

Dentalium Shells Used by Hunter-Gatherers and Pastoralists in the Levant

DANIELLA E. BAR-YOSEF MAYER

Zinman Institute of Archaeology and Department of Maritime Civilizations
University of Haifa, Haifa 31905, Israel
baryosef@research.haifa.ac.il

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ABSTRACT: *Dentalium* shells have long been recognized as a hallmark of the Natufian Culture where they were used to decorate skulls (or heads). Little attention has been paid to *Dentalium* shells from earlier or later sites. The frequency of *Dentalium* in a shell assemblage and the length of the *Dentalium* beads may reflect changes in the availability of the raw material and changes in the degree of mobility of hunter-gatherer societies.

KEYWORDS: *DENTALIUM*, SHELLS, EPI-PALAEOLITHIC, NATUFIAN, NEOLITHIC

RESUMEN: Las conchas de *Dentalium* han sido durante largo tiempo reconocidas como señas de identidad de la cultura natufiense en donde fueron utilizadas para decorar cráneos o cabezas. Muy poca atención se ha dedicado a las conchas de este género en periodos previos o posteriores. La frecuencia de *Dentalium* en una colección de conchas y la longitud de las cuentas de *Dentalium* podrían reflejar alteraciones en la disponibilidad de esta materia prima así como cambios en la movilidad de las sociedades de cazadores- recolectores.

PALABRAS CLAVE: *DENTALIUM*, CONCHAS, EPIPALEOLÍTICO, NATUFIENSE, NEOLÍTICO

INTRODUCTION

The significance of mollusc shells as ornaments in the archaeological record is well-established (e.g. Biggs, 1969; Claassen, 1998; Henshilwood *et al.*, 2004), and their first *consistent* use as ornaments is in the Upper Palaeolithic (Bar-Yosef, 1989; Kuhn *et al.*, 2001; Bar-Yosef Mayer, 2005).

A limited number of shell species appears in the archaeological record of the Levant during the Upper and Epi-Palaeolithic and is dominated by *Columbella rustica*, *Nassarius gibbosulus*, *Mitrella scripta*, *Conus mediterraneus*, *Glycymeris* sp. and *Dentalium* sp., all from the Mediterranean Sea. It is possible that various groups used the same shells in different ways and that the different patterns of wearing them are an important element in distinguishing the various groups from one another. If this is the case, then it follows that using a certain type of shell did have a certain meaning that was important to all of the various groups and that they did have some common affinities.

Towards the end of the Epi-Palaeolithic, in the Natufian Culture, shells are found in graves, attached to skeletons. *Dentalium* that appeared in modest numbers in some Upper Palaeolithic sites, increased significantly in Epi-Palaeolithic sites, and will be the focus of this paper (Bar-Yosef, 1991). Shells of this type continue to be in use in varying frequencies throughout the Neolithic and up to the Early Bronze Age. As of the Middle Bronze Age they are almost absent in the archaeological record in the Levant. In this paper I will attempt to explain the significance of *Dentalium* shells for the prehistoric populations of the Levant, based on the abundance of the shells, their size, and the contexts in which they are found.

WHAT IS *DENTALIUM*

Dentalium is a slightly curved tube-like shell of a mollusc (class: Scaphopoda) that lives on sandy sea bottoms. The wide (anterior) end of the tube is buried to allow the animal to feed. The narrow (posterior) end protrudes out of the sand and is used for breathing, dispersion of gametes and excreting. The Scaphopoda genus that lives in the Mediterranean is *Antalis* sp., while *Dentalium* sp. is the common genus in the Red Sea (Steiner & Kabat, 2001), both seas being sources for collecting shells by humans in the Levant in prehistoric

times. Because the name *Dentalium* sp. is widespread in the archaeological literature it will be referred to in this paper to mean all shells of the family Dentaliidae. Fossil species of this family were also collected by prehistoric humans for decoration purposes (e.g. Avnimelech, 1937; Taborin, 1993; Vanhaeren *et al.*, 2004; Álvarez-Fernández *et al.*, 2005).

DENTALIUM AS A BEAD

Dentalium sp. being a very small animal living on the ocean bed at relative great depth, has no value as a food source. Unlike the case of Native Americans that collected *Dentalium* from the sea bottom (Nuytten, 1993), in the Levant, *Dentalium* shells were collected, like most other shells, as empty shells from the sea-shore. This is evident from the degree of abrasion of the shells, and the presence of little holes typical of gastropod boring in some of them, indicating that the animal was dead prior to collection. They were brought to the different sites either by direct collection or by exchange between different groups who explored the Mediterranean, and a small number originated in the Red Sea shores. Using a complete *Dentalium* shell as a bead (i.e., an element that can be strung) can be difficult because in some species the posterior end is so narrow (a diameter of 1 mm or less) that it cannot be strung. Thus in most cases the posterior end is not present in shells from archaeological sites. It was either collected this way or it was removed. The anterior (wide) end is also often removed by humans because in nature it can be irregular and aesthetically not pleasing. While many of the *Dentalium* beads have been collected with both their posterior and anterior ends missing as a result of natural abrasion, others have been cut into shorter beads.

The techniques used to cut or slice *Dentalium* beads are apparently by sawing them with a flint blade as evidenced by one or two isolated cases where a v-shaped incision is visible on the shell. Another cutting method is snapping them by hand, as observed in experiments performed by Maréchal (1991, 1995). Vanhaeren *et al.* (2004) note that it is possible to either snap the shells between the fingers or by pressing them against a hard surface. Taborin (1993: 295) notes that because of the condition of preservation of *Den-*

talium it is usually impossible to identify which technique was used for cutting them.

DENTALIUM IN THE PREHISTORY OF THE LEVANT

The first occurrence of *Dentalium* is in Upper Palaeolithic sites (e.g. Ksar Akil; Altena, 1962), and it continues to be used throughout the various Epi-Palaeolithic cultures such as the Kebaran and Geometric Kebaran (e.g. Inizan & Gaillard, 1978; Reese, 1991). Throughout these periods *Dentalium* serve as beads along with small gastropods. It is, however, best known in the Levant as a hallmark of the Natufian culture (Garrod, 1957). Here it is most abundant in graves, in which bodies of the deceased were decorated with these shells (as well as other decorations). This phenomenon is more typical of the Early Natufian and diminishes in the Late Natufian. In the following PPNA period the relative frequency of *Dentalium* is further reduced, and this trend continues in the PPNB, but only in «core» areas. In desert sites, however, *Dentalium* is a significant component in both PPNA and PPNB periods (Bar-Yosef Mayer, 1999).

Dentalium assemblages differ in their absolute numbers, in their relative frequency, as well as in the length of the *Dentalium* beads, probably reflecting fluctuations in the ways they were used.

During the periods in which *Dentalium* appear in large quantities, one notices that there is a certain range of sizes that is more typical of certain periods. Based on measurements of *Dentalium* from 14 assemblages, that total over 1700 shells, I conclude that: 1. The range of size of *Dentalium* beads varies between 1 and 60 mm (the latter is an exception. One such shell was discovered in the Harifian site Ramat Harif). 2. The majority of *Dentalium* range roughly between 5–20 mm, obviously dictated by the size of the natural shell. However, in certain sites there is an unmistakable preference for very short beads of 1–3 mm (Especially Ohalo and the Final Natufian at Eynan). Since most of the contextual evidence derives from Natufian sites, I will try to use this information and to examine an explanation that may be applicable to earlier sites as well (such as the early Epi-Palaeolithic of Ohalo II; Nadel *et al.*, 2003).

In Early Natufian sites, *Dentalium* shells are found scattered in occupation levels as well as in burials. There, they are adhered to skulls and

sometimes to other skeletal parts, and they are arranged in various patterns, often with multiple rows of parallel shells. In certain cases *Dentalium* seem to have formed a necklace combined with bone pendants as reconstructed by Garrod in el-Wad B2 (Garrod & Bate, 1937: Pl. XIV; Valla, 1999).

Belfer-Cohen's study of the Early Natufian graves at Hayonim Cave demonstrated that there are differences between graves that included male inhumations vs. females, and that men had more decorations. Measuring *Dentalium* beads in these graves and comparing them to each other may provide further insight (Belfer-Cohen, 1995) (Figure 1).

The comparison of *Dentalium* lengths within the site of Eynan is particularly useful: In the earlier phase (Early and/or Late Natufian) 26% (N=54) of the shells are up to 10 mm long. In the Final Natufian 84% (N=224) of the shells are up to 10 mm long. (Figure 2; Valla *et al.*, 2004).

The evidence points to two main trends: 1. *Dentalium* in the Early Natufian are long, and are found both in occupation levels and in burials. 2. *Dentalium* in the Late and Final Natufian become shorter and are absent from burials. Belfer-Cohen's observation (1995: 10) that there are three times as many *Dentalium* in the Late Natufian of Hayonim Cave by comparison to the Early Natufian levels may be due to the fact that the shells were cut into smaller pieces. Janetski (2005) adjusted shell density to excavated volume and found that at Wadi Mataha (southern Jordan) there was no difference in density of *Dentalium* between Early and Late Natufian.

DISCUSSION

Assessing the meaning or purpose of the different strategies of *Dentalium* collection, processing, and use, is a challenge. Among the scholars that attempted to address this topic, the Reverend Biggs upholds that *Columbella* bears a resemblance to the female external genitals, while *Dentalium*, resembles the male (Biggs, 1963:127) and Valla (1999: 237) concurs. Valla (1999: 229) also suggests that *Dentalium* are a mere tool for emphasizing bone ornaments. Janetski proposes that the increase in *Dentalium* frequency during the Natufian is a manifestation of emerging social complexity (Janetski, 2005). Belfer-Cohen (1995:

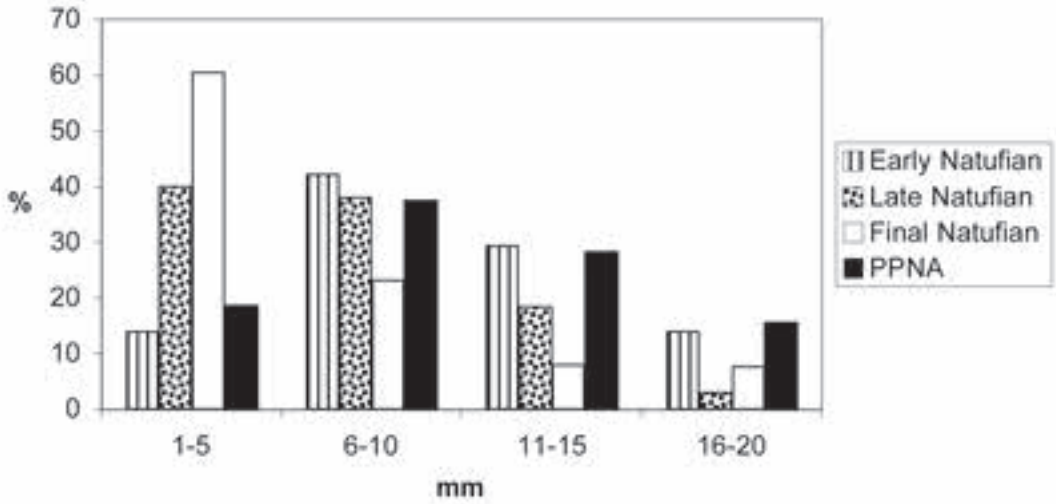


FIGURE 1
Changes in length of *Dentalium* beads during Natufian and PPNA.

Dentalium Bead Length at Eynan n=278

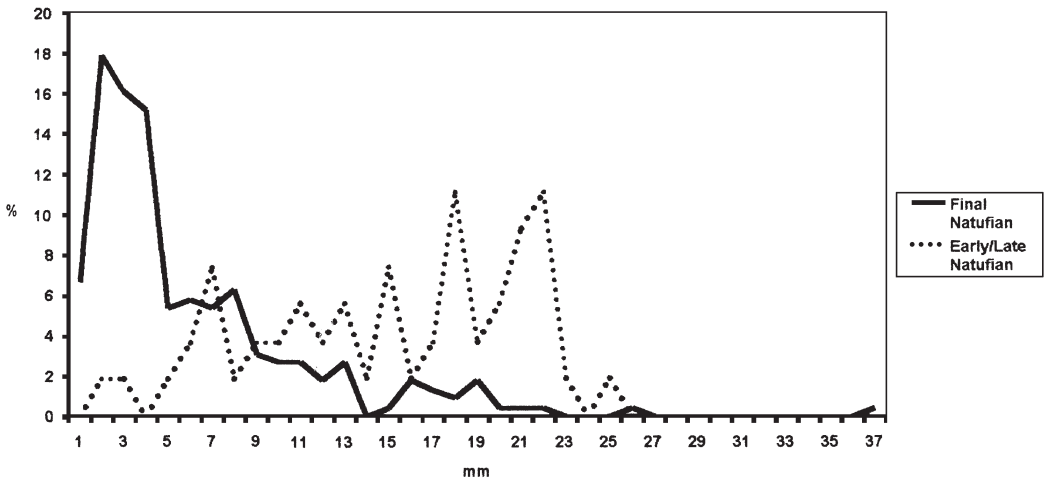


FIGURE 2
Dentalium bead lengths at Eynan.

15), on the other hand, stated that *Dentalium* are so abundant that they have no significant meaning.

Differences in shell exploitation between the Early and the Late Natufian are also discussed by

Mithen (2003). According to him, during the Early Natufian there was centralized control over the collection of *Dentalium*, but once this control no longer existed, in the Late Natufian, the shells had

lost their value and therefore they are found in «domestic rubbish» and not in burials (Mithen, 2003: 50). However, *Dentalium* are common throughout Late Natufian and Harifian sites (el-Wad Terrace, Nahal Oren, Eynan, Hilazon Tachtit Cave, Saflulim, Rosh Horesha, Ramat Harif, to mention just a few sites in Israel, and sites in Wadi Hisma and the Azraq Basin in Jordan (Reese, 1995), as well as in some PPNA (Abu Madi I, Netiv Hagdud, Gilgal I and III, Salibiya IX, Iraq ed-Dubb), PPNB (Ujrat el Mehd, Nahal Issaron, Basta) and up to Chalcolithic (*Nawamis*) sites (Bar-Yosef Mayer, 1999). They are present in relatively small quantities and frequencies in a few Early Bronze Age sites, mainly in the Negev. Furthermore, Mithen's theory does not explain why in some of these sites the shells become shorter than they were before.

The ability to slice *Dentalium* into very thin rings of 1-3 mm long demonstrates a high technological ability expressed in other Natufian artifact types as well (Bar-Yosef & Valla, 1991). The question is why were *Dentalium* sliced into short rings? There are two possible explanations: One, that making thin slices of *Dentalium* is one of the ways of using *Dentalium* in a specific pattern that will distinguish that group from other contemporaneous ones. Two, cutting the shells into thin slices may reflect shortage in supply of raw material and using these shells allows more individuals to use them. While this will not make more necklaces, it will allow more individuals to share this resource. The relative small size of *Dentalium* beads may denote an attempt to maximize the number of beads out of a certain number of shells available for this purpose.

The Early/Late Natufian at Eynan contains the whole range of *Dentalium* shells: complete shells, posterior ends, anterior ends, as well as «beads» where both ends have been removed. However, in the Final Natufian no complete shells were found: Most are «beads» with both ends removed, and just a few are the posterior or the anterior ends. This could be further evidence that the people inhabiting the site during the Final Natufian used material from previous levels, already at the site, as raw material.

According to Garrod in the «Middle Natufian» (that today we call Late Natufian) grave goods were no longer in use (Garrod, 1957: 224). The abundance of shells in occupation deposits but not in graves during the Late Natufian was recently noticed in the renewed excavations of el-Wad Ter-
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race (Weinstein-Evron *et al.*, 2007) and at Hayonim Cave where some of the later graves contain no *Dentalium* (Belfer-Cohen, 1988). Unlike the case of La Madeleine (Vanhaeren & d'Errico, 2003) where short *Dentalium* beads are associated with those of a child's burial, the short beads in the Levant are not associated with children. Furthermore, the appearance of short beads comes at a time when *Dentalium* are no longer found with burials. A more detailed study of the Hayonim cave assemblage in the future may shed light on this topic.

Societies that have plenty of a certain element, can afford to bury some of it, but where shells (and other elements) are precious, those will be removed from the deceased before their internment (e.g., Malinowski, 1954: 258; Jacobson, 1987: 57). This supports our contention that *Dentalium* were particularly valuable.

The notion that shortage in *Dentalium* during the two periods in which the beads are shorter, the Early Epi-Palaeolithic at Ohalo II and the Late/Final Natufian at Eynan, should be further explored, as it may provide insight into the reasons for obtaining them. The scarcity could be explained in several ways: People were, for some reason (competition? Territorial conflict?), unable to reach the source of the shells: the Mediterranean coast. Another possibility is that the group/s that used to «supply» this material (to exchange with those inhabiting the Jordan Valley?) no longer agreed to do so. Or, *Dentalium* shells were not easily found on the Mediterranean shores (as is the case today).

Whatever the cause, it is possible that the inhabitants of the sites resorted to using shells from earlier levels of their own sites, or simply other earlier Natufian sites. Their desperate attempts at obtaining more such shells are also expressed by the presence of *Dentalium* from the Red Sea or fossil beds, although those are few, and may reflect long-distance exchange networks (Valla *et al.*, 2004; Bar-Yosef Mayer, in press).

Because two of the sites where the *Dentalium* shells are the shortest, Ohalo and Eynan, are associated with a cold climate (the last glacial in the case of Ohalo, the Younger Dryas event in the case of Eynan), one wonders whether climate was a factor in obtaining shells (either their abundance or their scarceness). The impact of climate on cultural development has been widely discussed elsewhere (e.g. Moore & Hillman, 1992; Goring-Morris & Belfer-Cohen, 1998). Mienis (2005) suggests

that changes in Mediterranean sea-level that resulted in the exposure of the sea-bed during the last glacial maximum at *ca.* 18 ka BP enabled the collection of large numbers of *Dentalium*. Interestingly, a recent study of shells from sites along the Rhone and Rhine Rivers in Europe showed that most shells appear during maximum cold periods or at the end of cold periods, but surprisingly not during warm periods (Álvarez Fernández, 2001). This topic deserves a separate discussion elsewhere.

While *Dentalium* is a valuable artifact among Epi-Palaeolithic hunter-gatherers, with the onset of farming in the Neolithic it continues to appear only among mobile populations: hunter-gatherers of the Harifian, PPNA and PPNB in the deserts, and later among pastoralists of the Chalcolithic. There seems to be some correlation between the use of *Dentalium* and degree of mobility. Its popularity among Natufians who are more sedentary can be attributed to their subsistence on hunting and gathering, reflecting the «lifestyle» of nomads.

Joining together all the above considerations: Great efforts at obtaining *Dentalium* shells, great efforts at sharing them, and their consistent use over a long period, essentially starting about 20,000 years ago and ending about 5000 years ago, strengthens the thought that *Dentalium* were particularly valued by the people who collected them, most likely in the domain of their belief system. The occasional association of *Dentalium* with ochre strengthens the notion that it is linked to spiritual beliefs (Schick, 1998). *Dentalium* was not necessarily a symbol of male genitals as suggested by Biggs, but it did have an intrinsic value. The finding of thousands of shells in the context of the *nawamis* burials in the Sinai desert, dating to the fourth millennium B.C.E. further supports this notion, as it is well known that burial customs are some of the most efficient ways of carrying on long and forgotten traditions, and that people continue to execute specified burial customs long after the reasoning for them is remembered.

CONCLUSIONS

1. *Dentalium* beads are known from Upper Palaeolithic sites and were in constant use in the Levant (in various degrees of intensity) through the Chalcolithic period.

2. Their distribution in earlier periods is wider in the Mediterranean zone, and in later periods they are used mostly by desert populations.

3. *Dentalium* is abundant among mobile and sedentary hunter-gatherers of the Epi-Palaeolithic, but with the onset of agriculture they are used mostly by hunter-gatherers of the PPNA and PPNB in the desert regions as well as by pastoralists of the Chalcolithic and in a few Early Bronze Age sites. To some extent it is a predictor of degree of mobility.

4. In certain sites and in certain periods *Dentalium* are cut into thin slices. This might reflect both their scarcity at that site and time, and the importance attributed to them. Slicing them may be an attempt at sharing them with more people, despite their scarcity at a given time, due to their spiritual value.

5. Considering 3 and 4, and remembering their frequent association with pendants made of hunted animal bones, we should probably search for the symbolism of *Dentalium* in the domain of successful food provisioning (rather than fertility as suggested by Biggs).

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