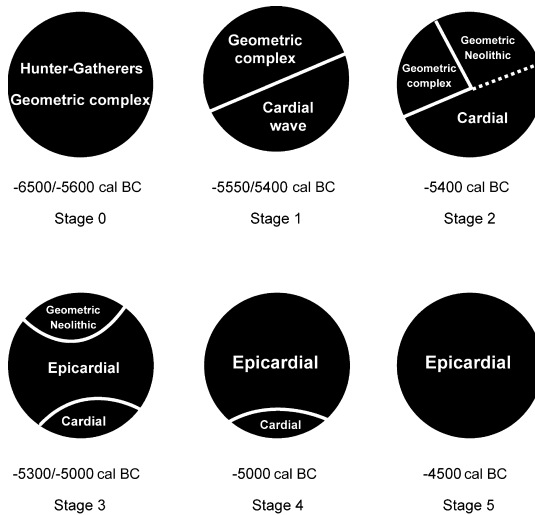


Figure 9. Experimental modelling of the Iberian Early Neolithic. After Juan-Cabanilles & Martí Oliver 2002.

While, as in southern France, research long concentrated on natural cavities, recent work has shown the advantages to be gained from the study of open-air settlements. On the 'lacustrine' site of Draga (Gerona), remains of quadrangular dwellings with wooden posts and cob have been identified (Bosch *et al.* 2000). A research project in the Serpis Basin, in the region of Alcoy, has revealed, at Mas d'Is, the remains of three Cardial huts, one with an apsidal end. Nearby, three concentric ditches, one of which is contemporary with the houses, have been identified (Bernabeu Aubán *et al.* 2003). These circular structures are reminiscent of certain southern Italian models of the end of the Early Neolithic.

Experimental models

Over the last few years a whole series of excellent research projects have enormously improved our vision of the Iberian Early Neolithic, especially in the Mediterranean zone. The Neolithisation of this area seems indeed to have occurred from the southern French Cardial which is here the vector of the Neolithic 'package'. From the two principal settlement poles previously mentioned—the Barcelona region and Cabo de la Nao—the Cardial rapidly spread to zones far inland (see the Chaves cave and Upper Aragon).

At a very early date, following a henceforth classical 'dual' model, contacts were initiated with the native populations of hunter-gatherers (Geometric Complex). The interaction, combined with certain traditions, gave rise here to the manifestation of specific 'Pericardial' cultural features: perpetuation of the lithic characteristics, a statistical rise in double-bevelled segments ('doble bisel'), a more or less well mastered assimilation of ceramic technology, with pots with no decoration or with a reinterpreted decorative theme, and progressive infiltration of production economy behaviour.

It is interesting to note that the effects are not merely one way, in the Cardial/Geometric Complex direction. The presence of double-bevelled segments ('doble bisel') in certain Cardial assemblages (as at Chaves) points to either influence from the opposite direction or the mixing of populations.

This 'continental' Neolithisation of the Geometric Complex could in part fashion the Epicardial, in parallel with a Late Cardial component. Bernabeu considers the Epicardial to be the true creator of the naturalistic Levantine art, a sort of identity reflex when faced with the intrusion of the schematic or macro-schematic art linked to the Neolithic 'package' (Bernabeu Aubán 2002).

THE EPICARDIAL

From the western Alps and the lower Rhône valley to Andalusia, the second part of the Early Neolithic is characterised in particular by pottery styles which often associate grooves and impressions arranged in bands, bundles or garlands. Groups of grooved lines edged with dots represent a sort of denominator specific to the whole of this broad western Mediterranean area. Regional stylistic nuances obviously exist over such a zone, still sufficiently evident compared with the classical general features.

This Epicardial also developed over several stages; in Languedoc, three are found at Gazel and Saint-Pierre-la-Fage. In a certain number of stratigraphies (at Châteauneuf, Gazel, Camprafaud, Cova del Frare, Cendres, and Cariguella de Piñar), the Epicardial style is established in parallel with the Cardial, which it finally eliminated. This 'secondary' stratigraphic position explains the term itself (Escalon de Fonton 1956; Guilaine 1970). The matter of its genesis is more delicate. While a gradual emergence from a Cardial substratum can be acknowledged, we are obliged to recognise that the Epicardial has a character which makes it a fully autonomous culture, not a mere epiphenomenon. The idea of a peripheral component of the Cardial in its very essence cannot be excluded. Whatever the case as far as the mechanisms are concerned (Cardial filiation and/or a 'peripheralisation' process for the Cardial), the expansionist strength of the Epicardial is obvious. In the Mediterranean regions, from the Rhône to Andalusia, it finally eliminated the Cardial and covered the whole of the initially Neolithised area. Its vitality, however, probably related to a certain demographic surge linked to agricultural expansion, led it to colonise large continental regions and to take the frontiers of the Neolithic well beyond the more limited Cardial sphere. Traces are found as far as the Alps (Grande Rivoire) and the Causse region. In the Iberian peninsula, this colonisation is in particular marked by its extension along the valleys of the large rivers flowing towards the Atlantic (Douro, Tagus, Guadiana, Guadalquivir). In so doing, the Epicardial is the vector of the Neolithic package on the central plateaus (Meseta). In western Andalusia and Portugal, the Mediterranean Epicardial appears in the form of a particular facies characterised notably by ornaments presenting panels with 'spike' incisions or impressions (Guilaine & Ferreira 1970; Zilhão 1992).

OTHER FACIES

Pseudo-Limbourg/Pseudo-Hoguette

Some styles cannot be linked with either the Cardial or the Epicardial in their classical form. Thus, a pot decorated with combed bands (at Margineda),

another with a pointed base and a motif of impressions on cords (at Gazel) have clear affinities with the Hoguette style (Guilaine & Manen 1997), of which they represent the extreme south-western extension. Similarly, a pot from the cave at Gazel with incised bands associated with garlands or triangles echoes a classical Limbourg theme. These pieces show how many other components, still not particularly apparent, exist in the Early Neolithic of the western Mediterranean.

CONCLUSION

The spread of the production economy in the western Mediterranean occurred in a cultural context extremely different from the zone where Neolithisation was born, the Turco-Syrian borders where PPNB, the truly founding culture of the Neolithic, seems to have emerged. Figure 10 sums up some of these differences in the characteristics of dwellings, in the funerary domain and in social functioning.

In southern France, the earliest Neolithic manifestations are due to small groups of ‘settlers’ of Italic origin. They are distinguished by the installation of small settlements of limited duration but which were clearly vectors of the ‘Neolithic package’: agriculture, animal husbandry, pottery, polished axes,

Eastern Mediterranean PPNB	Western Mediterranean Cardial
<p><u>Settlements</u></p> <ul style="list-style-type: none"> - Building material : stone and brick - Houses : quadrangular - Strong sedentism (in landnam) - Existence of big villages (Abu Hureyra, Ain Ghazal) <p><u>Burials</u></p> <ul style="list-style-type: none"> - Collective graves - First necropolis - Burials in settlement - « Houses of death » <p><u>Society</u></p> <ul style="list-style-type: none"> - First hierarchisation - Use of figurines - Ceremonial building (cf. Göbekli) 	<p><u>Settlements</u></p> <ul style="list-style-type: none"> - Building material : wood and clay - Houses : circular, quadrangular or in apse - Low sedentism (short duration) - Absence of big villages <p><u>Burials</u></p> <ul style="list-style-type: none"> - No collective graves - No necropolis - Isolated burials in caves - « Invisible dead » <p><u>Society</u></p> <ul style="list-style-type: none"> - No hierarchisation - Absence of figurines - ?

Figure 10. Differences in the characteristics of dwellings, in the funerary domain and in social functioning between the first eastern and the western Mediterranean Neolithic cultures.

and so on. It thus seems that the trigger in the beginning was a process of maritime colonisation of Italic origin.

The Cardial must henceforth be considered, in France, as a secondary process. Its genesis is still subject to discussion. Three components seem to have played a role in its composition: the previously mentioned Italic substratum, vector of the production economy; the Tyrrhenian Cardial group, perhaps responsible for the band decoration; and a possible native substratum, still poorly known. These three components would then have blended locally in a context of rapid population increase, stimulated by a 'demographic transition' resulting from the agro-pastoral practices introduced earlier. It is this hypothesis of 'demographic stress' which would have led to the process acquiring a stronger expansionist dynamism.

In Spain, where the pioneering Italic culture establishments have not yet been identified, the Cardial, spreading from Provence and Languedoc, seems to have been in its turn the vector of the economic and technical 'Neolithic package'. Settling first, preferentially, in Catalonia and Valencia, it spread rapidly but sporadically in more continental regions (as seen at Chaves).

Lastly, it is interesting to note that in the western Mediterranean the founding of settlements during the Early Neolithic did not lead to their continued existence over a long period, unlike, for example, certain tells in Thessaly or the Balkans or some southern Italian sites, which were occupied or frequented for several millennia throughout the Neolithic. Such a tendency to a lasting territorial attachment does not exist here. During the Cardial, sedentariness seems to have been relative, and the attachment to a given place was periodically called in question. Perhaps this periodic mobility is also responsible for the 'invisibility' of the dead.

The question of the role played by the last hunter-gatherer communities in Neolithisation will remain a subject for debate until a fuller corpus of data concerning these populations becomes available. At all events, it does not seem that these human groups could have carried much weight on an economic level except for prolonging for a while the hunting-gathering economy. It was, however, on a cultural level that these populations could, in a certain manner, have 'perpetuated' themselves in the Neolithic system by means of some persistent ideological features (exclusion of the dead, *Columbella* ornaments, culture of 'the wild' by means of 'deer tooth' type pendants or the hunting scenes of Levantine art).

After a few hundred years, the various components which had participated in developing the early southern French and Iberian Neolithic seem to have blended in the Epicardial complex, thereafter the only one present throughout the western Mediterranean area.

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