Upper Paleolithic Explorers: The Geographic Sources of Shell Beads in Early Upper Paleolithic Assemblages in Israel

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submitted: 18 January 2018; accepted 13 October 2018

ABSTRACT

The Upper Paleolithic occupation levels of Kebara and Manot caves (Mt. Carmel and Western Galilee, respectively, both in Israel) contain both Ahmarian and Aurignacian cultural remains, the former being a locally developed culture, and the latter an intrusion from Europe. The molluscan assemblages from the two sites contain both local and foreign elements. The local elements are mostly beads made of *Columbella rustica* and *Tritia gibbosula* shells. A comparison of Upper Paleolithic shell bead assemblages of Levantine sites to Aurignacian assemblages in Europe suggests that while most of the shells are Mediterranean species, it is nonetheless possible to distinguish between the local Ahmarian traditions in personal ornaments, and those which were brought or influenced by the Aurignacian traditions. Specifically, a few shell beads such as *Tritia mutabilis* and *Ocinebrina edwardsii*, might have been imported from sites in Western Europe, and likewise the scaphopods seem to be present as a result of Aurignacian influences (either brought from Europe or collected along the Levant coast). Furthermore, in a few cases shells were originally collected in distant locations. One *Euplica festiva*, from the Red Sea Shore found at Kebara Cave may have been collected by Ahmarians and exchanged with Aurignacians. Two others are fossil shells from the Jordan Valley, which were found at both Kebara and Manot. These finds testify to possible connections between Aurignacians and their Ahmarian neighbors, as well as to the explorative nature of these populations.

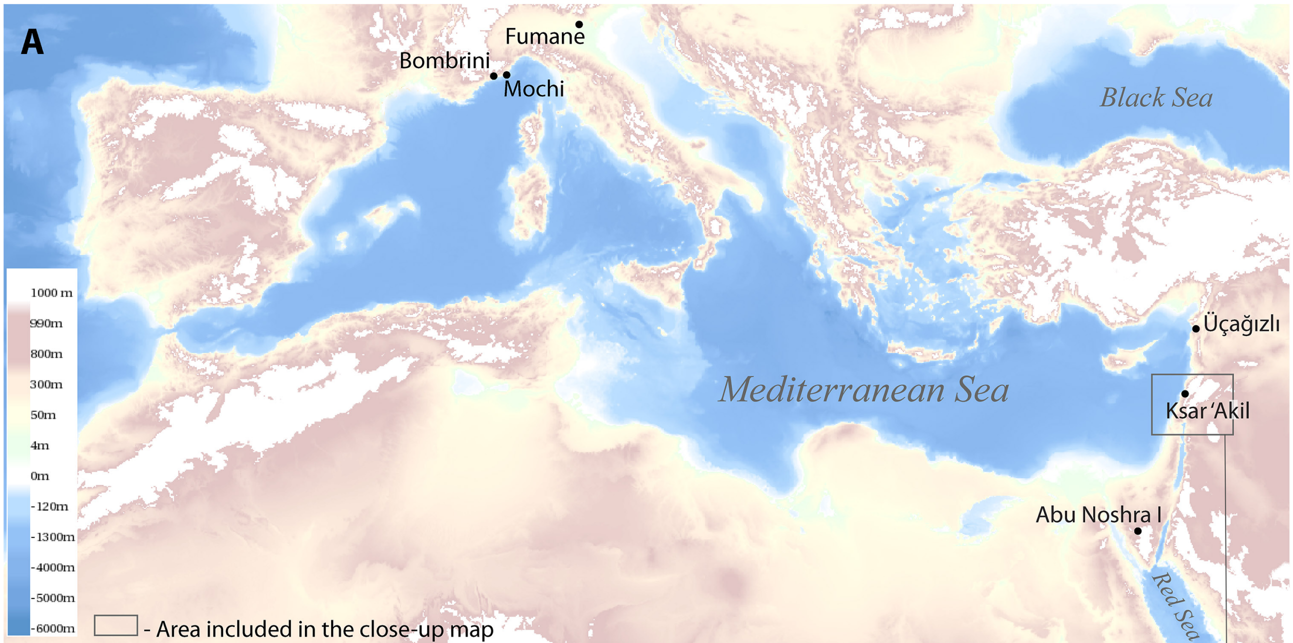
This special issue is guest-edited by Daniella E. Bar-Yosef Mayer (Steinhardt Museum of Natural History and Institute of Archaeology, Tel Aviv University) and Marjolein D. Bosch (McDonald Institute for Archaeological Research, University of Cambridge). This is article #6 of 12.

INTRODUCTION

The dispersal of modern humans within and between Africa and Eurasia during the Upper Paleolithic is part of a trajectory in human evolution (e.g., Bar-Yosef 2017; Mellars 2004). Recent finds in the Levant enhance our understanding of the dispersal of humans (e.g., Belfer-Cohen and Goring-Morris 2003; Goring-Morris and Belfer-Cohen 2006; Hublin 2015; Mellars 2006; Zilhao 2006). Modern humans traveled through this region on their way out of Africa (Hershkovitz et al. 2015), and the material remains they left behind seem to combine old traditions originating in Africa and new ones, which are an adaptation or innovation that developed along their expansion route. The best-known material culture of the Upper Paleolithic (UP) consists primarily of lithic artifacts but includes also a bone industry and shell beads. The lithics and bones were for the most part collected in the vicinity of the sites occupied. Beads could have been made of a large array of materials including organic ones (Balme and O'Connor 2019), but the best preserved and best known are mollusc shell beads that are the focus of this paper.

Beads in general and shell beads in particular serve as a means of communication and may have had other symbolic functions broadly discussed in the ethnographic and archaeological literature (Bar-Yosef 1991; Jackson 1917; Kuhn 2014; Vanhaeren 2005). According to Vanhaeren and d'Errico (2006), the combination of specific personal ornaments reflects "ethno-linguistic diversity of human groups". Is there really a way of deciphering what shell beads mean? Apart from their actual distribution, can we identify specific ethnic groups using shell beads? Surprisingly, by paying attention to specific compositions of shell assemblages in the Levant, we might be able to contribute to this topic, and possibly to identify interactions between two groups that are quintessentially separate, based mostly on their lithic industries, yet they co-existed for approximately three to four millennia during the Upper Paleolithic in the Levant (Bar-Yosef and Belfer-Cohen 2010; Gilead

  ISSN 1545-0031
doi:10.4207/PA.2019.ART126



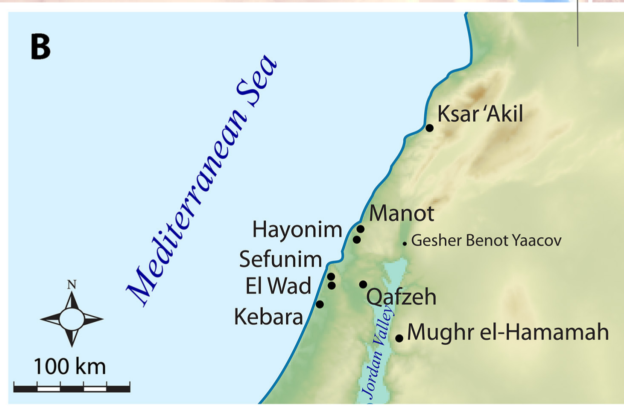


Figure 1. Map showing sites mentioned in the text. a) Circum-Mediterranean; b) Levant.

1991). The Ahmarian culture represents a local Levantine group that developed around 46–42 ka cal BP and lasted until about 32 ka BP (to be replaced by the Atlitian, not discussed here), while the Aurignacian, best known from numerous sites mostly in Western Europe, penetrated into the Levant and existed there from about 38–34 ka cal BP, initially defined as a "Levantine Aurignacian" culture (Alex et al. 2017; Barzilai et al. 2016; Belfer-Cohen and Goring-Morris 2003; Garrod and Bate 1937; Neuville 1934). Both Ahmarian and Aurignacian cultures were present in the sites of Kebara Cave in Mt. Carmel, and Manot Cave in the western Galilee, Israel (Figure 1). In these sites, excavations yielded shell bead assemblages, and I will attempt to explain the ecological and behavioral adaptations of the populations that used these shell beads.

At both caves, in addition to Mediterranean shells, some shells originated in distant regions, the Red Sea and the Jordan Valley. The western Mediterranean could be another remote origin of a few of the shells. These findings suggest that Aurignacian groups arriving in new territories may have conducted scouting expeditions to faraway environments. These could have been intended for food procurement, or part of seasonal migrations, but they included also the collection and transportation of non-edible shells, that further stress the value of these items to their owners. It thus appears that Aurignacian groups (or individuals) both brought "their own" shells from western Europe, and may have interacted with the local Ahmarian population.

METHODS

Mollusc shells were identified taxonomically by comparison to specimens at the mollusc collection of The Steinhardt Museum of Natural History at Tel Aviv University, as well as the pertinent literature (Bosch et al. 1995; Milstein et al. 2012; Poppe and Goto 1997). The shells were observed under a binocular microscope (Leica M-80) at up to x60 magnification and measured with a digital caliper (Mitutoyo digimatic). Comparisons to previously published shell assemblages from other Levantine and European sites were based exclusively on published materials.

RESULTS

KEBARA CAVE

The most recent excavations at Kebara Cave, Mt. Carmel, in the 1980's, yielded a small assemblage of marine and freshwater shells in the Upper Paleolithic (UP) levels near the cave's entrance. This area included rich anthropogenic remains of lithics and animal bones due to the intensive occupation of this area (Bar-Yosef and Meignen, in press; Goldberg et al. 2007). The excavated portion of these clay-rich deposits were mostly dated to the Upper Paleolithic on the basis of the lithic assemblages. Based on typological considerations, the entire accumulation was arbitrarily divided into Lower and Upper Entrance levels. The Lower Entrance deposit consists of mostly Ahmarian elements, and the Upper Entrance represents the Aurignacian occupation of the cave, but there have been slight mixtures in both levels, so that an exact separation between the assemblages was not possible (Belfer-Cohen and Bar-Yosef in press). All marine and freshwater shells described below must have been introduced by humans, and most served as shell beads described in detail elsewhere (Bar-Yosef Mayer in press; Table 1).

Most freshwater shells are regarded as artifacts because they were introduced into the cave by humans, although some could have also been introduced by animals, especially birds. At Kebara, there are two categories of freshwater snails—those that originated in the vicinity of the site, and others that were brought from a greater distance.

Theodoxus michonii is a snail living in freshwater streams on the coastal plain; it exists in the Taninim river today and was present in the Kebara wetlands in the past (Sivan et al. 2016). The shell is perforated and may have been deliberately collected to be used as a bead (Figure 2a).

In the category of shells from distant origins is a *Melanopsis* that belongs to a group of freshwater snails common throughout the southern Levant, found in lakes, rivers and springs (Heller et al. 2005). The specimens from Kebara Cave were identified as *M. costata*, a species common today only in the Jordan Rift Valley, and not *M. lampra*, a species that today inhabits rivers of the coastal plain of Israel. A few shells of *Melanopsis costata* were found in different parts of the UP archaeological sequence at Kebara. All are broken shells that do not seem to have served as artifacts and might be ecofacts. There is no evidence for a presence of *M. costata* along coastal freshwaters in the past, and the distance from Kebara Cave to the Jordan Valley is approximately 80km.

A single shell of *Theodoxus chalucina* (Petrbok 1925) was found. This is described as belonging to mid-Pleistocene levels (Mindel glacial period, in Petrbok's terminology) in an exposure on the south and southwestern banks of the Sea of Galilee. The shell is broken in the body whorl but it was artificially perforated prior to breakage (Figure 2b). This species was also identified in the virgin soil consisting of Lake Lisan sediments below the Neolithic site of Gesher, in the central Jordan Valley (Mienis, personal communication).

Kebara Cave today is under 3km from the coast, but during the UP would have been about 8km away. The marine molluscs from Kebara Cave included mostly Mediterranean gastropods, presented here briefly. *Ocinebrina edwardsii* (Figure 2c) comprises only its natural aperture, while the rest of the shell has been abraded, but this element may have served as a bead. Nine *Columbella rustica* shells, of which 6 had a perforation in the body whorl, constitute the largest group of ornamental shells (Figure 2d). Another Mediterranean gastropod is a perforated *Tritia mutabilis* (Figure 2e). Finally, one gastropod, *Euplica festiva*, is a Red Sea species. It is very small, only 8.3mm long, and has a perforation in its body whorl (2.4mm in diameter; Figure 2f). Under the microscope some red stains (probably ochre) were seen on both lips and on the base of the spire above the perforation.

Mediterranean bivalves include two complete valves of *Glycymeris nummaria* (previously called *G. violacescens* or *G. insubrica*) from the Upper Entrance (Figure 2g), and two more fragments of *Glycymeris*. In addition, there was one fragment of *Acanthocardia tuberculata*. Ten scaphopods of the genus *Antalis* were found in both Upper and Lower Entrance levels and range between 2.5–19mm long (Figure 2h).

MANOT CAVE

The Manot Cave excavation project has been ongoing since 2010 (Barzilai et al. 2016; Hershkovitz et al. 2015). The site, an active karstic cave, is today about 10km away from the Mediterranean coast, and it would have been about 15km away during the UP period. The UP levels in Area C were dated by Uranium/Thorium of speleothems (flowstones), which seal the archaeological layers, to 42,500–30,000 kyr. Those were backed by perfectly matching radiocarbon dates from within these layers, consisting of Early Ahmarian, from 46 to 42 ka cal BP; Levantine Aurignacian, from 38 to 34 ka cal BP; and a post-Levantine Aurignacian industry, from 34 to 33 ka cal BP (Alex et al. 2017).

The marine shells discussed here come only from Area C, in a talus deep inside the cave. Although the materials contained in these levels likely slumped from higher up inside the cave, these levels were radiometrically dated, and are considered reliable for the purpose of the current study. However, similarly to the situation at Kebara Cave, there are many mixed contexts and therefore it was very difficult to separate Ahmarian from Aurignacian contexts, and they are presented together.

The freshwater shells consist of three specimens of the local freshwater snail, *Theodoxus michonii*, as well as a single shell of *Syriomargaria apameae* (previously called *Viviparis apameae*; Figure 3a). The latter is a Pleistocene fossil from the Jordan Valley (about 55km eastwards) and was very common in the Lower Paleolithic site of Gesher Benot Ya'acov as an ecofact, but was apparently extinct ca. 240 ka ago (Ashkenazi et al. 2010).

Marine gastropods include *Erosaria* sp. (Figure 3b) and *Zonaria pyrum* (Figure 3c), both of which are cowries that were found together next to isolated human remains that are currently under study. While *Zonaria* is undoubtedly a Mediterranean species, *Eroasaria* was broken and could not be identified to species level, which means it could originate in either the Mediterranean or the Red Sea (Moretzsohn 2014: Appendix 1). The largest group of ornaments consists of *Columbella rustica*, most of them perforated (Figure 3d). Fourteen *Tritia gibbosula* (previously called *Nassarius gibbosulus*) were recovered (Figure 3e), and most were perforated. Bivalves include two *Glycymeris nummaria* (one was perforated) and three other bivalve fragments that might have been ornamental as well. Nine scaphopods, *Antalis* spp. (Figure 3f) complete the list of shells at Manot. Additional shells from Manot Cave Area E are described elsewhere (Marder et al., submitted).

TABLE 1. ORNAMENTAL SHELLS FROM THE UPPER PALEOLITHIC LEVELS OF KEBARA CAVE AND MANOT CAVE AREA C.

	SPECIES*	GEOGRAPHIC ORIGIN	KEBARA		MANOT AREA C		
			Upper and Lower Entrance	Worked Specimens**	Levels 3–7	Worked Specimens**	
Gastropods	† *Theodoxus chalucina*, Petrbok 1925	Jordan Valley fossil	1				unique
	Theodoxus michonii (Bourguignat, 1852)	Local freshwater	1		3	1	
	† *Syriomargarya apameae* (Blanckenhorn 1897)	Jordan Valley fossil			1		unique
	Melanopsis costata (Olivier, 1804)	Jordan Valley freshwater	2				
	Cerithium lividulum Risso, 1826	Mediterranean			1		
	Pirenella conica (Blainville, 1829)	Mediterranean			1	1	
	Erosaria sp.	Mediterranean			1	1	unique
	Zonaria pyrum (Gmelin, 1791)	Mediterranean			1	1	unique
	Ocinebrina edwardsii (Payraudeau, 1826)	Mediterranean	1	1			unique
	Columbella rustica (Linnaeus, 1758)	Mediterranean	9	6	31	21	
	Euplica festiva (Deshayes in Laborde & Linant, 1834)	Red Sea	1	1			unique
	Mitrella scripta (Linnaeus, 1758)	Mediterranean	2	2			
	Nassarius circumcinctus (A. Adams, 1852)	Mediterranean			1		
	Tritia gibbosula (Linnaeus, 1758)	Mediterranean			14	12	
	Tritia mutabilis (Linnaeus, 1758)	Mediterranean	1	1			unique
Bivalves	*Glycymeris bimaculata* (Poli, 1795)	Mediterranean			1		
	Glycymeris nummaria (Linnaeus, 1758)	Mediterranean	4		2	1	
	Cerastoderma glaucum (Bruguière, 1789)	Mediterranean			1		
	Acanthocardia tuberculata (Linnaeus, 1758)	Mediterranean	1		1		
Scaphopods	*Antalis dentalis* (Linnaeus, 1758)	Mediterranean	1	1			
	Antalis inaequicostata (Dautzenberg, 1891)	Mediterranean	2	2			
	Antalis vulgaris (da Costa, 1778)	Mediterranean	6	6	5	5	
	Antalis sp.	Mediterranean	1	1	4	4	
TOTAL			**33**	**21**	**68**	**47**	

*Species are listed in taxonomic order.
**Worked specimens include naturally perforated shells that could be suspended such as the scaphopods.

Figure 2. Selection of shells from Kebara Cave: a) Theodoxus michonii, *b)* Theodoxus chalucina, *c)* Ocinebrina edwardsii, *d)* Columbella rustica, *e)* Tritia mutabilis, *f)* Euplica festiva, *g)* Glycymeris nummaria, *h)* Antalis *spp. (credit: Oz Rittner, The Steinhardt Museum of Natural History, Tel Aviv University).*

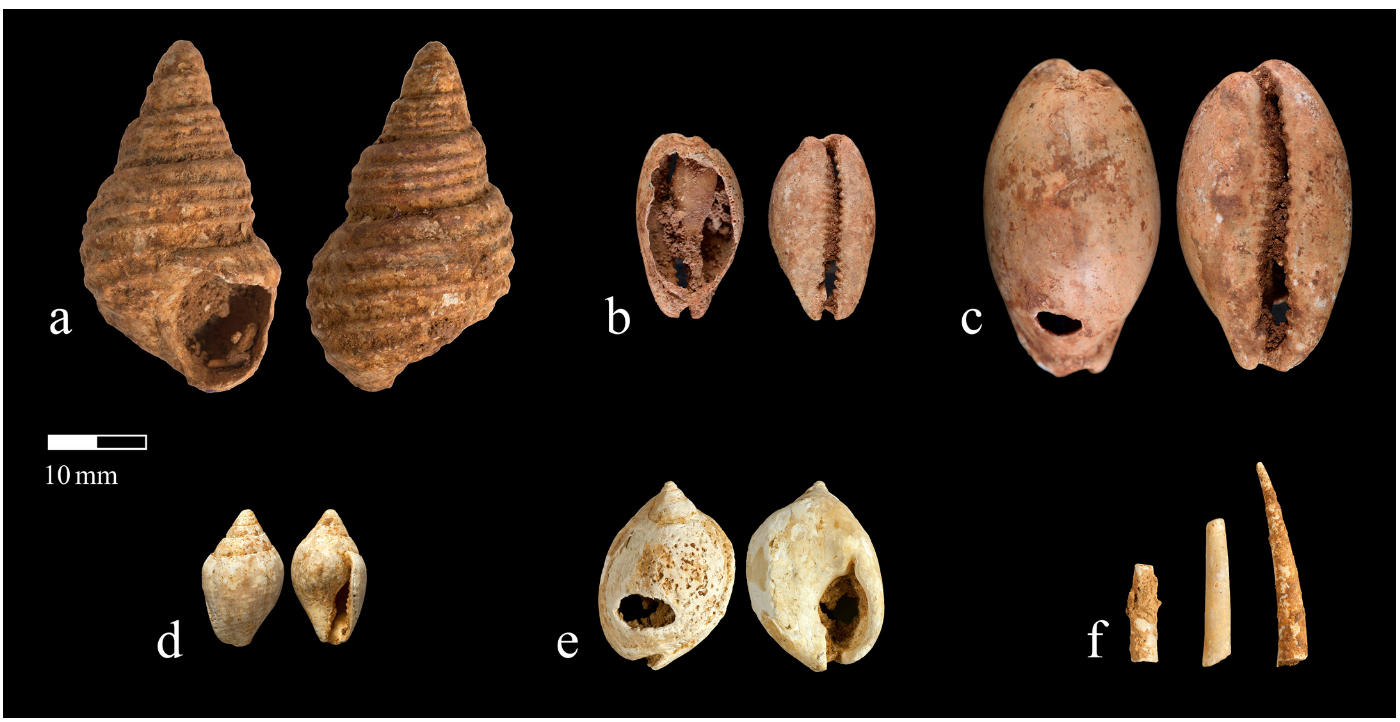


Figure 3. Selection of shells from Manot Cave: a) Syriomargaria apamea*e, b)* Erosaria *sp., c)* Zonaria pyrum, *d)* Columbella rustica, *e)* Tritia gibbosula, *f)* Antalis *spp. (credit: Tsila Sagiv, Israel Antiquities Authority and Oz Rittner, The Steinhardt Museum of Natural History, Tel Aviv University).*

DISCUSSION AND CONCLUSIONS

The UP period in the southern Levant is known from most cave sites in Israel and neighboring countries and in several open-air sites that are mainly situated in the arid zone of Sinai, the Negev, southern and central Jordan, and inland Syria. Ahmarian sites, thought to be derived from an indigenous culture, have a ubiquitous distribution in the region, but Levantine Aurignacian sites, considered to represent an intrusive population, are more prominently situated in the northern, more verdant parts of the region (Bar-Yosef and Phillips 1977; Gilead 1991; Phillips 1988). The Ahmarian, which emerged around 46–42 ka cal BP and lasted until about 32 ka BP[1], is characterized by a blade and bladelet lithic industry with removals from parallel sided cores following initial core shaping involving crested blades. Typologically, the industry is principally known for its lightly retouched pointed bladelets, especially el-Wad points. The most prominent markers of what used to be called the "Levantine Aurignacian" are el-Wad points, similar to the Font Yves or Krems points which are well-known from Europe, in conjunction with a dominance of endscrapers and burins, carinated pieces, Aurignacian retouch and Dufour bladelets. In addition to the el-Wad point, other cultural markers also are present, for example, a split-based bone point that was found at Kebara Cave, and other bone tools currently under study (Henry et al. 2017; Kadowaki et al. 2015; Tejero et al. 2016).

The Aurignacian is often stratified above an Ahmarian layer, sometimes capped with a later local UP culture such as the Atlitian (Alex et al. 2017). Importantly, the Ahmarian culture exists elsewhere in the Levant in parallel to the presence of the Aurignacian culture. The dates of the Aurignacian entity are approximately 38–34,000 years ago, as recently dated at Manot. It appears that the Aurignacians were visitors from Europe who brought with them a different lithic and osseous industry tradition, but also contributed to the choice of shell beads.

Unlike Middle Paleolithic sites in the Levant that have few marine shell beads (Bar-Yosef Mayer et al. 2009; Vanhaeren et al. 2006), sites of the UP usually exhibit larger shell assemblages (dozens of beads), and in a few cases even thousands of shell beads (Bosch et al. 2015; Stiner et al. 2013). Most shells are from the Mediterranean Sea (e.g., *Columbella rustica, Tritia gibbosula*), or local freshwater shells such as *Theodoxus michonii*. In this paper, I emphasize especially a few shells that are one-of-a-kind in the UP archaeological record of Israel and I show that some shells are from distant sources such as the Jordan Valley (About 60–80km from the Mediterranean coast) and the Red Sea (about 400km from Kebara). I consider the cultural meaning of the presence of shells from far away within the broader context of the two cultural units of the UP, the Ahmarian and the Aurignacian.

The relatively small assemblage of marine and freshwater shells from the UP of Kebara Cave, with 33 shells, is dominated by *Columbella rustica* and *Antalis* spp. In addition, several species that could be expected were present. Those are the local freshwater species, *Theodoxus michonii* and the Mediterranean bivalves, also known from other UP sites—*Glycymeris nummaria* and *Acanthocardia tuberculata*. On the other hand, *T. mutabilis, O. edwardsii*, and *Euplica festiva* are unusual species never before identified in any prehistoric site in Israel.

The shell assemblage of Manot Cave discussed here is based only on finds from Area C, while other areas are as yet under study. It is composed mostly of Mediterranean shells including 31 *C. rustica*, 14 *T. gibbosula*, 9 *Antalis* spp., and a few isolated marine gastropods and bivalves, as well as three local freshwater *T. michonii*. Within the group of isolated species, most notable are two cowries that were found side by side and one Viviparid from the Jordan Valley, discussed below.

The suggestion that Aurignacians explored large parts of the Levant, beyond the Mediterranean zone in which they settled, or that they may have interacted with the local Ahmarian population was further considered. To do so, the assemblages of Manot Area C and Kebara were compared to other UP shell assemblages in the Levant and in Europe. This comparison revealed the "outliers," or unexpected species that hint toward their original bearers. The better-known sites of the UP in the Levant include Üçagızlı in Turkey, Ksar 'Akil in Lebanon, Yabrud Cave in Syria, Manot Cave and Hayonim Cave in the Western Galilee, Qafzeh Cave in the Lower Galillee, Emireh Cave in the Eastern Galilee, Sefunim Cave, El Wad Cave, and Kebara Cave in Mount Carmel, and to those we might add Mughr el-Hamamah in the Jordan Valley (see Figure 1). Not all of these sites have shell assemblages, and if they do, those were usually only superficially studied and published (e.g., Reese 1991). Yet the comparison of the results from Kebara and Manot to the large contemporaneous sites of Ksar 'Akil (Bosch et al. 2015; van Regteren Altena 1962) and Üçagızlı (Stiner et al. 2013), provides clues for the interpretation of what consists of Ahmarian and Aurignacian shell assemblages. At Ksar 'Akil, which contains both Ahmarian and Aurignacian levels, the total NISP of 3404 Upper Paleolithic shells were recently re-analyzed (Bosch et al. 2015). Those include 1219 shells that served as food; 538 "ecofacts," and 2185 "artifacts" ('non-food transported' specimens; Bosch et al. 2015). Within the last group, 21 species are listed as ornamental, and 14 marine species were transported by humans to the site but are neither edible, nor could they have reached the site any other way. Among the ornaments, *Tritia gibbosula* (n=673) and *Columbella rustica* (n=409) dominate, and together form almost 50% of the total. Common bivalves include *Glycymeris, Acanthocardia,* and *Cerastoderma* (n=364; 22%). *Antalis* spp. (n=39 in levels VIII, IX, X) were present only in the Aurignacian levels, mostly in level IX, where a single shell of *Tritia mutabilis* also was discovered.

At Üçagızlı I, the shell assemblage consisted of an NISP of 1979 shells, 1289 (65%) of which are from the Ahmarian levels E to B. The 31 marine species also include edible species and "ecofacts" that were not identified in the publication (Stiner et al. 2013). The ornamental shells here consist of *Tritia gibbosula* (n=555) and *Columbella* (n=559) that together form almost half of the total assemblage. Notably, 77% of the Initial Upper Paleolithic (IUP) levels I-F are formed by *Tritia gibbosula*. Accordingly, bivalves are relatively few (*Glycymeris, Acanthocardia, Cerastoderma*, n=41; 0.03%). Üçagızlı, being mostly an Ahmarian site with no Aurignacian artifacts or any other Aurignacian characteristics in it, contained no *Antalis* sp. in its UP levels.

Thus, in both assemblages of Ksar 'Akil and Üçagızlı, *Tritia gibbosula* dominates and *Columbella rustica* follows. Scaphopods, on the other hand, are only known from the Aurignacian levels of Ksar 'Akil and are totally absent from the UP levels of Üçagızlı. Scaphopods also were noted in the Aurignacian level of Hayonim Cave, but at the time those were thought to be intrusive from the Natufian levels above (Belfer-Cohen and Bar-Yosef 1981). Likewise, the Aurignacian level V of Sefunim Cave contained numerous scaphopods (Shimelmitz et al. 2018).

A preliminary comparison of the Levantine assemblages to the vast numbers of shells in Aurignacian assemblages from Europe was based mostly on previous compilations by Vanhaeren and d'Errico (2006) and by Álvarez-Fernández and Jöris (2008). Aurignacian assemblages include a large variety of shells, and an extensive comparison is not possible at this point. Yet looking specifically at species present both in the Levant and in the European Aurignacian reveals certain trends. *Tritia gibbosula* was present in 14 sites in Europe. Because *Tritia neritea* (previously called *Cyclope neritea*) is closely related to *T. gibbosula*, and the ventral sides of these shells (containing the aperture) are morphologically similar, *T. neritea* was included in the study. Together, *T. gibbosula* and *T. neritea* were present in 27 sites in Europe. Since *T. gibbosula* is known already from various Middle Paleolithic sites in the Levant and North Africa (Bar-Yosef Mayer 2005; Bouzouggar et al. 2007; d'Errico et al. 2009; Garrod and Bate 1937; Steele and Alvarez-Fernandez 2011; Vanhaeren et al. 2006) and forms the majority (77%) of IUP shells at Üçagızlı (Stiner 2013), it is possible that this species spread from North Africa and the Levant to Europe, maybe via the "Proto Aurignacian package" (Mellars 2006) although there is no direct evidence to it as yet (but see Moroni et al. 2013). *Columbella rustica* that is present in seven European sites appears first in the Early UP in the circum Mediterranean (North Africa and the Levant) and the trajectory of its dispersal is unclear (e.g., d'Errico et al. 2009; Stiner et al. 2013). At Üçagızlı it is more prominent in the Ahmarian phases (E-B; about 45%) than in the IUP phases (I-F; 15%). While the two genera, *Tritia* and *Columbella* seem to be interchangeable, as is evident from their continuous long record throughout the Ahmarian record of Üçagızlı (Stiner et al. 2013: Figure 7), it is noteworthy that at Kebara Caves *Columbella rustica* shells are common, while *Tritia gibbosula* is completely absent (Bar-Yosef Mayer in press) and at Sefunim Cave *Columbella rustica* is very dominant (Shimelmitz et al. 2018).

The European record points at species that were never seen in the Levant prior to the UP—*Antalis* or *Dentalium* was found in 25 sites in Europe, cowries were present in nine sites (13 including *Trivia* sp.); *Tritia mutabilis* in 13 sites, and *Ocinebrina edwardsii* at five sites.

A detailed examination of the shells at both Kebara and Manot reveals that some of the shells found there are unexpected. Such is the case of *Melanopsis costata* that originates in the Jordan Valley. Freshwater snails could have been introduced by birds (Hunt and Hill 2017) or inadvertently by humans if they were adhering to plant materials, or along with drinking water (Bar-Yosef Mayer 2005). Because the *M. costata* is naturally broken and does not bear any signs of manipulation or use, it could have been brought to the site by either humans or animals.

Theodoxus chalucina, however, is a different case. This freshwater shell is a Pleistocene fossil from the Jordan Valley (correlated by Petrbock to the 'Mindel glaciation'; Petrbock 1925), and although broken, it does show the remains of a ground down hole on its body whorl, probably to be used as a bead. It derives from the Lower Entrance level of Kebara. This exhibits movements of Early Ahmarian populations within the Levant, either due to contacts with other groups, or reflecting seasonal movements of specific human groups between the coastal plain and the Jordan Valley. Another Pleistocene fossil from the Jordan Valley is *Syriomargaria apameae* (previously called *Viviparus apameae*) that was found at Manot. The presence of a single *Tritia gibbosula* shell bead from Mughr el-Hamamah (Stutz et al. 2015 and personal observation) on the eastern side of the Jordan Valley may be related to these activities, meaning that shells from the Jordan Valley were transported westward, and shells from the Mediterranean were transported eastward, maybe in exchange for each other.

Shells did not only travel on an East-West trajectory, though. *Euplica festiva,* a Red Sea shell that was discovered in Kebara Cave, to date, has never been encountered in any other archaeological site in Israel or elsewhere. The perforation of its body whorl and the red stains on it suggest it was used as an ornament. It was recovered in the Upper Entrance level of Kebara and was transported from the Red Sea, at a distance of about 400km to the south. The only other use of *Euplica* as ornament is known from recent centuries in Oceania, especially in the islands of Hawai'i, where *Euplica varians* is used for making shell leis, however, the latter are perforated in the spire, and not in the body whorl (Moriarty 1986). This shell could attest to an exchange between Aurignacians, who were more dominant in the Upper Entrance level of Kebara, and Ahmarians who co-existed throughout the desertic regions at the same time.

A few of the Mediterranean shells, at both Kebara and Manot, which are unique finds in the archaeological record of the Levantine UP, seem to resemble ones from the European Aurignacian shell assemblages. Such are the cases of *Ocinebrina edwardsii* and *Tritia mutabilis* from Kebara, and the two cowrie shells from Manot. *O. edwardsii* consists of the aperture area and a part of the columella, and looks like a round to oval bead (see Figure 3b). An almost identical specimen was found at the Aurignacian and Proto-Aurignacian levels of Riparo Mochi (Stiner 1999: Figure 3b, left item), and the species is present also at Grotta di Fumane (Peresani et al. 2019) and in the Proto-Aurignacian levels of

Riparo Bombrini (Holt et al. submitted), all in northern Italy. Although the shell exists on the Mediterranean coast of Israel, its complete absence from any other archaeological site of any period suggests that the Kebara shell may have been imported by a population that arrived from Italy to the Levantine coast. Similarly, *Tritia mutabilis*, to date, was found in Israel only in the Upper Entrance level of Kebara Cave. This shell was found in the same Italian sites mentioned above, as well as in several sites in France (Vanhaeren and d'Errico 2006 and references therein). The case of *Zonaria pyrum* and *Erosaria* sp. from Manot is slightly more complicated, because the precise identification of cowries to species level in the European record is very often lacking, and they are simply listed as *Cypraea* sp. However, like with *O. edwardsii* and *T. mutabilis*, no cowries have ever been discovered in the Levant from any UP site, and the earliest known case is that of *Trivia* sp. (a shell from the Cypraeidae family) from Fazael XI, now considered of Masraqan Age (ca. 25–20ka BP; Goring-Morris 1980 and Goring-Morris personal communication). An isotopic investigation of these shells is underway to try and corroborate a possible western Mediterranean origin for these shells.

These outliers, or unexpected species, belong to the Aurignacian tradition of Europe (and sometimes Proto-Aurignacian), because they are common there and rare in the Levant, and in fact appear only in Levantine sites where there is evidence for Aurignacian activity from lithics and bone artifacts (Bar-Yosef and Belfer-Cohen 2010; Belfer-Cohen and Goring-Morris 2003; Tejero et al. 2016). Yet, some aspects still need to be sorted out. For example, two shells of *T. mutabilis* were present at Üçagızlı, in the Initial UP levels (Stiner et al. 2013), and those would tell a different story because they are several thousand years older than the Aurignacian, and probably have nothing to do with the Aurignacian presence in the Levant. While the two cowrie shells from Manot Cave, the *Erosaria* sp. and *Zonaria pyrum*, also seem to represent an Aurignacian influence in the Levant, there was a single cowrie shell from the IUP of Üçagızlı Cave (Stiner et al. 2013), and it is unclear why it is there. It is important to note, though, that the *Erosaria* that we identified in Manot is not consistent with the common Mediterranean *E. spurca*. This means it either belongs to an extinct *Erosaria* species from the Mediterranean, as yet to be determined, or it is an Indo-Pacific species, that may be associated with Ahmarian activities.

A similar point that is as yet unclear, and might be resolved after a more rigorous study of dates, is that of scaphopods (*Dentalium* and *Antalis*) in Ahmarian sites in Northern Sinai (Bar-Yosef and Phillips 1977). It is not clear to what extent these reflect mutual influences or contacts between Aurignacians and Ahmarians. The *Dentalium* found in southern Sinai have ridges and are robust, whereas the *Antalis* found in sites closer to the Mediterranean are smaller and more delicate.

The various shells from distant sources, and especially *Euplica festiva* from the Red Sea, may represent the exploratory nature of the Aurignacian population, if they reached these sources themselves. It is also possible that once the Aurignacian groups reached the Levantine coastal plain from Italy, either by land or by sea (e.g., Broodbank 2014: 268), further explorations were conducted, and in one case, explorers (or a scout) returned with a shell from the Red Sea coast. It may also be the case that the Aurignacian population interacted with the local Ahmarian population, and that the latter were responsible for collection of the shell in the Red Sea (Bar-Yosef and Belfer-Cohen 2010). That Ahmarians engaged in collection of Red Sea shells was evident at Abu Noshra I, southern Sinai (Phillips 1988; Phillips and Gladfelter, n.d.; Appendix 1).

To conclude, the Kebara and Manot molluscan assemblages contribute to our understanding of the use of personal ornaments, and to human activities of this culture. Particularly, the presence of a Red Sea shell could reflect exploration, or contacts between Aurignacians and Ahmarians. The identification of unique shells such as the ones discussed here may eventually lead to a better understanding of the role of particular shell species as ornaments within their cultures. However, the exact meaning or reason for collection of the marine species is debated (Bar-Yosef Mayer 2015; Kuhn 2014; Stiner 2014; Vanhaeren and d'Errico 2006). There is agreement that the shells were collected and used as beads or another form of personal ornament, but whether each species had a specific symbolic meaning, or can be attributed to a specific population, is as yet unclear. The fact that a few specimens in the Kebara and Manot assemblages are idiosyncratic, and are presumed to have been brought to the site from various distant locations, sheds light on this question.

In his 2006 paper, Mellars (2006) wrote "It is interesting to ask how far we can detect any patterns of cultural or technological exchange between the earliest dispersing populations of modern humans across the different regions of Europe" and he showed various examples of exchange patterns of stone and shell beads in different parts of Europe. Here, I showed that exchange existed far beyond these boundaries, and may have crossed through the Mediterranean Basin.

ACKNOWLEDGMENTS

I wish to thank Henk K. Mienis (The Steinhardt Museum of Natural History, Tel Aviv University) for assistance with shell identification. Aaron Stutz (Oxford College of Emory University) and Liv Nilsson Stutz provided information on Mughr el-Hamamh. J.L. Phillips allowed me to study the shells from Abu Noshra I. Thanks to Marco Peresani (Univeristy of Ferrara) and Fabio Negrino (University of Genoa) for consultations regarding shells in sites in Italy. Yehuda Enzel (Hebrew University of Jerusalem) consulted on geological matters. Tsila Sagiv (Israel Antiquities Authority) photographed shells from Manot Cave. Oz Rittner (The Steinhardt Museum of Natural History, Tel Aviv University) is thanked for photography and layout of Figures 1 and 2. Finally, I am grateful to Don Henry and to two anonymous reviewers for their useful comments on an earlier draft.

ENDNOTES

[1]There does not seem to be any clear evidence for when the Ahmarian actually ended (see also Kuhn et al. 2009), and this topic is beyond the scope of the current paper.

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APPENDIX 1: MARINE SHELLS OF ABU NOSHRA I

During the excavations of Abu Noshra I, an Ahmarian site in southern Sinai (Phillips 1988; Phillips and Gladfelter n.d.), several marine shells were discovered. All shells were identified at the mollusc collection of The Steinhardt Museum of Natural History, Tel Aviv University. They were examined microscopically (Nikon DISCOVERY V8) at up to X60, and none show signs of manipulation or use. However, one shell did have a natural perforation (*Nerita*) that may have been used as a bead, as were the two complete scaphopods (*Dentalium*) that are naturally perforated lengthwise. They are listed and described here in taxonomic order:

- *Nerita sanguinolenta* Menke, 1829 [natural perforation opposite aperture; height 5 mm, width 16 mm]
- *Lambis truncata sebae* (Kiener, 1843) [fragment of body whorl]
- *Conus textile* Linnaeus 1758 [complete shell; height 62mm, width 30 mm]
- *Conus* sp. [fragment]
- *Dosinia* sp. [fragment]
- Venerid shell, unidentified [fragment]
- *Dentalium reevei* P. Fischer, 1871 [complete shell, 41.5 mm long]
- *Dentalium reevei* P. Fischer, 1871 [complete shell, 27 mm long]