Chapter 4

High level connections as a key component for the rapid dispersion of the Neolithic in Europe

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Abstract

The transition to farming represents the process by which humans switched from hunting and gathering wild resources to a reliance on domesticated plants and animals. The adoption of domestication and sedentary life was probably promoted by a new system of beliefs and a profound reconfiguration of symbolic and social codes. This paper aims to present how personal ornaments inform the social reorganization of communities by tracking the multiple forms of interactions between groups and individuals. Technological and use-wear analysis of personal adornments, combined with the analysis of a georeferenced database of the bead types used by the last foragers and the first farmers in Europe, explores how interactions and communication networks led to the social reconfiguration of cultural groups and reshaped the cultural geography of Europe 8,000 years ago. The circulation of personal ornaments contributed to building and maintaining extensive and persistent networks of communication between hunter-gatherers and farmers. Long-term stability of contacts enabled the circulation of social, technical, and economic information, essential for the diffusion of the farming lifestyle. The long-term persistence of personal attires within farming communities suggests beads reflected the most entrenched and lasting facets of a farmer's identity compared to other cultural proxies.

INTRODUCTION

The Neolithic Revolution represents the process by which human groups switched from hunting and gathering wild resources to a reliance on systems of food production based on domesticated plants and animals. The reasons for this transformation, which occurred independently and at dif-

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ferent times in various regions of the world, have been debated for decades and are still not fully understood (Barker 2006; Bellwood 2005). Proposed causes include climate change (Gronenborn 2009; Richerson, Boyd, and Bettinger 2001; Rowley-Conwy and Layton 2011; Weninger et al. 2006), human–plant co-evolution (Rindos 1984), demography (Bocquet-Appel 2002; Bowles 2011), social incentives (Dietrich et al. 2012), competition and inequality (Wright 2014), or a combination of these (Ammerman and Biagi 2003; Bocquet-Appel 2008). Despite considerable debate concerning proposed causes and mechanisms, consensus exists that this revolution helped create the economic and social foundations on which present-day societies are based, such as diversified food production and storage techniques, surpluses, sedentism, labor specialization, social complexity, and ultimately state institutions.

In the Fertile Crescent, farming, herding, and sedentism progressively took place 12,000 years ago (12 ka), then spread across Europe from 8.8 ka until 5.5 ka (Ammerman and Cavalli-Sforza 1984; Bar-Yosef 2004; Pinhasi, Fort, and Ammerman 2005). Increasingly refined archaeological (Özdoğan 2011; Perlès 2003; Tresset and Vigne 2007), anthropological (Bocquet-Appel 2008; Fernández et al. 2014; Galeta et al. 2011; Lazaridis et al. 2014), and chronological data (Bocquet-Appel et al. 2009) identify a succession of profound cultural, technical, and economic changes between the last indigenous hunter-gatherers and the first Early Neolithic farmers in Europe. Recent genetic studies reveal complex demographic events took place during the three millennia that farming spread across Europe, including multiple inputs from farmers originating from the Near East, and also a contribution from local foragers and agriculturalist societies (Brandt et al. 2013; Galeta et al. 2011; Haak et al. 2010; Malmström et al. 2015). The transition to farming was not a linear process and it was slowed down, stopped, or even abandoned several times in specific regions before being definitively adopted in many areas (Shennan et al. 2013; Vigne et al. 2011). Along with these changes, it is generally recognized that the switch to agriculture resulted in, at least during the initial phases, more intense labor, a less diversified diet, increased morbidity, decreased life expectancy, precarious household-based production systems, and increased intra- and inter-group conflict (Cohen 2008; Hershkovitz and Gopher 2008).

Despite these potential disadvantages, after 5,000 years, the transition to farming was a success almost everywhere in Europe. Maintaining domestication, husbandry, and related cultural practices over large territories implies interindividual interactions with substantial transfers of knowledge (Larson et al. 2014). Beyond the skills required to select, reproduce, and raise animals and plants, domestication also signifies deep social and cultural changes within communities (Cauvin 1998; Digard 1988). Sedentariness may have also significantly affected contact to other people, the range of contacts, the way contacts were maintained between individuals and groups, and the dynamics of exchange of materials and ideas. It is likely that these profound economic and social

changes transformed the way individuals perceived themselves and recognized each other and thus completely renewed their multiple past identities.

Identifying the material evidence of the multiple identities that may have existed within past foraging communities has puzzled archaeologists for several decades (Insoll 2007). Identities are linked to a broad cultural context, are socially mediated, and are implemented through embodiment, personal choices, and actions. They may refer both to individual identity and to group identity. The relation between individuals is seen as an essential factor conditioning people's actions, based on inexplicit rules and principles that guide their practices within society (Bourdieu 1977). Relationships between people are reproduced during a wide range of everyday activities, encompassing all aspects of the economical, technical, and ritual organizations of society. Group and personal identities are produced and maintained through the social processes related to these daily activities (Diaz-Andreu et al. 2005). The intrinsic link between an individual's activities and material productions, and interactions between people and identities, implies that the study of past material culture and related practices is insightful for the exploration of past identity constructions and changes (Dobres and Robb 2000). Approaches employed to explore the production and negotiation of identity in the archeological record rely on a broad range of cultural proxies, including tools, plant and animal exploitation, settlement organization, and body modification (Cobb and Gray Jones 2018; Finlay 2006). In this chapter, I will emphasize the recent conceptual, theoretical, and methodological developments in the exploration of past identities through the study of personal ornaments during the transition to the Neolithic in Europe.

Exactly like today, prehistoric personal ornaments transmitted symbolic messages in order to mediate the many social conventions related to individual and group identity (Sanders 2002). They were used for social transactions, rituals, the transmission of social memories, and to display social status within communities (Carter and Helmer 2015). Body ornaments were central to the creation of social and self identity. Their various associations and the way they were displayed on the body contributed to negotiating identities and unifying or distinguishing communities (Ogundiran 2002).

Numerous ethnographical studies have demonstrated that symbolic codes expressed by the association of ornaments on the human body change as a result of demic and cultural phenomena, including population replacement and admixture, trade, and the long distance diffusion of cultural traits (Lock and Symes 1999; Verswijver 1986). Personal ornaments can therefore be considered a reliable proxy for reconstructing cultural diversity and change in past societies. Here, I used personal ornaments to track possible interactions and contact networks during the Neolithic transition in Europe that led to changes in past cultural identities (Fig. 1).

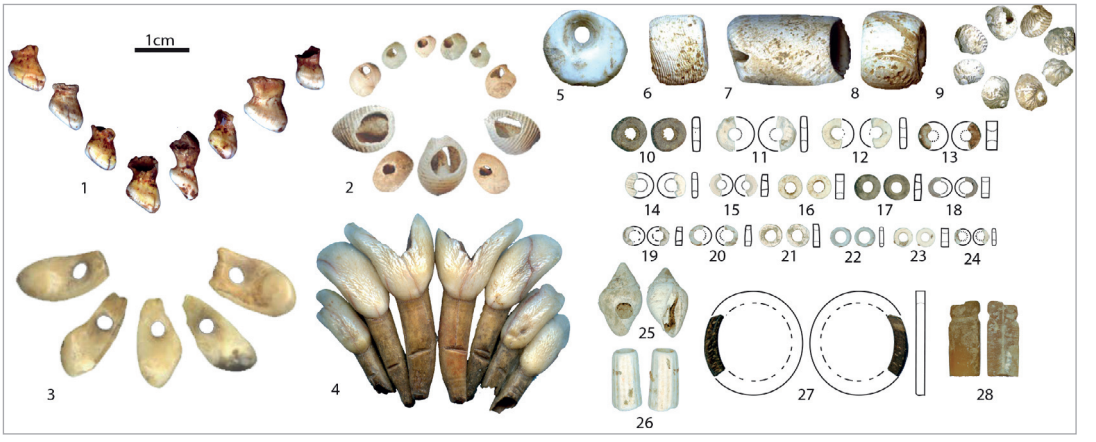

Fig. 1.
Selection of personal ornaments found in Mesolithic (1-4) and Early Neolithic contexts (5-28) showing a small part of the diversity of raw materials, shapes and techniques of suspensions potentially used to display various symbolic messages on the body. 1: Cyprinid teeth, Hohlenstein-Stadel (Germany), 2: *Littorina obtusata* and *Trivia* sp., El Mazo (Spain), 3: red deer canines, La Braña (Spain), 4: red deer incisors, Vedbaek-Bøgebakken (Denmark), 5-9: Essenbach-Ammerbreite (Germany), 5: calcite pendant, 6-8: *Spondylus* sp. beads, 9: *Theodoxus danubialis*, 10-28: Le Taï (France), 10: stone bead, 11-24: *Cerastoderma* sp. discoid beads, 25: *Columbella rustica*, 26: *Dentalium* sp., 27: stone ring, 28: calcite pendant (Modified after Rigaud 2014, 2013; Rigaud et al. 2018, 2013; Rigaud and Gutiérrez-Zugasti 2016; n°4 personal data see also Petersen et al. 2015).

HIGHLY CONNECTED MESOLITHIC FORAGING SOCIETIES

The transfer of cultural traits within and between past communities has long been investigated. Contact between populations can be seen through the circulation of raw materials from their source up to regions located several hundred kilometers away (Astruc 2011; Bajnóczi et al. 2013; Frost et al. 2004; Querré et al. 2014). The sharing of common stylistic traits in pottery design (Budja 2009; Hallgren 2004; Manen 2002), bone tools shaping and decoration (Man-Estier and Paillet 2013; Tartar et al. 2006), as well as flint weaponry production (Guilaine and Briois 2005; Langlais et al. 2016; Marchand 2003) are also commonly used to track interactions between communities. Maps describing connections, circulation roads, and exchange networks have been produced for many periods of prehistory across many regions (Álvarez Fernández 2008; Eriksen 2002; Rigaud 2013).

In their pioneering study, Newell et al. (1990) examined the chronological and spatial diversity of body ornaments produced by Epipaleolithic and Mesolithic hunter-gatherers from Western Europe, and used ethnographic data and a set of statistical analyses to map the geography of the social, ethnic, and linguistic groups (Newell et al. 1990). In this study, the main geographical corridors seem to be a key parameter for contact networks, the circulation of raw materials, and the shaping of Mesolithic cultural geography.

One of the most puzzling examples is the use of cyprinid teeth as body ornaments in the Late Mesolithic of the Upper and Lower Danube regions. The use of this raw material for ornaments emerges at the same time in these two remote regions (Newell et al. 1990; Rigaud 2011), and clearly corresponds to a cultural innovation since no previous use of these teeth has been attested during the Paleolithic. In both regions, the fish teeth were acquired from the Danube and suspended with a string attached using an adhesive compound (Cristiani, Farbstein, and Miracle

2014; Rigaud et al. 2013). Comparison of the material culture, economical organization, and mobility pattern between the two regions shows no other significant similarity (Bonsall 2008; Borić 2008; Jochim 1998; Orschiedt 1998). Body ornaments seem to have been a key element that culturally connected these two remote Danubian populations. Numerous other vast circulation roads lasted several millennia during the Mesolithic and at the beginning of the Neolithic. This is particularly the case for Mediterranean shells that circulated along the Rhône Valley up to Southern Germany (Álvarez-Fernández 2001) and along the Ebro Valley up to the Iberian Atlantic coast (Martinez-Moreno, Mora, and Casanova 2010) (Fig. 2).

However, contact networks were mostly not unidirectional. The use of modern reference data to study the 188 perforated red deer canines discovered in the multiple burials attributed to the final Mesolithic at Groβe Ofnet (Bavaria, Germany) shows an accumulation of the canines over time through a vast circulation network. Zooarchaeological and biogeographic data from modern and past reference samples suggests that the metric variability of the red deer canines accumulated at Groβe Ofnet covers the metric variability of red deer occupying Southern, Western, and Eastern Europe (Rigaud 2013). This result shows that perforated canines were accumulated through a multidirectional acquisition network.

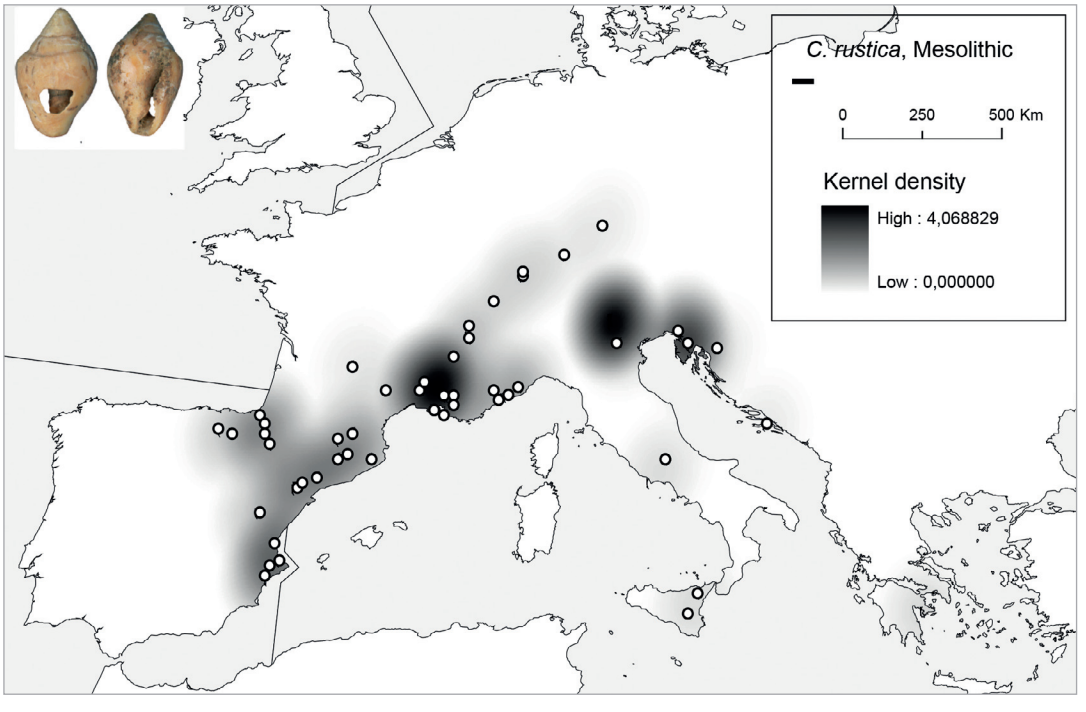

Fig. 2.
Distribution of the Mediterranean *Columbella rustica* shells found in 118 Mesolithic occupations (modified after Rigaud 2011) showing that the shells circulated along the Rhône Valley up to Southern Germany (Álvarez-Fernández 2001) and along the Ebro Valley up to the Iberian Atlantic coast (Martinez-Moreno et al. 2010).

The cultural connections visible through the use of similar association of bead types also extends beyond cultural groups identified by other markers. In Atlantic Iberia, the identification of coastal and inland foraging societies who developed distinct economies (Arias 2005) and funerary rites (Arias Cabal 2007; Arias and Alvarez Fernandez 2004; Gutiérrez-Zugasti 2011) has led archaeologists to propose the existence of territoriality at the end of the Asturian Mesolithic. The presence of common associations of bead types within both societies, however, questions their cultural affinity. By investigating raw material procurement, selection strategies, and the manufacturing processes for shell bead production on coastal sites (El Mazo and El Toral, Spain), it has been proved that all the technical steps required for bead production were conducted in situ: collection of the shells, bead manufacture, and use (Rigaud and Gutiérrez-Zugasti 2016). Conversely, no evidence of shell bead manufacture was identified inland, suggesting the beads were premade before being introduced to the sites (Álvarez Fernández 2006; Arias and Álvarez Fernández 2004; Martınez 2004). Raw material sourcing combined with functional data highlights the complex interaction networks that existed during the Mesolithic between these two bounded communities, including the coastal communities, involved in shell bead production and spread, and the inland communities, which were geographically and economically disconnected from the coastal area but symbolically connected to the coastal group by their common personal ornaments (Rigaud and Gutiérrez-Zugasti 2016). This particular case study highlights the difficulty in bringing together economical, stylistic, and cultural data in order to define cultural groups.

DURABLE CONNECTIONS AND THE SHAPING OF THE EARLY NEOLITHIC CULTURAL GEOGRAPHY

This cultural substrate made up of ultra-connected Mesolithic communities may represent favorable conditions for enhancing the rapid dispersion of the Neolithic in Europe; however, beyond the material evidence of contacts between populations, mechanisms at work in the processes of cultural transmissions and diversifications have also been intensively studied. The contributions of Cavalli-Sforza and Feldman (1981) and Boyd and Richerson (1985), who applied models of evolutionary biology to the transmission of cultural traits, were pioneer studies (Boyd and Richerson 1985; Cavalli-Sforza and Feldman 1981). Cultural evolutionary theories rely on the statement that many aspects of interindividual and intergeneration transmissions are influenced by social learning and the cognitive capacities of human learners (learning and memory abilities) (Griffiths, Kalish, and Lewandowsky 2008). Cultural selection processes (best model, survival advantage), selection bias (efficiency, prestige and conformism in reproduction), and cultural drift (random choice) rule the emergence, persistence, and loss of cultural traits over time (Shennan 2011). Based on the model of "descent with modification"

from ancestral populations, analysis of the pattern of variation in the archaeological record has contributed to the documentation of the various transmission mechanisms responsible for similarities and differences among groups in space and time (Collard and Shennan 2008; Jordan 2010; Shennan 2002; Shennan, Crema, and Kerig 2015; Tehrani and Collard 2009).

Within this analytical perspective, the database of Newell et al. (1990) was reassessed and updated in order to characterize the evolutionary mechanisms responsible for the spatial and chronological patterning of body ornaments during the Neolithic transition (Rigaud 2011). To conduct this study, archeological cultures were considered as the unit of analysis. Archeological cultures correspond to geographic and chronological units characterized by archaeological occupations associated with durable material culture (Boyd and Richerson 1985; Lyman 2008) and represent a system of social information transmission that materializes population-level processes (Riede 2011). It is this short cut between archaeological cultures and past ethnicity that has led researchers to directly equate archeological cultures and past group identity (Childe 1962). This idea has since been widely debated (Binford 1965; Hodder 1978) by stressing that no consensus exists for the use of the concept of ethnicity to denote group versus individual and for the relation between ethnicity and its material expression (Banks 1996). Archeological cultures are mostly defined in the literature according to stone tool technology for the Paleolithic and Mesolithic periods and ceramic productions for the Neolithic.

This study relies on a database of the bead type associations identified in archaeological sites attributed to the three millennia during which the last hunter-gatherers and the first farmers interacted in Europe (Rigaud, d'Errico, and Vanhaeren 2015). It combines a series of multivariate analyses performed to characterize similarities and differences between archaeological cultures based on the diversity of bead type associations identified in each archaeological culture. Results indicate that the two main roads of Neolithic dispersal, through Central Europe and the Mediterranean, are characterized by distinct associations of bead types (Fig. 3). Personal ornaments from the Northern European regions are remarkably homogeneous compared to the highly diverse bead types present in Southern Europe.

Raw material availability, however, does not account for the observed pattern. The long distance trade of objects used as beads, well attested during the Mesolithic and Early Neolithic (Álvarez-Fernández 2001; Eriksen 2002; Martinez-Moreno, Mora, and Casanova 2010; Rigaud 2013; Zvelebil 2006), supplied the raw materials to regions where they were naturally rare or absent but where beads were still desired. The absence of amber ornaments outside the Baltic area cannot be attributed to the lack of this raw material: amber outcrops are documented in many regions of Europe (Czebreszuk 2007; Desailly 1930; Gardin 1986) and were exploited during the Upper Paleolithic (Beck, Chantre, and Sacchi

Fig. 3.
Cultural geography shaped by the Early Neolithic bead type associations identified in 488 archaeological occupations (black dots, modified after Rigaud 2011; Rigaud et al. 2015).

1987; White 2007) and probably the Bronze Age (Gardin 1986). Raw material availability also fails to explain the near complete absence of perforated shells in the Baltic area, where numerous suitable shell species were available, at least at the beginning of the transgression circa 8–7.2 ka, (Gutiérrez-Zugasti 2011; Høisæter 2009; Lewis 2011). Since raw material availability is not the determining factor for the observed pattern, the study concluded that the Mesolithic and Early Neolithic cultural geography identified by personal ornament diversity reflects cultural processes that drove the way individuals and groups identified themselves using bodily ornaments (Rigaud, d'Errico, and Vanhaeren 2015).

Bead type associations identify a well-defined and long-lasting stylistic boundary that persisted through time between Scandinavia and southernmost Europe (Rigaud, d'Errico, and Vanhaeren 2015). Population geneticists recently explored this frontier and identified two complete different population histories between Northern and Southern Europe. They concluded that specific migration patterns contributed to shape the Mesolithic material culture spatial patterning of Northern Europe (Jones et al. 2017; Malmström et al. 2009; Skoglund et al. 2014). The wide distribution of a specific personal ornament, namely perforated red deer canines, has also led geneticists to consider the high level of connection between groups as a major factor for the absence of genetic structure within southernmost European Mesolithic populations (Sánchez-Quinto et al., 2012). However, by considering an isolated bead type

instead of the associations of personal ornaments, the authors have drastically neglected the high level of cultural diversity previously identified (Álvarez Fernández 2006; Dupont 2007; Newell et al. 1990; Rigaud 2011) and failed to relate population history to cultural geography.

The significant persistence of bead types used by hunter-gatherers is observed within farming communities in Central Europe and the Mediterranean region, where they are associated with new types of adornment exclusively present in farming communities. This is the case of the perforated *Columbella rustica* and other species of simply perforated gastropods in the Mediterranean area that are preserved from the Mesolithic to the Early Neolithic, but associated with new types of ornaments exclusively present within farming communities and previously unknown in Europe, in particular fully shaped objects such as discoid shell beads or stone bracelets. Bead type associations are highly diverse between each region during the beginning of the Neolithic, but show a similar trend in Central European and Mediterranean areas with the preservation of Mesolithic bead types combined with new Early Neolithic personal ornaments. These particular bead types, already identified in Mesolithic contexts, indicate that certain cultural traits, and probably also individuals, circulated from one society to another (Rigaud 2011; Rigaud, d'Errico, and Vanhaeren 2015). Genetic data (Bentley, Layton, and Tehrani 2009; Soares et al. 2010) are consistent with these results and identify complex demic processes, including the contribution of local hunter-gatherers and Near Eastern farmers to the European gene pool. The appropriation and incorporation of cultural traits could have facilitated the movement of individuals from one community to another and led to the persistence of cultural attributes initially adopted during the Mesolithic. This process could represent a successful strategy for farmers seeking to disperse in areas where large Mesolithic communities were already present, and implies that the cultural geography identified by personal ornaments at the beginning of the Neolithic in Europe is rooted in symbolic practices and stylistic choices inherited from the Mesolithic foraging communities, probably reflecting the most entrenched and lasting facets of a farmer's cultural identity (Rigaud, Manen, and García-Martínez de Lagrán 2018).

These data show that bead production at the dawn of the Neolithic reflects a long-term strategy favoring the replication of symbolic messages transmitted by personal ornaments. In addition to maintaining supply networks over time, a hypothesis formulated to explain the faithful reproduction of bead type associations suggests that specific transmission processes acted and involved a small number of specialized craftsmen responsible for bead manufacture within the first farming communities (Rigaud, Manen, and García-Martínez de Lagrán 2018). Involving few specialized crafters for bead production may limit errors in replication and secure long-term maintenance of styles and symbolic codes. This hypothesis opens up the possible existence of particular sites dedicated to the production and dispersal of ornaments holding a key place in the symbolic landscape of the communities. This category of site

is rarely identified in the archaeological record but they are known from the end of the Paleolithic (Rigaud et al. 2019; 2014). At Franchthi Cave (Greece), a large amount of shells, ranging from unperforated in perfect condition to heavily used or broken ornaments, have been recovered in every Mesolithic unit (Perlès 2018). The presence of a large number of shells with use-wear suggests worn elements were removed and replaced by newly manufactured ones. Freshly embroidered garments were probably exported from the site (worn by the Franchthi inhabitants themselves) or exchanged with inland sites where similar bead types are found (Perlès 2018). This pattern defines Franchthi Cave as a lasting production center that drove the way people shaped their body ornamentation.

CONCLUSION

By studying the personal ornaments belonging to the last foraging and the first farming communities, I examined the circulation, exchange, and transmission of objects, as well as the aesthetic standards and symbols between groups relying on drastically different economies. More specifically, I explored how societies established symbolic relationship through the use of common associations of ornaments and the mechanisms that led some societies to adopt body ornamentations different from those of neighboring communities. The results highlight the stylistic, territorial, and symbolic identities of past human populations who occupied Europe at this time. Europe appears as a cultural patchwork where early farming communities faced different challenges, implying dissimilar opportunities for the exchange and transfer of information with foraging communities and for access to new territories. Changes in personal ornamentation show that population dynamics were ruled by the renewal of symbolic standards, linked to social norms and systems of belief.

Besides the clear impact of cultural transfers between populations, the role of environmental factors in shaping the cultural geography of Europe has also been characterized (Banks et al. 2013). By applying two predictive architectures to reconstruct the eco-cultural niches of farming populations, based on their geographic occurrences and abiotic and climatic data, ecological niche modeling indicates that cultural processes behind the spread of farming in Europe took place in specific environments compatible with particular cultural adaptations (Banks et al. 2013). That these processes of economic specialization took place in particular environments reinforces the idea of major adaptations of farming cultures within distinct environmental envelopes. Foraging societies were probably not passive participants in the European ecosystem (Colehour 2008): knowledge of seasonal fluctuations in the local environment and landscape, soil properties, patterns of natural germination of local wild plants, and water availability are all essential in the development of a successful production system. Social interactions between foraging and farming populations highlighted by the personal ornaments analysis may have often granted the transmission of useful naturalistic knowledge and

related know-how which remain to be explored. Maintaining and reinforcing connections with neighboring communities represented an efficient strategy for emerging farming societies seeking to spread and access new territory.

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