Territoriality and Settlement in Southern France in the Early Neolithic: Diversity as a Strategy?

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Research Article

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Territoriality and Settlement in Southern France in the Early Neolithic: Diversity as a Strategy?

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Abstract: In the western Mediterranean, the question of the settlement patterns of the first farming communities remains a much debated issue. Frequently compared with the LBK model, based on hundreds of well-documented villages, the settlement organization of the Impressed Ware complex is still poorly characterized and highly diversified. New data obtained in Southern France (Languedoc) may shed light on this matter, based on new excavations, revised data, and a multi-proxy perspective (site type, domestic area, food supply strategies, activities, spheres of acquisition of raw material, and so forth). Rather than reproducing a pattern of site locations and settlement structuring, it seems that these Early Neolithic groups sought to optimize the location and structuring of their settlements in relation to the specific characteristics of the surrounding environment and available resources. We therefore propose that the diversity observed in the settlement organization of these first farming communities is a reflection of a social organization well-adapted to the diversity of the ecosystem.

Keywords: southern France, Early Neolithic, settlement patterns, territoriality, social networks

1 The Early Neolithic Context in the Western Mediterranean

In the western Mediterranean, agro-pastoral techniques first arose among communities whose economic and cultural expressions can be grouped under the term “Impressed Ware complex”. Frequently compared

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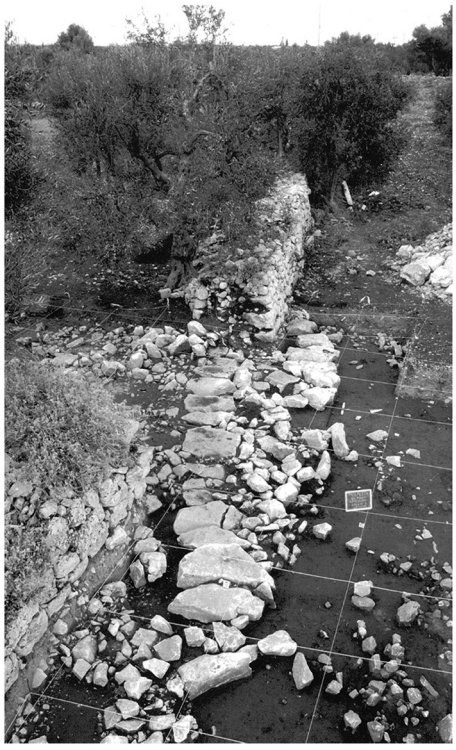
with the LBK or "Linearbandkeramik" complex – the other major current of neolithization in Western Europe, characterized by hundreds of well-documented villages – the settlement patterns of the communities of the Impressed Ware complex appear very diverse and poorly characterized. Cases of agglomeration of domestic units into "villages" are indeed relatively rare throughout the northwestern Mediterranean. In southeast Italy, where the earliest *Impressa* facies have been documented, particularly in the Ofanto valley and Tavoliere, the communities based their subsistence on a highly technical agro-pastoral economy (Vigne, 1998). Settlement model is based on the preferential occupation of coastal and sub-coastal areas, but also of the terraces of inner river valleys (Natali & Forgia, 2018). Vast domestic sites have been identified, and their land use strategy clearly involves perennial and sedentary lifestyles. This is demonstrated, for example, by the ditches of varying size that have been dug (enclosing areas ranging from 15 to 40 m in diameter for the smaller ones to several hundred metres in diameter for the large ones), the function of which remains ambiguous (extracting raw materials, preparing the daub, defence, draining rainwater, etc.; Guilaine, Radi, & Angeli, 2019). But no clearly homogeneous structuring of the areas within these ditched enclosures has been demonstrated (Radina & Sarti, 2002). At the site of Ripa Tetta (Lucera, Puglia), for example, the hypothesis has been put forward of a ditch marking out a much larger area than that strictly reserved for the domestic structures, which could also have been used for keeping animals and the most sensitive crops (Cipolloni Sampò, Tozzi, & Verola, 1999). In Pulo di Molfetta (Puglia, Muntoni, 2003), the remains of a large stone construction have been documented in Sector 3 – a sort of wall that may have served to protect the village. Plans of houses have been established in Rendina (Potenza, Basilicata) based on rows of post holes and the presence of internal hearths. Rectangular structures and cobble paving have been observed in Balsignano (Bari, Puglia; Grifoni Cremonesi & Radi, 2014). The structures that characterize the villages include various types. These show the ability to adapt to different contexts and resources offered by the territory (Natali & Forgia, 2018). Further north, the exceptional site of La Marmotta (Anguillara Sabazia, Lazio; Fugazzola Delpino, 2002), discovered at the bottom of Lake Bracciano, has revealed rectangular housing units, about 6–8 m in length, built from oak wood and mud architecture on stone bases. This offers a very heterogeneous set of data, both in terms of the building plans and the materials used (Figure 1). Different site categories have been defined (Fugazzola Delpino et al., 2002): greater than 3 ha, between 1 and 3 ha ("villages", which represent the majority of sites), and less than 1 ha ("farms or hamlets"), but these categories tell us very little about the population networks and general settlement dynamics themselves. These ditched enclosures, which developed widely over time in southern Italy, have no equivalents further north on the Tuscan, Ligurian, or French coasts. In Spain, as in Southern France, the occupation and use of caves are well-documented and few open-air sites provide clear indications as to the structuring of the sites. In Catalonia, at the site of Guixeres de Vilobi (Mestres Mercadé, 1982), complex stone constructions have been documented, together with pits and some post holes, but without any clearly identifiable organization. Near Valencia, at the site of Mas d´Is (Bernabeu Aubán, Hernández, Köhler, Castillo, & Puche, 2003), a ditched enclosure has been documented, within which the remains of a house with a timber framed apse have been found. More generally, the open-air sites and cave dwellings only provide information about simple domestic arrangements such as hearths, cobble paving, silos, and so forth. The lakeside site of La Draga, where hundreds of posts have been found driven into the ground, seems to have been divided into two areas: an area dedicated to economic and artisanal activities and an area used as a domestic space containing several rectangular dwellings (between 10 and 12; Bosch Lloret, Chinchilla Sánchez, & Tarrus Galter, 2011). Once again, it is the polymorphous nature of the settlements (Figure 2) that emerges from the research on this subject (Gómez Puche, 2008; Mestres Mercadé & Tarrús Galter, 2009). This brief overview shows us that the available data present a wide variety of situations (whether at the scale of the strictly domestic unit or that of the network of settlements; ranging from the large sites of La Marmotta and La Draga to rock shelters in karst cliffs). While this may simply be a reflection of the current state of research, in our view, it denotes a certain archaeological reality regarding the economic, social, and structural dimensions of Neolithic groups. To examine this question in more detail, we will consider the specific case of the south of France, where the development of the first farming communities took place in two stages involving an initial pioneering coastal process followed by a large geographical expansion of the Neolithic economy.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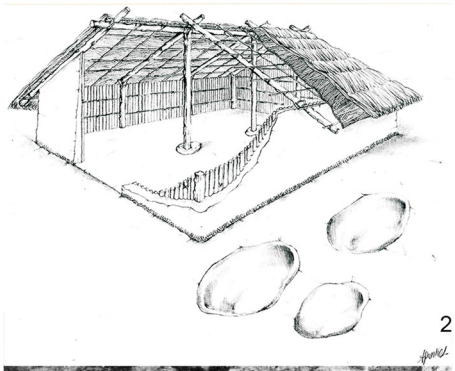
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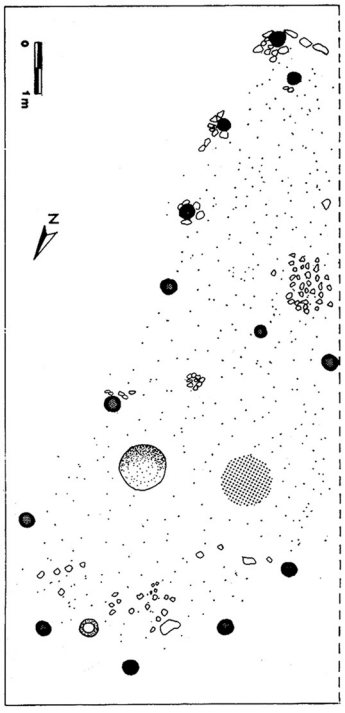

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Figure 1: Few examples of the diversity of settlements in Southern Italy (Ceramica Impressa). (1) Pulo di Molfetta, large stone construction, Muntoni, 2003; (2) Favella, hypothetical reconstitution of a house, Tiné, 2009; (3) Ripa Tetta: quadrangular house delimited by small trenches, Cipolloni Sampò et al., 1999; (4) Rendina, house plan delimited by the alignment of postholes, Grifoni Cremonesi and Radi, 2014; (5) Balsignano, rectangular house with cobble paving, Grifoni Cremonesi and Radi, 2014.

Figure 2: Few examples of the diversity of settlements in Spain (Cardial). (1) Mas d'Is, ditched enclosure and house built on an apsis plan, Bernabeu Aubán et al., 2003; (2) Guixeres de Vilobi: stone constructions and structures, Mestres Mercadé, 1982; (3) Restitution of the buildings of La Draga, Palomo, Huerta, and Batlle, 2017.

2 Neolithization and Settlement Organization in Southern France: Research Overview

On the French Mediterranean coast, the emergence of agro-pastoral societies at the start of the sixth millennium BCE is explained by a colonization model of small groups originating from the *Impressa* complex on the Italian peninsula, preceding an expansion phase of the Cardial culture lasting several centuries (Guilaine & Manen, 2007). Comparisons are frequently made between research in the south of France, with its strong focus on small-scale excavations of caves, with research in the north of France, which is marked by extensive excavations of open-air sites (Manen & Hamon, 2018). While in the south of France, efforts have indeed been primarily focused on establishing chrono-stratigraphic frameworks based on the stratigraphies of caves or rock shelters, extensive open-air excavations have also occurred over the last 20 years thanks to the impact of major construction work such as high-speed train lines and the expansion of urban centres (Gutherz, 2009). For example, the city of Nîmes, in the Gard, has been subjected to in-depth preventive research for the last 20 years. This currently represents around 300 operations over 450 explored hectares, including 10% that have been excavated (Breuil et al., 2003; Perrin, Manen, & Séjalon, 2014). And yet, the characteristics of the settlement organization of the Early Neolithic communities remain as ill-defined and polymorphous as ever.

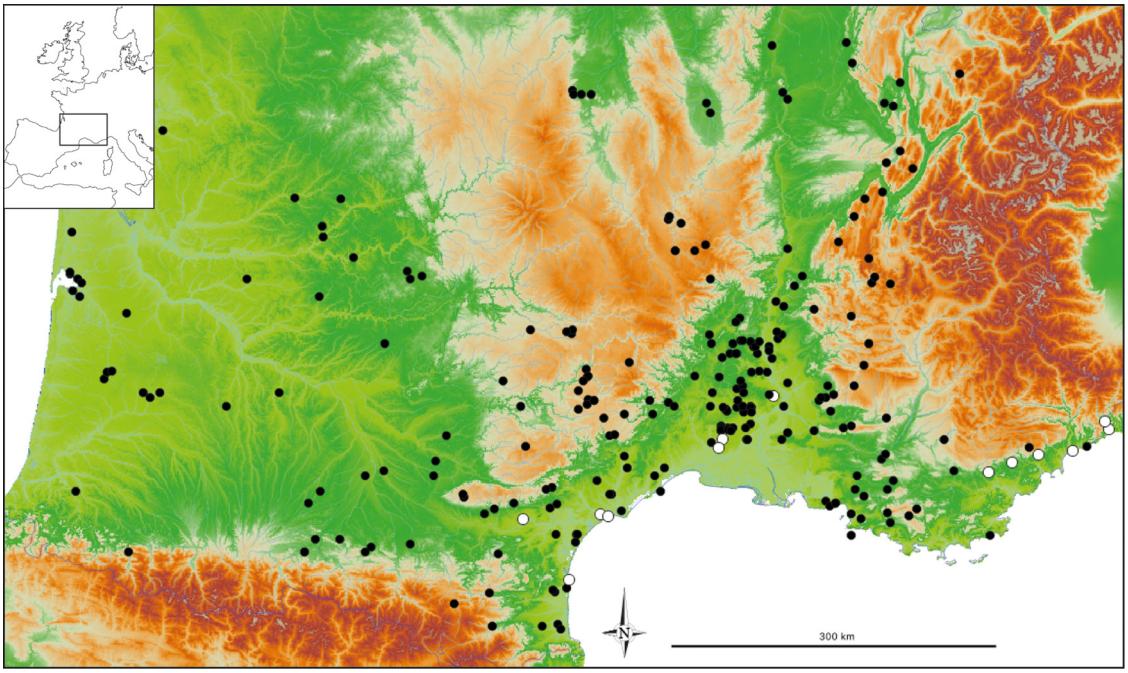

Figure 3: Map of Southern France and distribution of the Early Neolithic sites. In white the Impressa sites. BDA Database (https://bda.huma-num.fr/).

For the *Impressa* stage, few sites have yet been documented over the entire range of Southern France (Figure 3). They present a discontinuous distribution, and it is difficult to identify the natural and cultural factors that determined the settlement patterns. According to pioneering colonization models, in which maritime navigation holds a prominent place, it is customary to ascribe these sites with a preferentially coastal location (leapfrog colonization model; mooring in lagoon areas and estuaries). The recent discovery of several sites (Manen et al., 2019b) has somewhat challenged this model, although work on the location of the coast at the start of the sixth millennium must be undertaken in order for it to be discussed in greater detail. The few recognized sites (principally Pendimoun, Peiro Signado, and Pont de Roque-Haute) present the characteristics of small-scale settlements occupied by small communities whose economies were based on the exploitation of domestic animal and cultivated plants (mainly sheep/goats and wheat). At Pont de Roque-Haute and Peiro Signado, the analysis of the imprints on the wattle and daub demonstrates the use of a cladding made of a mixture of earth, sand, and straw on a wooden frame (Chazelles, 2007). The rock shelter of Pendimoun is considered to have been a seasonal settlement (Delhon et al., 2020).

The second stage involved the expansion, from 5400 cal. BC, of the Cardial/Epicardial complex which then became a vector for the spreading of technical and economic agricultural innovations over a vast geographical area (Figure 3) (Manen et al., 2019a). Data regarding the settlement dynamics are confusing. As already mentioned, extensive work in the region of Nîmes (Gard) has made it possible to identify a series of open-air settlements (Perrin et al., 2014). But paradoxically, these sites provide little information about the household units themselves. At Mas de Vignoles X, the location of these units can be identified through the analysis of the spatial distribution of the remains and pits, but we do not know how they were built, both due to erosion and difficulties in identifying the shallower pits. The few elements available to us for the sites studied, or that we can infer from them, suggest that they involved oval-shaped buildings, about ten metres long by 5–6 m wide. This is a form that seems to have been recurrent in the early Neolithic settlements of southern France (Sénépart & Beeching, 2009). But while circular or oval plans remain the basic forms of domestic construction, a wide variety of structural organizations can be observed among the archaeological examples documented: oval plans marked out by post holes (Espeluche-Lalo in terms of open-air sites, and Saint-Marcel, Baume de Ronze, and Rochas in terms of caves); circular stonework at

open-air sites (Courthézon and Petites Bâties); and a layer of remains, post holes, and various structures, including heated stone pits, at the site of Petites Bâties (Binder & Sénépart, 2004). Excavations at Courthézon also seem to indicate a complex spatial structuring with basal stone foundations (Sénépart, 2009). In general, it should be pointed out that the use of mud as a building material is probably underestimated and this probably contributes to the confusion. Of course, answers to this question of territoriality and settlement patterns largely depend on taphonomic factors. They also depend on the quality of the data available at the archaeological sites, especially the possibility of basing the discussion on multi-proxy studies in order to obtain the most complete picture possible of the domestic and economic organization of the communities. For this reason, we will focus on the region of the lower Rhône valley and its tributaries, which have benefited from recent archaeological excavations and interdisciplinary research programmes.

3 Territoriality and Settlement Patterns in the Lower Rhône Valley

This geographical area shows a great topographical and environmental diversity (Figure 4):
- a coastal area, characterized by extensive hydromorphy (lagoons and ponds), which was strongly affected by the rise in sea level at the beginning of the Holocene and by modern human developments, and where no sites have yet been documented pertaining to the early Neolithic;
- various alluvial terraces and plains with thick, well-developed soils offering water reserves favourable to agriculture;
- and plateaus, offering a landscape alternating between omnipresent limestone outcrops, and depressions of varying expanse where arable land is found. Within these plateaus, the deep gorges of the rivers offer many natural cavities.

The diversity of the landscape is characteristic of the environmental mosaic of the south of France. The map in Figure 4 shows the distribution of the Early Neolithic sites and highlights the most reliable ones; in other words, those which have been recently excavated and for which extensive and diverse documentation is available. Our analysis will be organized around three points: overall spatial distribution, types of settlement (infrastructure, activities carried out, etc.), and social and economic networks.

3.1 Spatial Organization and Settlement Types

The general distribution of these sites shows an appropriation and exploitation of the whole range of topographical environments. Except for the coastal zones, where taphonomic factors are evident, the sites are located on alluvial plains and terraces, on limestone plateaus near the plains, and in the heart of deep valleys (Figure 4). The proximity of rivers is logically a recurring feature. The altitudes of the sites range from 27 to 305 m. This appropriation of diverse environments is probably due to a progressive demographic population growth, but not one involving a restrictive model dependent on a specific ecological setting.

If we consider the nature of the sites associated with these varied landscapes, we can observe a range of different types of sites: small and large caves, rock shelters, open-air sites, etc. This heterogeneity in the nature of the sites is traditionally explained in terms of their functionality. Traditionally, we thus broadly associate temporary seasonal occupations or specialized activities with caves and rock shelters on limestone plateaus and permanent, sedentary agro-pastoral sites with open-air settlements on flood plains. But if we examine the data in greater detail, this simplistic correlation between the topography and the nature of the occupation of the site does not appear so clear. Indeed, analyses of the domestic arrangements and structures, ranges of activities, and strategies for managing animal and plant food resources show that there is no absolute correlation between a topographical environment and an occupation type. We will

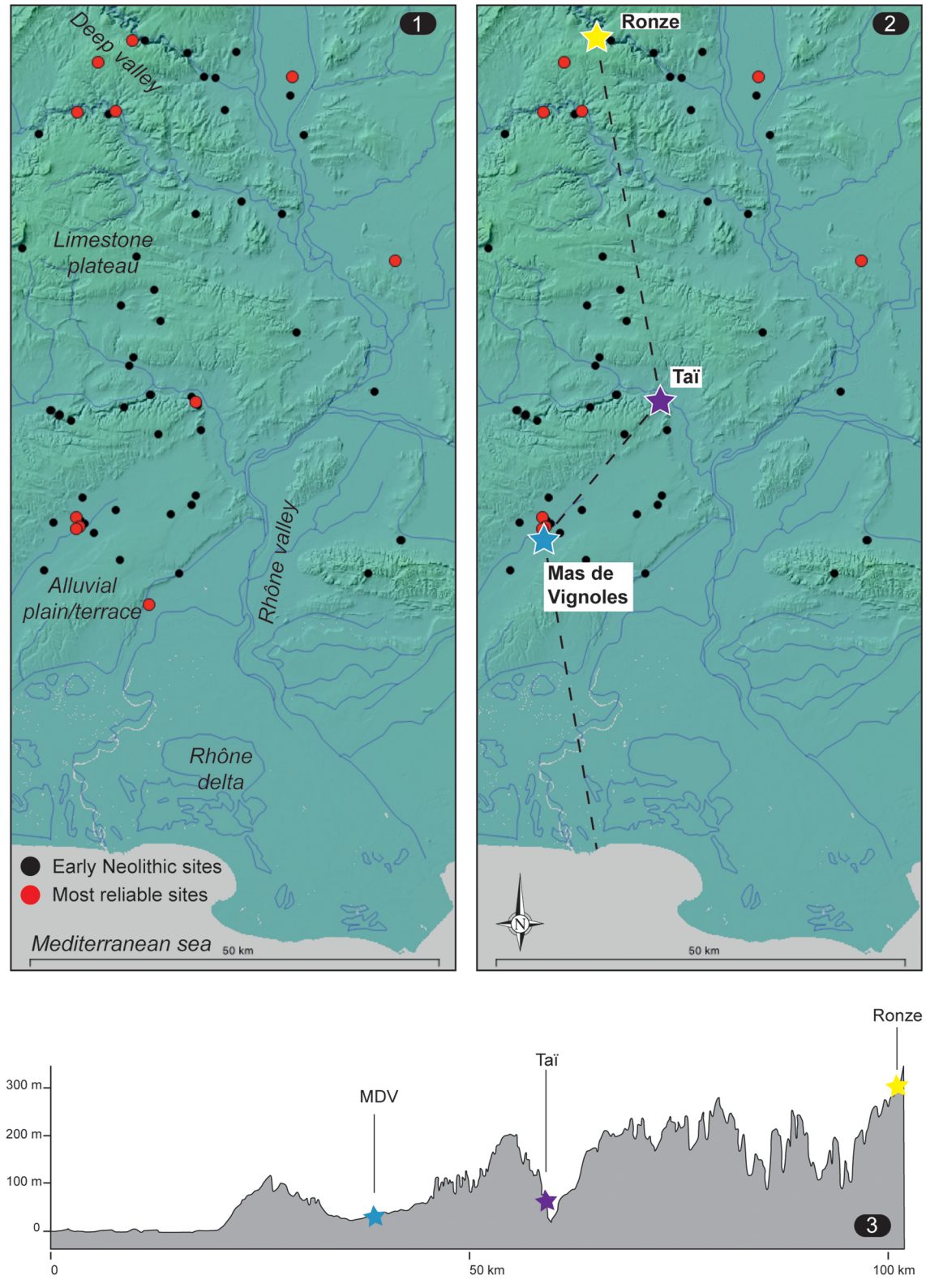

Figure 4: (1) Map illustrating the geographical parameters of the lower Rhône valley, and the location of the Early Neolithic sites (5500–4500 cal. BCE). In red, the most reliable sites (new excavations, multi-proxy data, new radiocarbon dating…). (2) Map illustrating the location of the three sites highlighted in the paper. (3) Schematic topographic location of the three sites highlighted in the paper.

consider three specific sites to illustrate this point. The selected sites are all dated in the range of 5300–5000 cal. BCE (Table 1), a period in which the first farming communities were in full expansion.

Mas de Vignoles X (Nîmes, Gard) is an open-air site located in a small alluvial depression – the plain of the Vistre river (Figure 4). The Mediterranean sea is currently only about forty kilometres away, while the Rhône valley is only about twenty kilometres away. Geomorphological (Chevillot, Perrin, & Séjalon, 2014) and micromorphological (Perrin et al., 2014) analyses show that the environment was frequently waterlogged, with periods of prolonged wetness. Sedimentary deposits are, however, discontinuous and alternate with episodes during which a low grassland type of vegetation cover developed. The distribution of the archaeological material and structures (post holes, hearths, pits, etc.) has made it possible to reconstruct several housing units (Perrin, 2014). The forms and structure of this settlement are hypothetical, but it may have involved a village composed of at least 10 oval-shaped dwellings, outside of which activities took place related to stone knapping, the use of flint tools, the storing of ceramics (or foodstuffs in these ceramics), the storing of foodstuffs in silo-pits, and the roasting of ochre. We do not know the building techniques that were used, but they certainly would have involved perishable materials (wood and daub) or at least materials that are fungible over time (mud, for example). All these elements, together with the variety of material productions made on the site (local raw materials used for the ceramics and flint, roughouts of adornments, etc.), indicate a permanent settlement. Furthermore, paleo-environmental analyses show that the plain has been strongly affected by human activity since the early Neolithic (Martin, 2014). The site was completely deforested in the area where most of the activities took place; on the fringes, it shows at most the retention of some undergrowth amidst a landscape of dry grassland, on the edge of a more humid meadow. This vegetation scenario implies that the area was probably used as pastoral land. The carpological and zooarchaeological remains have been very poorly preserved at this site, but they attest to sheep/goat and cattle husbandry and the cultivation of cereals.

The site of Taï (Remoulins, Gard) is located about 20 km to the north, at 81 m altitude, at the junction of different ecosystems conducive to the establishment of Neolithic societies: plateaus, steep slopes, and the Gardon alluvial plain (Figure 4). Following various excavations (Caro & Manen, 2014; Manen et al., 2004), it has been established that the site of Taï was made up of two karstic openings facing each other and encompassing an open-air space; this whole area was occupied throughout the Neolithic period, that is to say, over nearly three millennia. This site is therefore unusual in that it combines archaeological levels in both caves and outside. No building remains have been identified for the early Neolithic, but diverse domestic structures have been documented (silo-pits, refuse pits, hearths, etc.). The high density of these structures argues in favour of a permanent settlement, and various activities have been identified: probable storage of cereals, cooking activities, knapping of flint and quartz, refuse areas, and so forth. Some ground stone tools indicate the presence of partially preserved zones of activity (food processing, sometimes in association with other undetermined activities) in the entrance of the cave and the porch. As at Mas de Vignoles X, the various material productions have mainly been made using local resources. The *chaîne opératoire* for the pottery at Taï appears homogeneous and adheres to the same standards as those identified at Mas de Vignoles X. The use-wear analysis of the chipped flint industries demonstrates the practice of a wide range of activities dominated by craft processes on vegetal materials and hide and also involving hard animal and mineral materials, and finally, harvesting and hunting activities perceptible through the maintenance of sickles and arrows. The zooarchaeological studies show a subsistence economy heavily based on ruminant herding and strongly suggest a self-sustaining system for the sheep, which were present on the site at least from the autumn to the end of the spring (Bréhard & Vigne, in press; Tornero et al., 2020). The functional status of the site of Taï is therefore clearly different from the specialized one identified at other cave sites in the same area for the Middle Neolithic, which have been interpreted as sheepfold-caves. The archaeobotanical remains (Bouby, Durand, Rousselet, & Manen, 2019) indicate the cultivation of cereals, but also the exploitation of wild plant resources from various plant communities around the site, particularly to be used as a food supplement for sheep/goats. These remains also suggest that the early Neolithic communities occupied the site in a permanent manner throughout the year.

The final example is that of Baume de Ronze (Orgnac, Ardèche) located on a limestone plateau at 300 m altitude (Figure 4). The early Neolithic levels are almost a metre thick and extend over a large, sheltered

Table 1: Set of the 14C dates obtained from three settlements in the lower Rhône valley (Southern France) and discussed in this paper

Country	Municipality	Latitude	Longitude	Site name	Level	Laboratory code	Conventional Date BP		cal. BCE (HPD 95.4)		Sample		Reference
France	Orgnac	44.31875758	4.40405464	Baume de Ronze	Zone 1 – cabanes 1er état	Ly-6087	6340	40	5466	5215	Animal bone		Banadora online database
France	Orgnac	44.31875758	4.40405464	Baume de Ronze	Zone 1 – cabanes 1er état	Ly-6084	6445	40	5478	5331	Animal bone		Banadora online database
France	Orgnac	44.31875758	4.40405464	Baume de Ronze	Zone 1 – c.82c	Ly-6083	6620	40	5622	5481	Animal bone		Banadora online database
France	Nîmes	43.807419	4.3627031	Mas de Vignoles X	US 1005	Erl-9579	6048	56	5206	4792	Charred seed	*Hordeum* sp.	Perrin et al., 2014
France	Nîmes	43.807419	4.3627031	Mas de Vignoles X	US 1005	Erl-9580	6182	56	5304	4989	Charcoal		Perrin et al., 2014
France	Remoulins	43.94283	4.54302	Taï	GC1	Beta-428094	6090	30	5206	4853	Charcoal	*Juniperus* sp.	Manen et al., 2019a
France	Remoulins	43.94283	4.54302	Taï	GC1	Beta-398958	6120	30	5209	4947	Animal bone	Caprini	Manen et al., 2019a
France	Remoulins	43.94283	4.54302	Taï	GC2	GrA-25607	6130	40	5210	4952	Animal bone	Caprini	Manen et al., 2019a
France	Remoulins	43.94283	4.54302	Taï	GC1	Beta-428095	6130	30	5210	4958	Charcoal	*Juniperus* sp.	Manen et al., 2019a
France	Remoulins	43.94283	4.54302	Taï	GC1	Beta-432164	6140	30	5210	4997	Charred seed	*Triticum aestivum durum turgidum*	Manen et al., 2019a
France	Remoulins	43.94283	4.54302	Taï	GC1	Beta-398956	6180	30	5216	5016	Animal bone	Caprini	Manen et al., 2019a
France	Remoulins	43.94283	4.54302	Taï	GC1	Beta-432165	6190	30	5286	5039	Charred seed	*Hordeum* sp.	Manen et al., 2019a
France	Remoulins	43.94283	4.54302	Taï	GC1	UBA 9959	6193	41	5296	5012	Animal bone	*Bos taurus*	Manen et al., 2019a
France	Remoulins	43.94283	4.54302	Taï	GC1	UBA 9961	6207	32	5298	5046	Animal bone	*Bos taurus*	Manen et al., 2019a
France	Remoulins	43.94283	4.54302	Taï	GC1	GrA-25614	6220	45	5306	5044	Animal bone	Caprini	Manen et al., 2019a

(*Continued*)

Table 1: *Continued*

Country	Municipality	Latitude	Longitude	Site name	Level	Laboratory code	Conventional Date BP		cal. BCE (HPD 95.4)		Sample		Reference
France	Remoulins	43.94283	4.54302	Taï	GC2	GrA-25613	6230	40	5306	5054	Animal bone	*Ovis aries*	Manen et al., 2019a
France	Remoulins	43.94283	4.54302	Taï	GC1	Beta-398955	6250	30	5310	5072	Animal bone	Caprini	Manen et al., 2019a
France	Remoulins	43.94283	4.54302	Taï	GC1	UBA 9958	6284	42	5364	5078	Animal bone	Caprini	Manen et al., 2019a
France	Remoulins	43.94283	4.54302	Taï	GC1	GrA-25627	6285	45	5367	5074	Animal bone	*Ovis aries*	Manen et al., 2019a
France	Remoulins	43.94283	4.54302	Taï	GC1	UBA 9960	6292	32	5356	5209	Animal bone	*Bos taurus*	Manen et al., 2019a
France	Remoulins	43.94283	4.54302	Taï	GC1	Ly-4154(SacA-7411)	6295	30	5329	5211	Animal bone	*Bos taurus*	Manen et al., 2019a
France	Remoulins	43.94283	4.54302	Taï	GC1	Ly-4152(SacA-7409)	6295	30	5329	5211	Charred seed	*Triticum dicoccum*	Manen et al., 2019a
France	Remoulins	43.94283	4.54302	Taï	GC1	Ly-4155(SacA-7412)	6310	35	5360	5214	Animal bone	Caprini	Manen et al., 2019a

Calibration is with OxCal 4.4.2 using INTCAL20 (Reimer et al., 2020).

1,200 m^2 platform. The excavation and detailed analysis of the sedimentary units have revealed the floors of several houses (Beeching, 2013; Thirault & Beeching, 2009). The reconstructed dwellings are oval in shape, ranging from 10 to 20 m^2 in size, and have conical roofs and wooden frames. The subsistence economy seems to have been based on a mixture of production and predation, particularly in terms of the meat diet, where hunting held a significant place. Here again, the varied material productions have been made locally, and the composition of the flint supply shows a good knowledge and exploitation of local resources.

It therefore appears that in all the topographical environments and at all the types of site (open-air sites and caves), we can observe the following (Table 2):

- diverse domestic structures and dwellings related to long-term occupations,
- an subsistence economy based on domestic plant and animal resources, but which did not exclude diverse, locally abundant wild resources,
- and a wide range of activities and complete production cycles.

3.2 Social and Economic Networks

Another important aspect to discuss considering territoriality and settlement patterns is that of the social and economic networks that structured the first agro-pastoral societies. If we accept the hypothesis that the distribution of sites represents a real territorial network and not the palimpseste of occupations related to a mobility system of the communities, we can highlight different types of data demonstrating the existence of strong links between communities.

This primarily involves siliceous resources, for which analyses regarding the sources of origin show that local resources were used at each site together with a common exogenous raw material: Barremian-Bedoulian flint. This blond flint, of good quality, could be taken in various places of the Rhone valley, on the primary deposit located on the right or left banks, as well as in secondary position in the alluvial deposits of the river. This raw material has mainly been used in the blade production, at each of the sites studied, and the *débitage* is most of the time carried out outside of the sites. Thus, even if we do not yet know the sites producing blades, the blank circulate at least throughout the study area, and all sites considered seem to belong to the same supply network (Defranould, 2020).

Another argument is the presence of ornaments made from sea shells at sites which are located away from the coast. This may have involved the movement of groups or individuals between the coast and areas further inland, or be due to the indirect acquisition of these ornaments via circulation networks in which they were transported from group to group. Long-distance contact (a bead shaped in a *Spondylus gaederopus* shell – a shell which is found in the Adriatic or Aegean Sea – has for example been found at Mas de Vignoles) and cultural influences between the communities are demonstrated by the wide distribution of specific types of associations of ornaments found almost systematically at all the early Neolithic sites in the western Mediterranean (Rigaud, d'Errico, & Vanhaeren, 2015; Rigaud, Manen, & García-Martínez de Lagrán, 2018). Furthermore, the on-site shaping is rarely attested at sites in the region and these adornments often show signs of wear, indicating that they were probably lost during the occupation of the sites. These technological and functional data thus confirm that circulation, commerce, and exchange are important mechanisms in explaining the wide distribution of ornaments.

Research into the origin of the clay-rich soil used for manufacturing pottery and the technical actions carried out to treat this soil (different types of added temper: calcite versus grog, for example) as well as decorative methods (decorative techniques using Cerastoderma type sea shells or punch type tools) also allow us to demonstrate the circulation of pottery between communities. Pottery of non-local origin is present in small quantities at each site (Manen & Convertini, 2012, 2014), showing that connections existed between sites at different levels. These artefacts demonstrate circulation networks involving the movement of vessels or their contents, but also probably of potters in a context of social relations whose nature cannot yet be defined.

Table 2: Main characteristics of the three settlements considered in the text. MDV: Mas de Vignoles X, Nîmes, Gard; Taï, Remoulins, Gard and Ronze: Baume de Ronze (Orgnac, Ardèche)

Site	Altitude	Topographic situation	Type	Buildings and/or diversified domestic structures (pit-silo; earth)	Varied material products range locally manufactured	Agro-pastoral economy	Wild domestic resources management
MDV	27	Alluvial plain	Open air	X	X	X	n/a
Taï	81	Limestone plateau open onto a plain	Open air and cave	X	X	X	X
Ronze	300	Limestone plateau connected with deep valley	Large cave	X	X	X	X

X = presence.

Studies into domestic herd management also provide information about these relationship networks. Domestic cattle only represents 12% of the bone remains on average. At Taï, which provided the largest cattle sample, about ten individuals have been identified over the whole occupation; in other words, several decades. Given that 30 to 50 animals are necessary to ensure the viability of a herd, cattle herd management must have taken place at a regional or micro-regional scale, indicating relationships between human groups or sites (Bréhard & Vigne, in press).

In summary, we can say that in the study area selected, the sites reflect the following:

- permanent habitats of probably small communities often located near different ecological niches;
- communities well-adapted to their environment, taking advantage of all the local resources offered by the surrounding ecosystem, in addition to basic domestic resources;
- dense inter-site relationships and the existence of social and economic networks.

4 Territoriality and Settlement in Southern France in the Early Neolithic: Diversity as a Strategy?

The characteristics described in the study area of the lower Rhône valley together with those that have been more briefly presented in the northwestern Mediterranean allow us to establish the following points:

- It is not possible to identify a standard settlement model for the sites of the Cardial/Epicardial complex. On the contrary, our data seem to reflect a converse scenario to the restrictive "best patch" model used to predict the spatial trajectories involved in the expansion of the Neolithic economy of the LKB culture, in which settlers choose the location of their villages based on criteria of optimal agricultural production and accessibility (Bocquet-Appel, Moussa, & Dubouloz, 2014). It should also be noted that this model is mostly valid for central Europe. Indeed, the Paris Basin seems to show that large villages are rather exceptional and that a different colonization model implementing hamlets or farmsteads is at work (Bostyn, Ilett, & Meunier, 2018).
- The model which prevails in the south of France is that of scattered settlements, based on small housing units with nearby areas for growing crops and grazing, regardless of the topographical environment involved: alluvial plains and terraces, but also limestone plateaus further inland.
- Of course, our data do not negate the hypothesis of communities organized around a system of seasonal land exploitation and the existence of specialized seasonal sites. This hypothesis has been formulated for both Provence (Binder, 1991) and Languedoc (Guilaine, 1993). But our goal was to show that a binary opposition between open-air sites and cave sites is not a relevant criterion for addressing the question of territorial organization and functional complementarities between sites. It thus seems that if we would like to propose a site "typology" for these first farming communities, one of the most relevant variables to take into account is that of the nature of the surrounding environment and its suitability in offering the communities favourable conditions for carrying out a diverse range of activities, rather than one based on a distinction between caves and open-air sites. The range of activities practiced on the sites and the provenance of raw materials are also important criteria to take into consideration. It is, besides, on this basis that the demonstration of the existence of specialized sites was well-shown in Provence (Lombard cave for instance; Binder, 1991). Similar conclusions have been proposed for different regions of Spain. This is shown, for example, by the work carried out by Mazzucco, Clemente-Conte, Gassiot, and Gibaja Bao (2015) at the cave of Chaves (Bastarás). This cave site, which is emblematic of the Spanish Cardial culture, is located in the north of Aragon in a pre-Pyrenean region at 663 metres altitude. The use-wear analyses of the lithic assemblage in Level 1b indicate the practice of various activities whose "functional spectrum" is comparable to that of various open-air sites in the western Mediterranean, which are considered permanent settlements. Close comparisons have been made between the assemblage from Chaves Ib and three other sites, namely La Draga, La Revilla, and La Lampara. Thus, after studying these

sites, the authors have confirmed that "*it has been possible to highlight a functional variability between sites that overcomes the traditional dichotomy of open-air vs. cave sites, indicating more subtle variances in the economic patterns from one site to another*". In the same vein, in a recent study of the early Neolithic sequence in the Valencian region, particularly after reviewing the data from the site of Cova de la Sarsa, Garcia Borja (2017) put forward the hypothesis that the cave was a densely occupied, multifunctional site situated at the heart of a wider network of open-air sites, caves, and rock shelters (all in the Valleta d'Agres and visible from the cave).

– Finally, we have been able to show that these communities were strongly linked to each other despite the variety of environments involved.

Thus, while certain regional recurrences may exist, the main characteristic of the early Neolithic settlements of the northwestern Mediterranean seems to be their lack of standardization. This strong variability may reflect a common nature structuring these groups: rather than reproducing a specific site settlement pattern or organization for the settlements themselves, it seems that these early Neolithic groups sought to pragmatically optimize the location and organization of their settlements according to the specific characteristics of the surrounding environment and available resources (no potential resource was overlooked, especially hunting and gathering). We therefore suggest that the diversity observed in the settlement organization of these first farming communities is a reflection of a social organization well-adapted to the diversity of the ecosystem; in other words, a concrete strategy implemented to minimize risk (Antolín, 2015; Guilaine, 2000). The existence of strong social ties probably contributed to the sustainability of this system. In this context, we can consider that the mosaic environment typical of southern France was probably an active element in the social and economic systems of these first farming communities. With a more systematic application of multi-proxy analyses to the study of these sites, it would be possible to enlarge our scale of observation and deepen our understanding of the economic and territorial organization of these prehistoric societies.

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