Ornaments of the earliest Upper Paleolithic: New insights from the Levant

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Two sites located on the northern Levantine coast, Üçağızlı Cave (Turkey) and Ksar 'Akil (Lebanon) have yielded numerous marine shell beads in association with early Upper Paleolithic stone tools. Accelerator mass spectrometry (AMS) radiocarbon dates indicate ages between 39,000 and 41,000 radiocarbon years (roughly 41,000–43,000 calendar years) for the oldest ornament-bearing levels in Üçağızlı Cave. Based on stratigraphic evidence, the earliest shell beads from Ksar 'Akil may be even older. These artifacts provide some of the earliest evidence for traditions of personal ornament manufacture by Upper Paleolithic humans in western Asia, comparable in age to similar objects from Eastern Europe and Africa. The new data show that the initial appearance of Upper Paleolithic ornament technologies was essentially simultaneous on three continents. The early appearance and proliferation of ornament technologies appears to have been contingent on variable demographic or social conditions.

Today, the practice of decorating oneself with pigment or objects is universal among human cultures, such that most of us take personal ornaments for granted. Nonetheless, the appearance of ornaments such as beads and pendants during the Paleolithic marks an important rubicon in the evolution of human behavior. These objects are among the first documentable forms of information technology, the earliest unambiguous use of material objects as media for communication.¶

Widespread use of comparatively standard ornament forms such as beads and pendants of shell, tooth, ivory, or stone is a hallmark of the Upper Paleolithic (1, 3), a series of archaeological techno-complexes that appeared around or shortly after 45,000 years ago in Eurasia. Ornament making traditions are also characteristic of the Late Stone Age (LSA), the African equivalent of the Upper Paleolithic. The Upper Paleolithic can no longer be considered exclusively the product of anatomically modern humans, at least in Europe (4), but the proliferation of the Upper Paleolithic does coincide with the radiation of modern humans within Eurasia and the eventual disappearance of the Neandertals. Ornaments have occasionally been reported from archaeological deposits containing late Middle Paleolithic or Middle Stone Age chipped stone artifacts (1, 5, 6), but questions persist as to whether these rare objects are actually artifacts or were introduced into Middle Paleolithic layers by subsequent disturbance of sediments (7).

The geographic distribution of the earliest evidence of personal ornamentation has implications for the mechanism by which this behavioral innovation spread. If ornaments appeared much earlier in one small area and spread from there, it could be argued that their diffusion reflected the expansion of a particular (modern) human population. If similar uses of material objects as media for communication evolved simultaneously on a much larger geographic front, more generalized demographic or social factors are implicated. Answering these questions requires reliable radiometric dates, secure stratigraphic associations between dated materials and artifacts, and, finally, establishing the artifactual nature of the materials suspected to be ornaments.

For some time it has appeared that the earliest Upper Paleolithic ornaments came from eastern Africa and central Europe (8, 9). In the Eastern Mediterranean Basin (the Levant), it seemed until recently that ornaments became widespread only in the late Upper Paleolithic or early Epipaleolithic, after 20,000 years ago. Reports of shell beads in earlier sites are sporadic, few in number, and often troubled by the lack of reliable dates (refs. 10–13, but see ref. 14). This fact was particularly puzzling in the context of recent arguments about modern human origins. The Levant is one likely route of movement from North Africa into Western Asia. If the origins and spread of Upper Paleolithic cultures had some connection to the dispersal of early anatomically modern human populations into Eurasia, we might expect to find some of the earliest evidence of ornaments and other distinctive Upper Paleolithic behavioral traits in the Levant.

Results from recent excavations at Üçağızlı Cave in Turkey and reappraisal of mollusk remains from the Lebanese Paleolithic site of Ksar 'Akil greatly alter the picture of the antiquity and distribution of early Upper Paleolithic ornament-making traditions in the eastern Mediterranean basin. Ornaments are present in large numbers in these sites in layers dating to at least 40,000 years ago, perhaps much earlier, about the same age as the earliest ornamental objects known from Central Europe and Africa.

Archaeological Background

Ksar 'Akil is one of the most important prehistoric sites in the eastern Mediterranean basin. Situated a few kilometers inland from the coast near Beirut, Lebanon, this large rockshelter contained artifact-rich deposits more than 19 m deep and spanning the late Middle Paleolithic through Epipaleolithic culture periods. Ksar 'Akil was first investigated on a large scale by J. F. Ewing in the 1940s (15). J. Tixier reexcavated the upper layers at the site (16) but was not able to reach the earliest Upper Paleolithic strata before political events forced the project to a halt. Ksar 'Akil serves as a reference sequence for the Upper Paleolithic in the northern Levant. The 25 Upper Paleolithic layers at this site have been divided into 6 stages (17, 18). Stages 1 and 2, representing the earliest Upper Paleolithic, are of particular interest here.

The artifact assemblages from Stage I (layers XXV–XXI) are characterized by a method for producing stone flakes and blades that closely resembles what is known as Levallois technology, involving flat cores with faceted platforms and hard-hammer (stone-on-stone) percussion. Levallois technology is most often

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Abbreviations: B.P., before present; NISP, number of identified specimens.

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¶Red ochre pigment is quite common in archaeological sites dating back to more than 100,000 years ago. However, ochre has practical uses in tanning hides and treating the surfaces of wooden objects, so its symbolic significance is not self-evident (1). Arguments have also been made about the shapes of certain early stone artifacts carrying intentionally added symbolic information. Again, the inference can be questioned in that these attributes also have functional implications (2). The distinctive characteristic of beads and similar artifacts is that they have no obvious function except as visually arresting objects.

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associated with earlier, Middle and Lower Paleolithic archaeological occurrences. In contrast, retouched (intentionally reshaped) tools from Stage I are typical Upper Paleolithic forms, including endscrapers and chisel-like burins. Layers XXV through XXII are distinguished by the presence of a distinctive artifact form, the *chanfrein* or chamfered piece, but these artifacts are much rarer in layer XXI (17). These basal Upper Paleolithic assemblages do not contain bone or antler artifacts and many other elements of the complex of traits associated with so-called "modern human behavior" (12, 17).

The combination of Middle Paleolithic technological elements (the Levallois features) and Upper Paleolithic retouched tool forms in intact sedimentary layers has prompted some researchers to call these earliest Upper Paleolithic assemblages "transitional" (e.g., refs. 13 and 17). However, whereas the presence of Middle Paleolithic elements in the methods of blade manufacture does suggest that these technologies developed out of a Middle Paleolithic base somewhere, it does not demonstrate that they represent an *in situ* evolutionary development wherever they are found (19, 20). The more neutral term "Initial Upper Paleolithic" (21) is thus more appropriate.

Stage 2 at Ksar 'Akil (layers XX through XV/XIV) is characterized by a gradual decline in the Levallois-like techniques of blade production, and concomitant increase in a form of blade technology employing opposed-platform prismatic cores that is closely associated with the Upper Paleolithic elsewhere. Dominant tool forms are endscrapers and a variety of retouched and pointed blades, and burins are extremely scarce. Again, bone and antler tools, and certain other classic Upper Paleolithic innovations, are not reported. Stage 2 at Ksar 'Akil has been compared with the "Ahmarian" early Upper Paleolithic assemblages from the southern Levant (12, 18, 22).

Unfortunately, no absolute dates are available for Stages 1 and 2 at Ksar 'Akil. A radiocarbon determination of 43,750 ± 1,500 before present (B.P.) from the underlying Mousterian layers (XXVI or XXVII) should probably be treated as an infinite date, providing at best a minimal age for the late Middle Paleolithic. Two radiocarbon dates from a position equivalent to layer IX or X in Ewing's excavations average to about 32,000 B.P. Extrapolations based on an assumption of constant rates of sediment accumulation result in age estimates of between 43,000 and 50,000 years ago for the earliest Upper Paleolithic of layer XXV (23).

Üçağızlı Cave is located on the Mediterranean coast of the Hatay region of south-central Turkey, about 15 km south of the Asi (Orontes) River mouth, and roughly 250 km north of Ksar 'Akil. Üçağızlı Cave was discovered by A. Minzoni-Deroche, who excavated there through 1990 (24). In 1997, three of the authors began a new program of excavations (25). Üçağızlı is the remnant of a large collapsed cave. Pleistocene sediments are preserved near the back wall of the cave, as well as in a tunnel-like chamber to the south. Our excavations have concentrated on the former area, where the sequence of Upper Paleolithic deposits is more than 3 m deep. The sediments consist of red clays (*terra rosa*), originating outside of the cave, mixed with varying amounts of anthropogenic sediment, mainly calcite-rich wood ash. Preservation of bone and shell is excellent throughout the stratigraphic column.

The cultural sequence at Üçağızlı Cave appears to correspond with late Stage 1 through Stage 2 at Ksar 'Akil. The oldest Upper Paleolithic assemblages from layers G, H, and I at Üçağızlı closely resemble the assemblage from layer XXI at Ksar 'Akil (the top of Stage 1); they are characterized by a method of blade manufacture that exhibits some features of Levallois technology, such as flat cores (Fig. 1 *15* and *16*), platform faceting (Fig. 1 *9-14*), and hard hammer percussion. Retouched tools are dominated by typical Upper Paleolithic types, especially small, heavily retouched endscrapers Fig. 1 *11-13*). As in Ksar 'Akil XXI, *chanfreins* are absent. The most recent Upper Paleolithic archaeological assemblages from layers B through B4 at Üçağızlı Cave (Fig. 1 *1-8*) bear a striking resemblance to artifact assemblages from layer XVI and XVII at Ksar 'Akil, with well-developed prismatic blade technology produced by soft-hammer or indirect percussion. Common retouched tool forms include endscrapers and pointed blades (Fig. 1 *5-8*), and there are very few burins. In contrast with Ksar 'Akil, however, bone and antler tools are present in layers B through B4 at Üçağızlı. Artifact assemblages from layers C through F document a gradual transition between the upper and lower components.

A number of accelerator mass spectrometry (AMS) radiocarbon dates have been obtained from Üçağızlı Cave (Table 1). Radiometric ages for the layers B–B4 range from 29,000 to 32,000 years B.P., those for layers G and H vary between 38,900 and 41,000 years B.P. (uncalibrated). These dates probably underestimate the actual or calendar ages by 2,000–3,000 years (26, 27), meaning that the actual age of layer H is between 41,000 and 44,000 years. Two somewhat more recent dates from layer H may be the result of contamination, a common problem with radiocarbon determinations as they approach the limits of the technique, or the samples may be intrusive from overlying layers.

Ornaments from the Early Upper Paleolithic

Ornaments are ubiquitous in the Upper Paleolithic layers at Ksar 'Akil and Üçağızlı Cave. Almost all were made from small mollusk shells, usually perforated for use as beads or pendants. At Üçağızlı, the terminal phalanx of a large predatory bird (eagle or vulture) incised for suspension is one of the few ornamental objects not made of shell. The frequencies of major mollusk species used as ornaments and for food in the earliest layers at both sites are summarized in Tables 2 and 3.‖ Data from Ksar 'Akil are grouped by "stage"; whereas the array of taxa is probably representative, this sample was collected more than 40 years ago, using less stringent procedures than archaeologists employ today, so the absolute numbers may not be correct. The Üçağızlı samples are much more representative. It should be noted that much of the variation in shell assemblage sizes reflects the volume of sediment excavated rather than differences in the actual densities of these objects within the deposits.

The Paleolithic inhabitants of Ksar 'Akil and Üçağızlı were selective in their choice of shells for ornament making, preferring comparatively rare varieties with luminous white or brightly colored shells, some with arresting patterns. A variety of mollusk species were used as ornaments at both sites, but the same taxa predominate (28). Two species of marine gastropod, the carnivorous scavenger *Nassarius gibbosula* (Fig. 2*a*) and the omnivore *Columbella rustica*, together account for between 50% and 90% of the total assemblage in all layers. *Glycymeris*, the marine bivalve most often used for ornamental purposes, is more common at Ksar 'Akil than at Üçağızlı. At Üçağızlı Cave, the freshwater gastropod *Theodoxus jordani* was also made into ornaments in some later periods; it probably was obtained in the nearby Asi (Orontes) River. The dominant food species were much larger herbivorous gastropods, *Patella* (limpets) and *Monodonta* (turbans; Tables 2 and 3). Both prefer the kinds of rocky substrates common to the steep coastlines of Lebanon and the Hatay.

There is a relative increase over time in the abundance of *Columbella*, and corresponding drop in *Nassarius* after the initial Upper Paleolithic of both sites. The importance of mollusks as a food resource also increases radically in both sequences. *Patella* and *Monodonta* were seldom consumed at the two sites during

‖Mollusc assemblages from Üçağızlı were studied by Stiner. Reese reanalyzed the material from Ksar 'Akil.

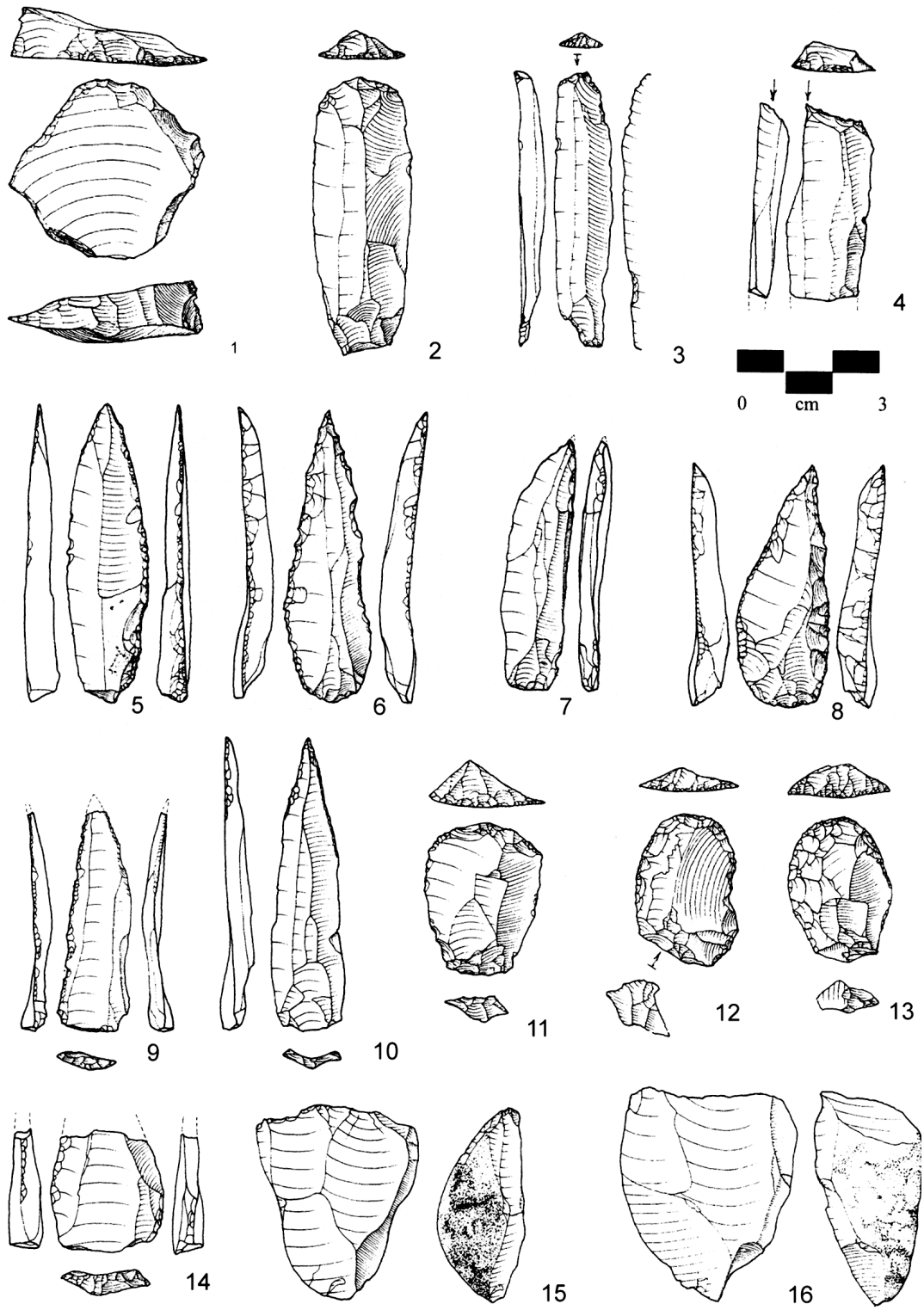

Fig. 1. Stone tools from Üçağızlı Cave. (*1-8*) From layers B–B4; (*9-16*) from layers F, G, and H.

the initial Upper Paleolithic, so that ornamental shells actually outnumber food species in the early layers.

The fact that Paleolithic inhabitants of Üçağızlı and Ksar 'Akil used mollusks as food and for ornamental purposes raises the question of how to distinguish decorative shells from the remains of meals. In fact, the ranges of taxa used for each purpose are quite distinct, differing in size, trophic characteristics, natural abundance, and typical forms of damage. The ornamental gastropods are very small (7–18 mm in length), with minimal food value for humans. Some are also carnivorous animals that tend to be relatively rare in nature. These same species were used for ornamental purposes throughout the Paleolithic and Epipaleolithic periods. Most of the archeological specimens were modified by humans, usually by scratching and/or punching a

Table 1. AMS radiocarbon dates from Üçağızlı Cave

Layer	Date no.	^{14}C age	Material dated
Upper breccia (above layer B)	AA35258	31,060 ± 140	Charcoal
Layer B	AA38203	29,130 ± 380	Aragonite*
Layer B1	AA38201	32,670 ± 760	Aragonite*
Layer F	AA35260	34,000 ± 690	Charcoal
	AA37624	35,020 ± 740	Charcoal
Layer G	AA37626	39,100 ± 1,500	Charcoal
Layer H	AA37623	33,040 ± 1,400	Charcoal
	AA35261	35,670 ± 730	Charcoal
	AA27995	38,900 ± 1,100	Charcoal
	AA27994	39,400 ± 1,200	Charcoal
	AA37625	41,400 ± 1,100	Charcoal

*Date numbers AA38203 and A38201 are made on aragonite from well-preserved *Monodonta* shells. A modern specimen collected in 1999 (AA38202) gave a ''post-bomb'' ^{14}C date, indicating that no major adjustment for hard water or metabolic fractionation is needed.

hole near the shell's lip with a pointed tool (Table 4, Fig. 2*b*). These perforations are distinct from the regular, beveled holes bored by predatory mollusks (29, 30). The ornamental shells are usually whole, and a significant portion show evidence of abrasion by water or wave action, indicating that they were collected from beaches. In contrast, the species consumed as food are much larger, more productive, and more common herbivorous or filter-feeding types. These food shells are almost always fragmented and frequently burned, but never wave-worn, indicating that they were collected while alive.

Given the scarcity of ornaments in early Upper Paleolithic sites in the eastern Mediterranean region in general, it is relevant to ask whether the ornaments in the earliest layers at these two sites could be the result of mixing with more recent Upper or Epipaleolithic layers. The changes in species composition over time argue strongly against this possibility. All of the gastropods used as beads are similar in size and shape, and it is unlikely that one species would have filtered down through the sediments more readily than another. The scarcity of food species (*Patella* and *Monodonta*) in layers G–I at Üçağızlı Cave and layers XXI–XXV at Ksar 'Akil also weighs against the possibility that the ornaments got into these levels as a result of mechanical mixing with later deposits. It is also highly improbable that the ornaments in the earliest layers of Ksar 'Akil represent inadvertent mixing of materials from adjacent layers because of imprecise methods of excavation. Together, layers XXI–XXV are between two and three meters thick. The later Aurignacian (XII–VII) and Epipaleolithic layers (VI–I)—also rich in ornaments—are separated from the top of the Initial Upper Paleolithic by roughly three additional meters of Upper Paleolithic deposits. Excavators of the site in the 1940s might have missed some fine stratigraphic distinctions, but they would not have mixed layers on the scale of several meters. The ornaments belong to the stratigraphic levels in which they were found.

Table 3. Distribution of ornamental and food shells at Ksar'Akil (percent NISP)

	Stage		
	2b	2a	1
	Layers		
Taxon	XIV–XVIII	XIX–XX	XXI–XXIV
Ornamental taxa			
Marine gastropods			
Nassarius gibbosula	40%	40%	60%
Columbella rustica	27%	13%	9%
Other species	6%	8%	11%
Marine bivalves			
Glycymeris sp.	24%	36%	20%
Other species	3%	—	<1%
Fresh/brackish water gastropods			
Theodoxus jordani	—	1%	—
Other species	—	1%	—
Total NISP	479	92	243
Food taxa			
Patella sp.	17%	—	—
Monodonta turbinata	56%	p	p
Murex trunculus	3%	p	—
Acanthocardia tuberculata	24%*	—	p
Ostrea edulis	—	—	p
Total NISP	96	2	7

p, present but frequency too low to calculate percentage.
**Acanthocardia* may have been used both as an ornamental species and for food.

Table 2. Stratigraphic distribution of ornamental and food shells at Üçağızlı Cave (percent NISP)

	Layer						
Taxon	B	B1–B4	C	D	E	F	G/H/I
Ornamental taxa							
Marine gastropods							
Nassarius gibbosula	50%	44%	29%	50%	25%	64%	88%
Columbella rustica	33%	44%	41%	50%	63%	22%	7%
Other species	6%	4%	6%	—	10%	2%	5%
Marine bivalves							
Glycymeris sp.	3%	3%	—	—	—	2%	—
Other species	5%	2%	—	—	—	—	—
Fresh/brackish water gastropods							
Theodoxus jordani	3%	3%	21%	—	2%	10%	—
Other species	<1%	—	—	—	—	—	—
Total NISP	385	481	70	6	48	50	58
Food taxa							
Patella sp.	87%	80%	87%	68%	77%	100%	75%
Monodonta sp.	13%	20%	12%	32%	23%	—	25%
Cerastoderma sp.	<1%	<1%	1%	—	—	—	—
Total NISP	2,255	2,092	117	22	31	3	4

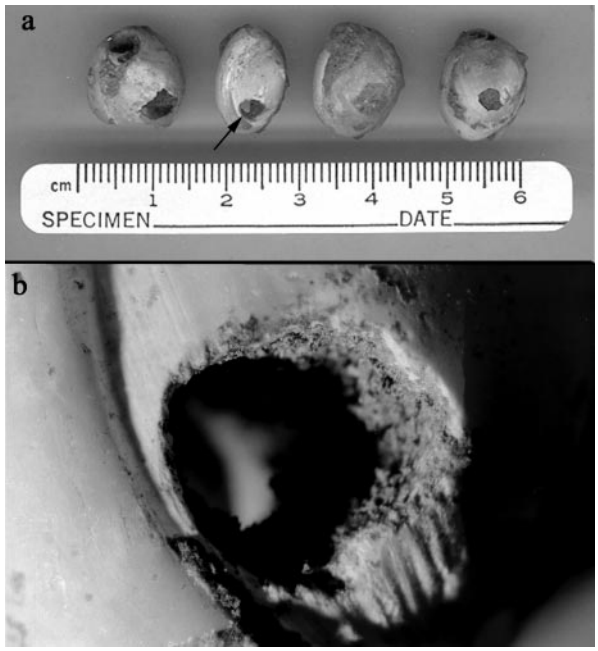

Fig. 2. Ornaments from Üçağızlı Cave. (*a*) *Nassarius*, from layer H; (*b*) close-up of man-made hole in specimen marked with arrow (×15 magnification).

The Evolutionary Significance of Early Ornaments

Secure dates from Üçağızlı Cave and the close formal affinities of its artifacts to certain layers of Ksar 'Akil help fill a long-standing gap in the distribution of early Upper Paleolithic ornaments. The habitual production and use of standardized ornaments first appeared at about the same time in central Europe, western Asia, and eastern Africa. In Africa, ostrich eggshell beads associated with early Late Stone Age assemblages have been dated by radiocarbon technique to *ca.* 41,000 B.P. or before at the site of Enkapune ya Muto (8). The oldest definite ornaments known in Europe are two pierced animal teeth associated with a preAurignacian or Bachokiran artifact assemblage from layer 11 at Bacho Kiro Cave (Bulgaria), dated by radiocarbon to >43,000 years ago (9, 31). The oldest ^{14}C date from layer H at Üçağızlı Cave (41,000 B.P.) is somewhat more recent than this, but it almost certainly underestimates the true age. Moreover, if layer H at Üçağızlı does indeed correspond with layer XXI at Ksar 'Akil, the beads from the earliest initial Upper Paleolithic layers at the latter site (XXIV, XXV) are considerably older. All of the dates cited are near the limits of the radiocarbon technique, and there may be some compression of ages, but none of these cases is clearly much more ancient than the others.

The Upper Paleolithic and Late Stone Age ornaments from the three sites mentioned above may well not be the most ancient nonutilitarian artifacts documented, but more is at issue than simply the oldest bead or pendant. What is most significant about Upper Paleolithic and Late Stone Age ornaments is that they can be characterized as part of a shared system of communication. Cases of possibly modified ornamental objects date back to at least 120,000 years ago in both Eurasian Middle Paleolithic and the African Middle Stone Age (MSA) contexts (1, 5, 32). Additional study of many examples will be required to validate whether they are indeed artifacts (33). More importantly, and regardless of whether all turn out to be artifacts, the earlier MSA/Middle Paleolithic specimens are scarce, they generally occur in isolation, and almost every specimen is unique (7, 32). In contrast, the perforated shells of Üçağızlı Cave and Ksar 'Akil, the pierced teeth from Bacho Kiro, and the ostrich eggshell beads from Enkapune ya Muto all embody forms that are repeated later at multiple locations and that persisted for thousands of years. To argue that a group of artifacts were part of a system of information technology, media for symbolic communication, presupposes that the symbolic elements were widely shared (7, 34). This quality certainly applies to the Late Stone Age and Upper Paleolithic cases, but it does not appear to characterize the putative ornaments from earlier periods.

Some paleoanthropologists argue that the appearance of personal ornaments, art, and decorated bone tools of the Upper Paleolithic marks evolutionary changes in the cognitive abilities of early humans and the emergence of "modern behavior" (3, 34, 35), including symbolic language as we know it. Other researchers hold that these objects are simply the first durable material expression of long-established behavioral tendencies and thus the only evidence preserved (6, 11). We agree that the use of ornaments and other symbolic objects implies the existence of certain cognitive capacities, and that these evolved relatively late in prehistory. However, it cannot be assumed that changes in the material record coincided precisely with fundamental changes in human cognition. The fact that traditions of ornament making emerged almost simultaneously in the earliest Upper Paleolithic/Late Stone Age on three continents argues strongly against their corresponding to a specific event in the cognitive evolution of a single population.

If parallels can be drawn with recent human societies, beads and pendants may have been used in the Upper Paleolithic/Late Stone Age to communicate social identity, such as group membership, gender, and individual life-history characteristics (age, marital status, etc.) (e.g., refs. 1, 29, 31, 36, and 37). In recent populations, visual display of personal information through ornaments, clothing, or other media most often targets strangers or infrequently encountered individuals (38). Without some history of contact or interaction, the meaning of the visual symbols would be opaque to the viewer. On the other hand, there is no need to use material symbols to identify one's affiliation or identity to family and very close acquaintances. The benefits of efficient visual communication, especially at a distance, depend on the likelihood of encountering someone less familiar. As a consequence, we might expect ornament technology to arise first where the chances of meeting strangers, and the benefits of advertising one's identity and status from afar, were relatively high. The near-simultaneous appearance of traditions involving redundant, standardized ornament forms in the Upper Paleolithic of Europe, the Levant, and eastern Africa may reflect critical local thresholds in human demography, what Gamble (39) has called a "release from proximity," as human populations in these areas reached sizes at which new forms of communication became advantageous.

Table 4. Frequencies of damage to ornamental shells at Üçağızlı Cave (percent NISP)

	Layer						
Taxon	B	B1–B4	C	D	E	F	G/H/I
Beach worn	33%	33%	31%	—	44%	42%	57%
Perforated	74%	77%	81%	—	68%	90%	74%
Mollusk-predated	6%	3%	3%	—	0%	0%	3%

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