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"Standardization" in Upper Paleolithic ornaments at the coastal sites of Riparo Mochi and Üçağızlı cave

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ABSTRACT This study considers the cultural and ecological contexts of marine shell ornament use at Riparo Mochi, on the Ligurian coast of Italy (5 assemblages, 36-9 kyr BP), and at Üçağızlı Cave on the Hatay coast of Turkey (7 assemblages, 41-17 kyr BP). Both sites contain long Upper Paleolithic artifactual and faunal series, including the earliest phases. Taphonomic analyses clearly distinguish ornamental shells from food debris and co-resident land snails in the sites. Because of a relatively uniform shoreline environment at Riparo Mochi, ornament assemblages are shown to have changed little in taxonomic content over five Paleolithic phases, while human foraging agendas and material culture changed greatly. Ornament traditions appear full-blown in the earliest Upper Paleolithic horizons of both sites and, at Riparo Mochi, are preceded by Mousterian layers that lack ornaments entirely. While trade with interior peoples was very limited, there is remarkable uniformity in the size and shape of the ornaments from coastal and interior sites of northern Italy, southern Turkey, Portugal, southern France, and parts of Germany, despite expedient use of natural shell forms in some areas and elaborately carved beads in others.

Introduction

Evidence for self-decoration is central to discussions of when and where "modern" human behavior first emerged in the Paleolithic. Most early ornaments were made from animal skeletal parts — teeth, bone, or marine shell — with mollusk shells being especially common at coastal sites on the Mediterranean Rim. The emphasis on biological materials in ornament making of the Paleolithic virtually guarantees that both Mother Nature and human handiwork governed the forms and geographic distributions of what we consider to be distinct ornament types. Thus, isolating evidence for human intentionality, style, and early symboling behavior is seldom a straightforward endeavor.

Models from marine ecology can help to control for this problem where shell ornaments are involved. Ecological models and biological standards can also be used to test hypotheses about the local evolution of ornament traditions from the earliest Upper Paleolithic to the Epipaleolithic. Here I present findings on Paleolithic ornament series (multiple consecutive assemblages) from two Mediterranean coastal shelter sites (Fig. 1), with special reference to the earliest Upper Paleolithic. The sites are Riparo Mochi (Alhaique et al., 1997; Blanc, 1953; Kuhn and Stiner, 1992, 1998; Laplace, 1977), one of the Grimaldi Caves in the Balzi Rossi of the Italian Riviera (Liguria), and Üçağızlı Cave (Kuhn et al., 1999, 2001) on the Hatay coast of Turkey, near the modern border with Syria. Both sites preserve rich faunal and artifactual records, including abundant ornament assemblages (Kuhn et al., 2001; Stiner, 1999) made primarily or exclusively from marine shells. The five ornament

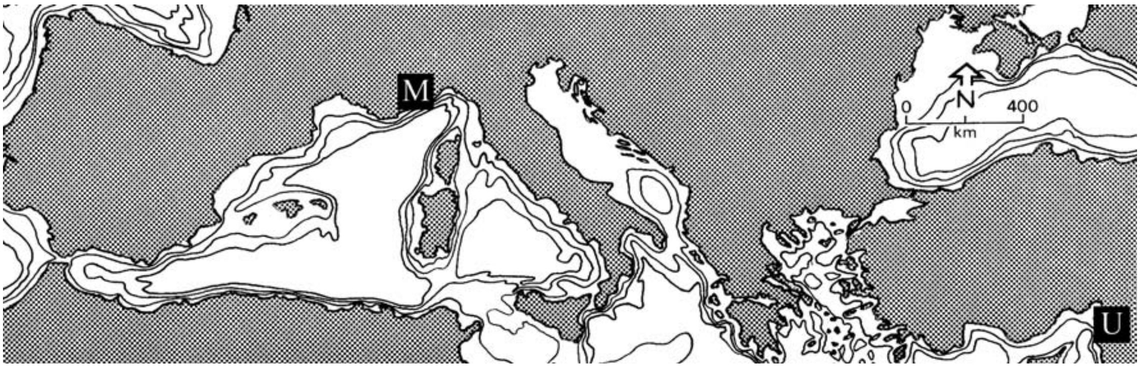

FIG. 1 – Underwater topography of the northern Mediterranean Sea, and locations of Riparo Mochi (M) in the Grimaldi Cave complex in the Balzi Rossi, and Üçağızlı Cave (U) on the Hatay coast of southern Turkey. Elevation intervals below modern sea level are 200 m, 1000 m, 2000 m, and, in the Atlantic Ocean, 4000 m. Note the very steep coastlines of the two site localities.

assemblages from Riparo Mochi span 36 000-9000 years BP and include an early Aurignacian component (Kuhn and Stiner, 1998). Üçağızlı Cave contains seven ornament assemblages, including Initial Upper Paleolithic, Ahmarian, and early Epipaleolithic components. The Üçağızlı series spans ca.42 000 to 17 000 years BP; research at this shelter is ongoing, but preliminary results are sufficiently robust for making the points below. No human graves have been found at either site.

Riparo Mochi and Üçağızlı Cave are separated by roughly 1600 km as the crow flies (Fig. 1), but the sites occur in similarly steep, rocky topographic settings. Prior to recent development, each site was associated with a very rich littoral community fed by near-shore upwelling and high nutrient outflow from nearby river deltas. Shell ornaments occur by the hundreds in the sites alongside well-defined stone and bone tool industries and well-preserved vertebrate remains. Non-shell ornaments are rare — just a handful of carved stone and bone beads and pierced mammal teeth from Riparo Mochi (Kuhn and Stiner, 1998; Stiner, 1999), and from Üçağızlı one incised talon of a huge raptor (probably vulture) (Kuhn et al., 2001). Few if any of the marine shells used for ornament-making at the two sites were obtained from fossil outcrops. Rather, they were collected from active local beaches of the period. The immediacy of acquisition is especially apparent in the case of Üçağızlı Cave, where protein-based pigment is still preserved in many of the shells (Stiner et al., 2002).

Shell Taphonomy

“Ornamental” shell artifacts are distinguished from other mollusk shell remains in the archeological deposits based on an aggregate of damage patterns and other characteristics. Most important are (a) the high frequencies of perforation by pecking or punching techniques and consistent hole placement; (b) the moderate incidence of wave-induced abrasion, which indicates that shells were collected from beaches well after the deaths of the animals; (c) the consistently small size of shells; and (d) a tendency toward shell completeness in many species (Table 1) (see Stiner, 1999 for greater discussion of methods). The examples shown in Fig. 2 are typical human-made perforations: the hole is usually a rough circle with relatively straight fracture walls that may or many not display fine (often asymmetrical) abrasion from fiber.

TABLE 1

Summary of damage frequencies by shell type for molluskan assemblages from Üçağızlı Cave.

Variable	(O)small gastropods	(O) tusk shells	(O) most bivalves	(F) large turbans	(F) limpets
beach polish (% of NISP)	21	5	3	0	0
completeness (MNI/NISP)	0.96	0.53	0.51	0.43	0.66
perforation (% of MNI)	69	90	17	0	0
burned (% of NISP)	5	0	3	16	2
punched-out spire (% of NISP)	27	n/a	11	39	«1

(O) ornamental shells; (F) food species. Perforation count refers to sectioning in the case of tusk shells. Data are for all layers combined. n/a = not applicable.

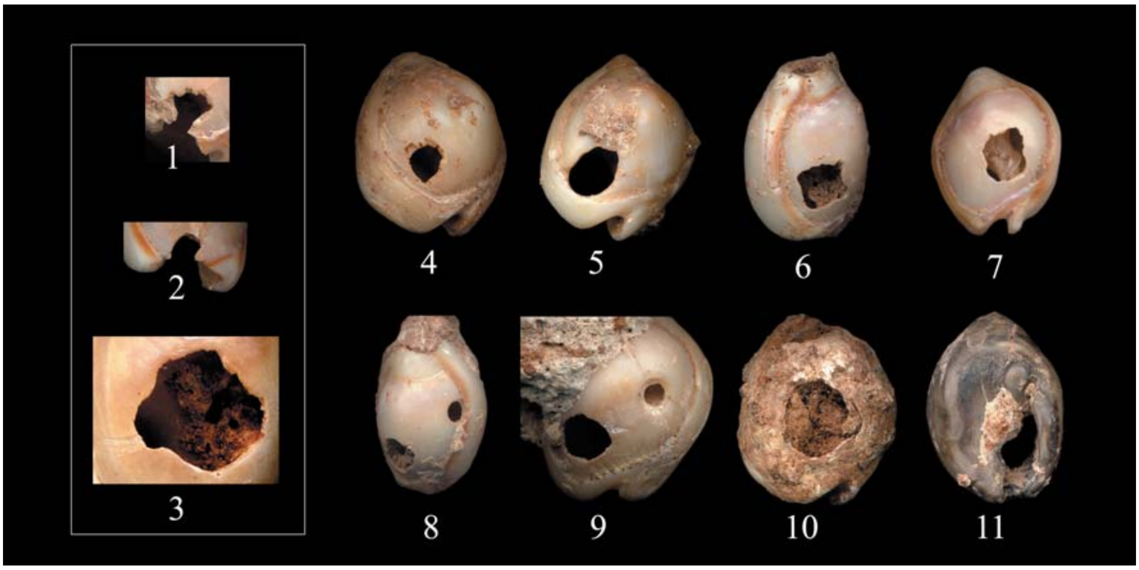

FIG. 2 – Ornament shells (*Nassarius gibbosula*, 1.2-1.8 cm) from Üçağızlı Cave with human-made perforations. Humanly-made holes have irregular contours (1-7, 10) but consistent positions near the shell aperture on gastropods; 1-2 are humanly-made perforations that are subsequently broken; hole in specimen 3 was scratched near the rim of the hole by the punching tool; 4 was extensively polished, apparently by the cord on which it was strung; 10 displays a remnant "ring" fracture from a punching tool. Specimens 8-9 display humanly-made holes on lower left and holes drilled by molluskan predators (Naticidae or Muricidae) on upper right. Specimen 11 is burned.

Still other kinds of information say something about the context of ornament disposal by humans, from deliberate interment (caching) to casual loss (burning, breaks at perforation points, cord polish) (Table 2). In fact, the condition of ornament shells found in camp litter varies a great deal, with some specimens being burned and/or wave-worn while others are of fresh appearance, many but not all are perforated, and the holes of some were broken away by one accident or another (Fig. 2). The characteristics listed above contrast sharply with the condition of the shells of mollusks that were consumed as food, the latter group being large-bodied, often extensively broken, and with crisp, sharp bead edges (indicating collection during life); the incidence of burning damage may also be higher in food shells (Stiner, 1994, 1999). The discovery of ornament shell caches in Üçağızlı Cave in 2001 underscores the importance of considering this critical suite of condition characteristics and lends additional justification to the distinction between ornaments, food shells, accidentals, and co-resident land snails in the two sites (Stiner, 1999; Stiner et al., 2002).

TABLE 2

Abundance and damage frequency data for ornamental mollusks by layer in Üçağızlı Cave at the close of the 2001 excavation season.

Layer	total NISP	total MNI	MNI/NISP completeness index	(%) NISP burned	(%) NISP beach worn	(%) MNI perforated	(%) MNI mollusk predated	(%) MNI perforation broken	(%) NISP color retained
EPI (early Epipaleolithic)	59	46	78	(5)	(20)	(63)	(0)	(0)	(2)
B (Ahmarian)	385	359	93	(7)	(33)	(74)	(6)	(9)	(23)
B1-3 (Ahmarian)	481	456	95	(6)	(33)	(77)	(3)	(16)	(23)
C (early Ahmarian?)	70	70	1.00	(11)	(31)	(81)	(3)	(11)	(27)
E-E2 (early Upper Paleolithic)	48	47	98	(10)	(44)	(68)	(0)	(13)	(12)
F-F2 (Initial Upper Paleolithic)	50	50	1.00	(8)	(42)	(90)	(0)	(20)	(22)
G-H-I (Initial Upper Paleolithic)	58	57	98	(2)	(57)	(74)	(3)	(14)	(10)
all layers combined	1157	1091	94	(7)	(34)	(76)	(3)	(13)	(21)

Note: Damage criteria follow Stiner (1999).

The Ornaments from Riparo Mochi and Üçağızlı Cave

Riparo Mochi is an interesting case due to the long cultural sequence preserved in the shelter and the unusual stability in marine habitats along the Balzi Rossi between 36-9 kyr ago due to the very high relief of its coast. This physiographic situation eliminates to a large extent the two most common causes of variation in shell ornament assemblages — species biogeography and climate-driven reconfiguration of local shoreline habitats. It is for this reason that tests of human-caused biases in the Mochi assemblages are feasible.

To begin, Fig. 3 compares the proportion of gastropod to bivalve species in the five Upper through Epi- Paleolithic ornament assemblages from Riparo Mochi to a global standard for coastal marine communities (Sabelli, 1980; see Stiner, 1999). None of the archeological assemblages differs much from the natural balance of species. This is an important standard for the next comparison of the relative biomass of carnivorous, omnivorous, and herbivorous gastropods in living marine communities with that represented in the Mochi ornament assemblages. Because of inefficiencies in energy transfer to higher trophic levels in the marine food chain, predator biomass should always be less than that of omnivores and (especially) herbivores. The shell ornaments exhibit very limited size ranges (see below), and thus the number of individual shells (MNI) serves as a proxy for biomass. The example from the Hatay coast, obtained by censusing beach-cast shells over an extended period ("exp" in Fig. 3), is typical with carnivores at 13% of total MNI. Yet the ornament assemblages from Riparo Mochi all deviate from this expectation. Humans clearly favored relatively rare carnivorous types for ornament making, a pattern that is also apparent elsewhere on the Mediterranean Rim (cf. Bartolomei et al., 1994; Fiocchi, 1996-1997; Kuhn et al., 2001; Stiner, 1999; Taborin, 1993). In the case of Riparo Mochi, the carnivorous scavenger *Cyclope* was the favored genus. Based on the author's experience, *Cyclope* and related species generally take a good deal more time to find on the littoral margin than do most herbivorous and fully omnivorous species used by humans.

Another human bias is apparent from the size distribution of the shell ornaments, which are mostly between 5-16 mm in length (Fig. 4). This size range is well below the aver-

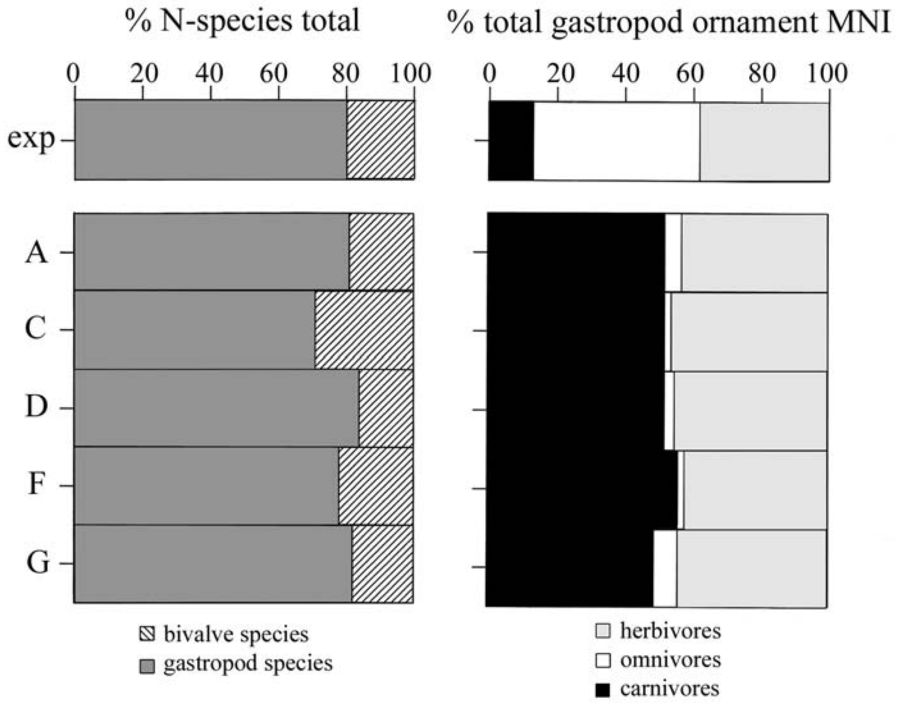

FIG. 3 – Comparison of (a) taxonomic richness (N-species) for ornamental marine gastropods and food bivalves by layer in Riparo Mochi to Sabelli's (1980, p. 23ff) worldwide standard for living mollusk communities; and (b) percentage MNI for carnivorous, omnivorous, and herbivorous gastropod taxa among the ornamental shells by layer in Riparo Mochi to Stiner's census of beach-cast shells from beaches on the Hatay coast, Turkey (adapted from Stiner, 1999).

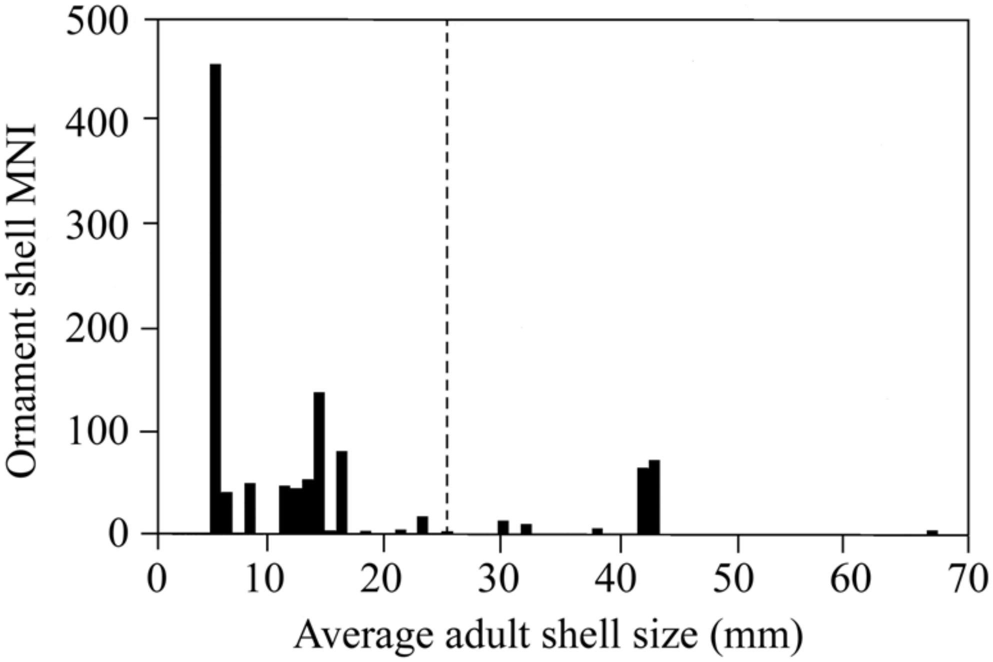

FIG. 4 – The number of ornamental shells (MNI) by size class (mm) for all layers of Riparo Mochi combined, based on the median adult size attained by each taxon. The dashed vertical line represents the expected size median across ornamental taxa, if shells were to be collected without regard to size (adapted from Stiner, 1999).

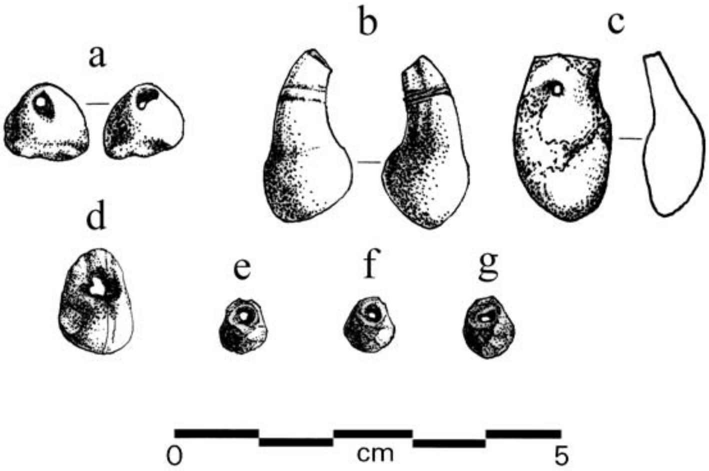

FIG. 5 – The non-shell ornaments from the Upper and Epi- Paleolithic layers of Riparo Mochi: (a) possible small limestone ornament with natural hole, (f) red deer canine with tie-striae encircling root, (b) perforated red deer canine, (c) perforated pendant carved from compact bone or ivory of large mammal, and (d-f) perforated, faceted pendants carved from soft stone (probably steatite and/or chlorite).

age for the modern beach-cast census (26 mm) and the natural median adult size for taxa that are also represented in the Riparo Mochi assemblages (25 mm). The peak in the size distribution at 4-7 mm overlaps perfectly with that observed by R. White (1989, 1993) for meticulously carved stone and ivory ornaments in Aurignacian sites of the Périgord region in southern France. In fact, three carved stone beads from the early Aurignacian (Layer G) of Riparo Mochi (Fig. 5) are identical to those recorded in France (Kuhn and Stiner, 1998).

The shell and carved beads of Riparo Mochi tend to have a small, asymmetrical and globous form, also known as "basket" beads (Figs. 5 and 6). The remarkable consistency of this shape in ornaments across large regions of Europe and Mediterranean Asia raises interesting issues with regard to geographic and temporal variation from the earliest Upper Paleolithic through Epipaleolithic periods, especially since it appears to be semi-independent of the raw materials used.

Paleolithic shell ornament assemblages from sites that lie nearest the Balzi Rossi are most similar in taxonomic content, as documented by Taborin (1993). Farther away, species composition differs more, such as in the Levant (including the Hatay) to the east and Portugal to the west. Thus geographic distance best explains the level of taxonomic similarity among shell ornament assemblages in Mediterranean coastal sites. Distance exerts a similar influence on the proportions of shell to non-shell ornaments in sites as one moves from the coast into the continental interior of Europe (compare Fiocchi, 1996-1997; Hahn, 1972; Kozłowski, 1990; Soffer, 1985; Stiner, 1999; Taborin, 1993; White, 1993). What is more, the gradient of exchange or "movement" of ornaments was clearly very steep (Stiner, 1999). If trade was involved, it was strictly low volume in character. For example, Aurignacian culture as defined by stone and bone tools is widespread in Europe, but *Cyclope* shell ornaments are concentrated in a few areas where they occur naturally in living marine communities and/or can be found in fossil outcrops (see also Taborin, 1993). *Cyclope* shells were not exchanged very widely during the Aurignacian, despite the vast geographic distribution of this Paleolithic "culture" horizon.

Also striking in the case of Riparo Mochi is the fact that, while human preferences for certain shell shapes, sizes, and rare species are clearly expressed, these preferences changed remarkably little from 36 000 to 9000 years ago (Fig. 7). Riparo Mochi has a well defined stratigraphy, with sterile or semi-sterile layers separating most of the artifact-rich layers, so the similarity in the taxonomic contents of the ornament assemblages cannot be the result of post-depositional mixing or time-averaging. The stone industries of Riparo Mochi certainly changed over this time span (e.g., Laplace, 1977; Palma di Cesnola, 1993), and so did game use (Stiner, 1999, 2001; Stiner et al., 2000), such as the ratio of small-bodied to large-bodied prey animals, and the relative contribution of terrestrial and marine animals (shellfish) to Paleolithic human diets. Yet the same few molluskan genera always dominated the ornaments assemblages — these are *Cyclope*, *Homalopoma*, *Nassarius*, and *Cerithium*.

Rather different marine mollusk genera are represented in the shell ornament series from Üçağızlı Cave in the Hatay province of Turkey (Table 3). There is greater variation in ornamental taxa through time, reflecting more heterogeneous environmental conditions; there are numerous small sandy or limestone cobble beaches tucked between the rocky cliffs of this coast. All of the seven ornament assemblages nonetheless are biased to ecologically rare taxa (>15% carnivores and scavengers). The assemblages also display the same narrow size distributions seen at Riparo Mochi and other sites, and the majority of the shells used for ornament-making possess a rounded basket-like form (Stiner et al., 2002).

TABLE 3

Relative abundances (MNI) of common and uncommon taxa in the ornamental shell assemblages by layer from Üçağızlı Cave.

Shell types	EPI MNI (%)	B MNI (%)	B1-3 MNI (%)	C MNI (%)	D MNI (%)	E-E2 MNI (%)	F-F2 MNI (%)	G-H-I MNI (%)
Columbella rustica	10 (22)	123 (34)	204 (45)	29 (41)	3 (50)	29 (62)	11 (22)	4 (7)
*Nassarius gibbosula***	10 (22)	191 (53)	203 (44)	20 (29)	3 (50)	12 (25)	32 (64)	50 (88)
Dentalium spp.**	9 (20)	0 (0)	0 (0)	0 (0)	0 (0)	1 (2)	0 (0)	0 (0)
Gibbula spp.	11 (24)	16 (4)	5 (1)	1 (1)	0 (0)	1 (2)	0 (0)	1 (2)
Theodoxus jordani (+)	0 (0)	12 (3)	15 (3)	16 (23)	0 (0)	1 (2)	5 (10)	0 (0)
marine bivalves	4 (9)	9 (2)	16 (3)	1 (1)	0 (0)	0 (0)	1 (2)	0 (0)
other species	2 (4)	8 (2)	13 (3)	4 (6)	0 (0)	3 (6)	1 (2)	2 (3)
total assemblage MNI	46	359	456	70	—	47	50	57
N-species	13	19	15	9	—	7	5	5

Note: Data from secure proveniences excavated 1997-2000 are included in the calculations. (+) This category represents fresh- and brackish water taxa, dominated by *T. jordani* but including a few specimens of the genera *Corbicula*, *Melanopsis*, and *Potomida*, nearest sources of which would be the Orontes River drainage

Discussion

The properties of Paleolithic ornaments described above are apparent in many places on the Mediterranean Rim, from Portugal in the far west and Üçağızlı and other Levantine sites in the east (Fig. 6). This seemingly timeless aesthetic, or human-imposed bias, transcends local differences in the molluskan families and genera available to human collectors along the seacoast. During the Paleolithic, foragers emphasized *Littorina obtusata* in southern Portugal (Stiner, new research; Zilhão, 1997), *Cyclope* among others in northwestern Italy (see also Fiocchi, 1996-1997 on Riparo Fumane), and *Nassarius* and *Theodoxus* (and *Columbella*) in the Levant (Bar-Yosef, 1989; Kuhn et al., 2002; Stiner et al., 2002) (Table 3). People's adherence to the so-called small basket form also transcends raw material type and

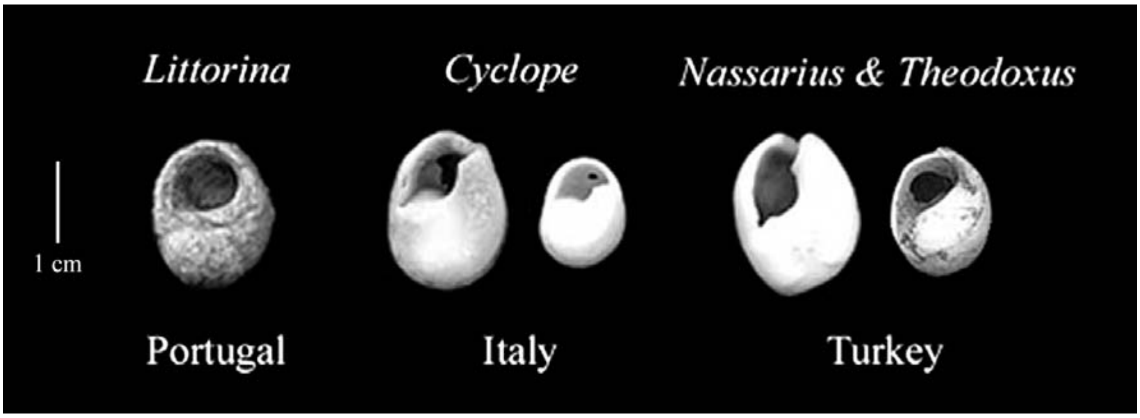

FIG. 6 – Similarity in size and form of distinct molluskan genera used as ornaments in Mediterranean coastal areas from west to east (all specimens between 1.0 and 1.8 cm in length).

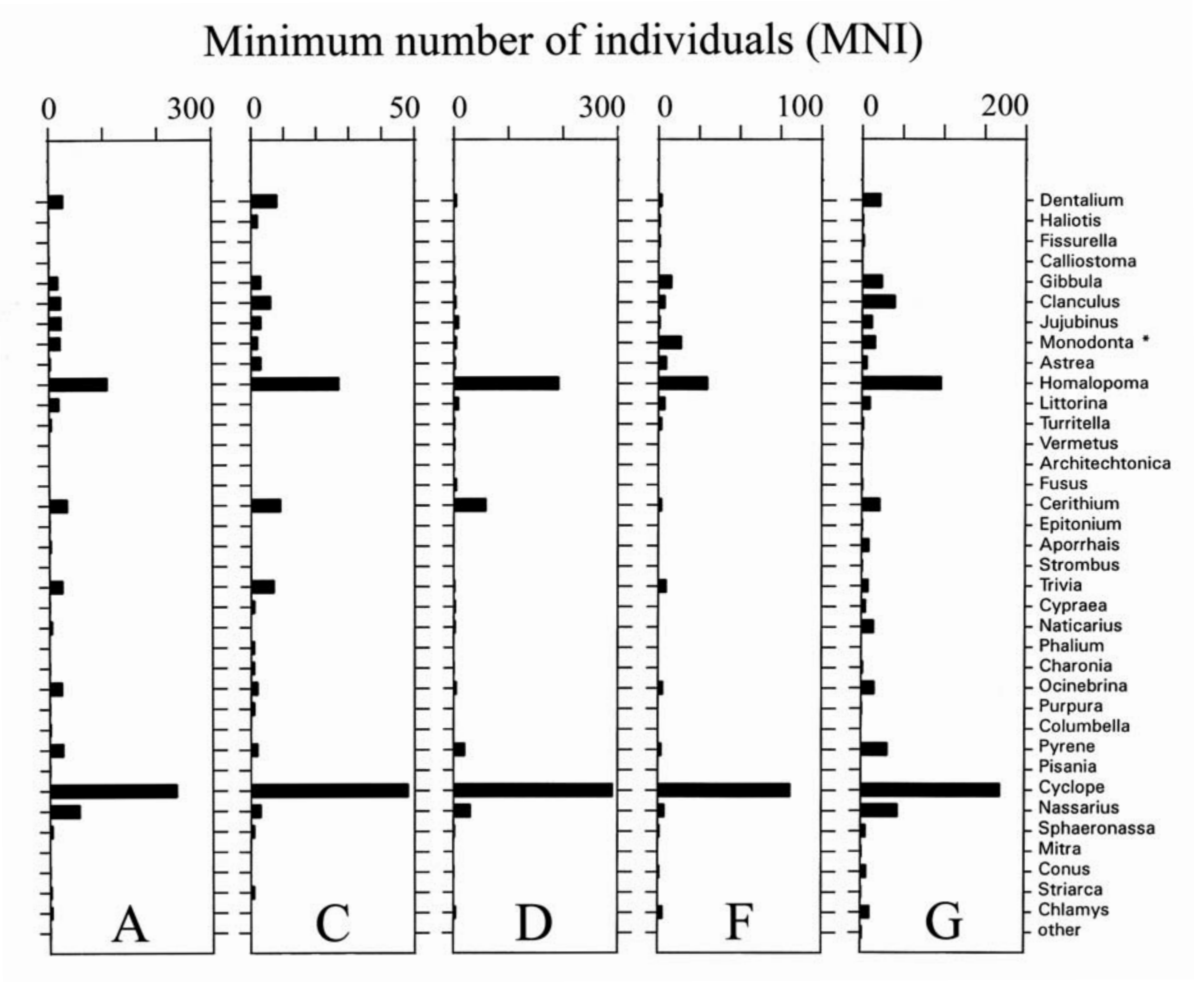

FIG. 7 – Relative abundances (MNI) of ornamental marine shell genera in the five Paleolithic layers of Riparo Mochi. Layer A is Late Epigravettian in age, C is Early Epigravettian, D is Gravettian, F is Middle Aurignacian, and G is Early Aurignacian. (*) Monodonta does not include the large-bodied food species M. turbinata (adapted from Stiner, 1999).

degrees of manufacturing investment to an impressive extent — the ornaments may be made from shell, the pearl-like canines of red deer, ivory or soft stone, and produced by techniques as diverse as punching a small hole in a shell to carving the entire piece from stone or ivory.

What was the inspiration for such a widespread search image or "aesthetic" in shell collecting such that it could last 20 000 years or more in a single area? Human styles of the historic period and late prehistory are highly volatile by comparison, and, even in the Upper Paleolithic, rapid turnover is seen in the designs of certain tools. Perhaps the consistency in bead design in the Paleolithic stems from certain natural objects of constant form, linked to some basic aspect of forager existence commonly seen and important to many or all human groups (e.g., human breasts as suggested by Reese, 1989; or the widespread reliance on red deer hunting in Eurasia). Whatever the prototype, the basket form was one that many materials could be made or selected to emulate, and the products seem to have served as essentially interchangeable elements in larger ornament arrangements.

As for the origins of self-adornment behavior in Paleolithic humans, beads of the early Aurignacian are by no means the earliest in Eurasia at 36-37 kyr ago. But, as in the Aurignacian of Europe, the older ornaments of the Initial Upper Paleolithic of Üçağızlı Cave in Turkey and Ksar 'Akil in Lebanon (Kuhn et al., 2001) at >41 000 years BP appear as well developed and abundant as anything that follows them in prehistory. As far as we know, ornaments appeared just as suddenly in western Asia as they did in Europe, following a Middle Paleolithic which generally lacked ornaments (but see discussions in Broglio, 1995; d'Errico et al., 1998; Kuhn and Bietti, 2001, among others). The Asian examples are merely earlier, with ages roughly on par with the earliest ornaments known from eastern Europe (Kozłowski, 1982) and eastern Africa (Ambrose, 1998).

It seems likely that the focus on shells for ornament making in coastal areas during the Paleolithic, and on certain locally available species, inadvertently identified human groups with regions, beyond any intentional signaling of social roles or life history states on the part of individuals. The kinds of materials used for ornament making by Paleolithic people varied least when and where that raw material was most constantly available. Thus the impressions to be made by ornaments emerge directly from animal biogeography. The steep distance gradients in ornament raw material movement during the Upper and Epi- Paleolithic may imply that visual expressions (via adornment) were directed internally to the group or, more likely, to one's most immediate neighbors. In this sense the variation in mollusk species composition from site to site was not a deliberate or contrived expression of "style". But style it became by virtue of repeated use and social contact.

Acknowledgments

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