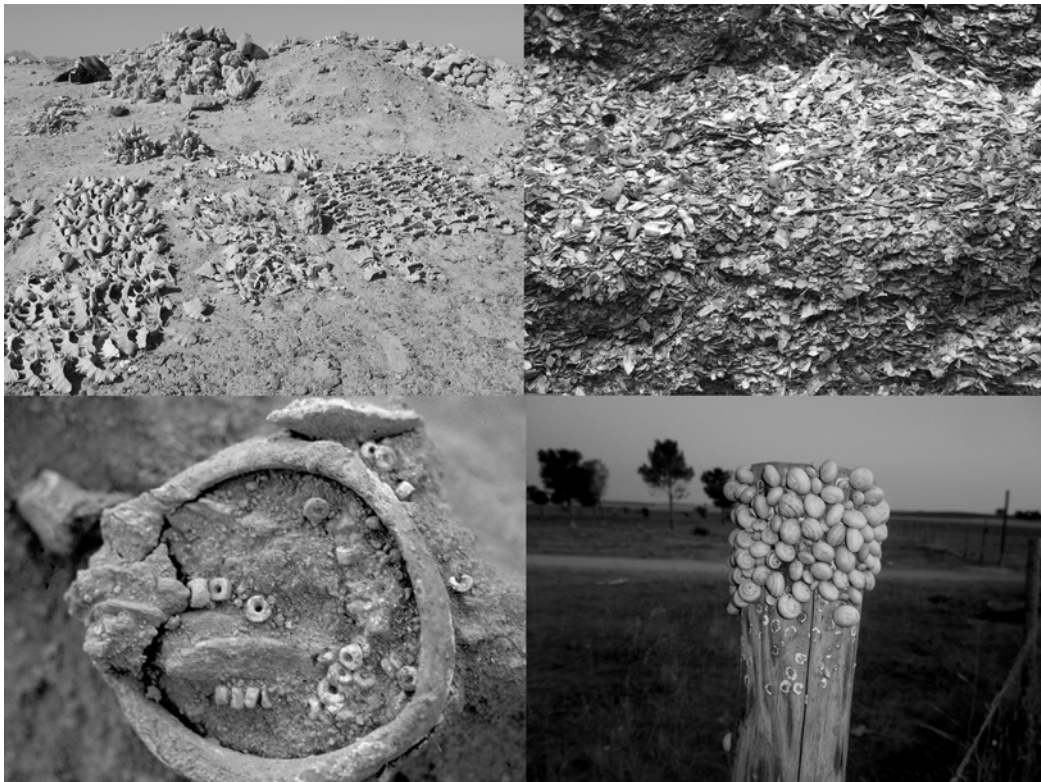


Archaeomalacology: Shells in the Archaeological Record

Edited by

Katherine Szabó
Catherine Dupont
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Preface

This publication is one of the volumes of the proceedings of the 11th International Conference of the International Council for Archaeozoology (ICAZ), which was held in Paris (France) 23rd-28th August 2010. ICAZ was founded in the early 1970s and ever since has acted as the main international organisation for the study of animal remains from archaeological sites. The International Conferences of ICAZ are held every four years, with the Paris meeting – the largest ever – following those in Hungary (Budapest), the Netherlands (Groningen), Poland (Szczecin), England (London), France (Bordeaux), USA (Washington, DC), Germany (Constance), Canada (Victoria), England (Durham) and Mexico (Mexico City). The next meeting is scheduled to be held in Argentina in 2014. The Paris conference – attended by some 720 delegates from 56 countries – was organised as one general and thirty thematic sessions, which attracted, in addition to archaeozoologists (zooarchaeologists), scholars from related disciplines such as bone chemistry, genetics, morphometry, anthropology, archaeobotany, and mainstream archaeology. This conference was also marked by the involvement in the international archaeozoological community of increasing numbers of individuals from countries of Latin America and of South and East Asia.

As nearly 800 papers were presented at the Paris conference in the form of either oral or poster presentations, it was not possible to organize a comprehensive publication of the proceedings. It was left up to the session organizers to decide if the proceedings of their session would be published and to choose the form such a publication would take. A comprehensive list of publication plan of the 11th ICAZ International Conference is regularly updated and posted on the ICAZ web site.

The conference organizers would like to take this opportunity to thank the Muséum national d'Histoire naturelle, the Université Pierre et Marie Curie, the Centre national de la Recherche scientifique and the ICAZ Executive Committee for their support during the organization of the conference, and all session organisers – some of them being now book editors – for all their hard work. The conference would not have met with such success without the help of the Alpha Visa Congrès Company, which was in charge of conference management. Further financial help came from the following sources: La Région Île-de-France, the Bioarch European network (French CNRS; Natural History Museum Brussels; Universities of Durham, Aberdeen, Basel and Munich), the LeCHE Marie Curie International Training Network (granted by the European Council), the Institute of Ecology and Environment of the CNRS, the Institut National de Recherche en Archéologie Préventive (INRAP), the European-Chinese Cooperation project (ERA-NET Co-Reach), the Centre National Interprofessionnel de l'Économie Laitière (CNIEL) and its Observatory for Food Habits (OCHA), the Ville de Paris, the Société des Amis du Muséum, the French Embassies in Beijing and Moscow, the laboratory "Archaeozoology-Archaeobotany" (UMR7209, CNRS-MNHN), the School of Forensics of Lancaster, English Heritage and private donors.

*Jean-Denis Vigne, Christine Lefèvre and Marylène Patou-Mathis
Organizers of the 11th ICAZ International Conference*

1 - THE USE OF MARINE MOLLUSC SHELLS AT THE NEOLITHIC SITE SHKARAT MSAIED, JORDAN

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Abstract : *Marine shells from the Mediterranean Sea and the Red Sea were widely used as ornaments by early Neolithic hunter-gatherers as well as sedentary groups in the southern Levant. A study of marine shells from the Neolithic site Shkarat Msaied (9,500±90 to 8,880±80 BP) shows that the diversity of species is high. Most of the shells were used as beads, and rather simple modification techniques were applied. The variation of bead types is quite limited when compared to other sites in the region. From an intra-site spatial analysis of artefacts at Shkarat Msaied it is suggested that shell artefacts are like stone and bone tools stored in communal buildings. Because of the high frequency of marine shells in the building designated to the interment of the dead, they are strongly associated with mortuary rituals.*

Keywords : *Marine molluscs, Shell beads, Neolithic, Exchange, Southern Levant*

Introduction

During the Middle Pre-Pottery Neolithic period (MPPNB) (c. 9,300-8,300 BP) (Kuijt and Goring-Morris 2002:366), marine shells were collected and used, mainly as ornaments, by hunter-gatherer groups in the southern Levant (Goring-Morris 2005:97; Kirkbride 1967:9). Many scholars consider their presence in the material cultural repertoire an *ipso facto* proof of exchange between groups (Bar-Yosef and Belfer-Cohen 1989; Kuijt and Goring-Morris 2002). When found at inland sites far from their sources, marine shells are assigned a high value and typically categorised as prestige items (Banning 1998:215; Watkins 2008:160). The study of marine mollusc shells from the Neolithic site Shkarat Msaied provides an insight into the use of shells among hunter-gatherer societies in a semi-arid inland region (Abu-Laban 2010). Excavation of the site Shkarat Msaied was carried out by a team from the University of Copenhagen between 1999 and 2005, and again in 2010.¹

The site Shkarat Msaied

Shkarat Msaied is situated c. 13 km north of Petra (fig. 1-1), in the Nemelleh region; a semi-arid steppe area c. 980 m above sea level between two mountain peaks (Gebel 1988:8; Jensen *et al.* 2005:115). The eastern area of the site is dominated by a sandstone plateau, and the west by plains of drainage systems, which run into Wadi Araba (Gebel 1988:71, 83). The vegetation today is characterised by forests of oak and pistachio, as well as shrubs and other minor plants. These plant species generally grow in the area of the Arabian Plateau and surround the site from the east. In the west, the *siqs* are wooded with pistachio, oak and juniper (Gebel 1988:81; Jensen *et al.* 2005:115).

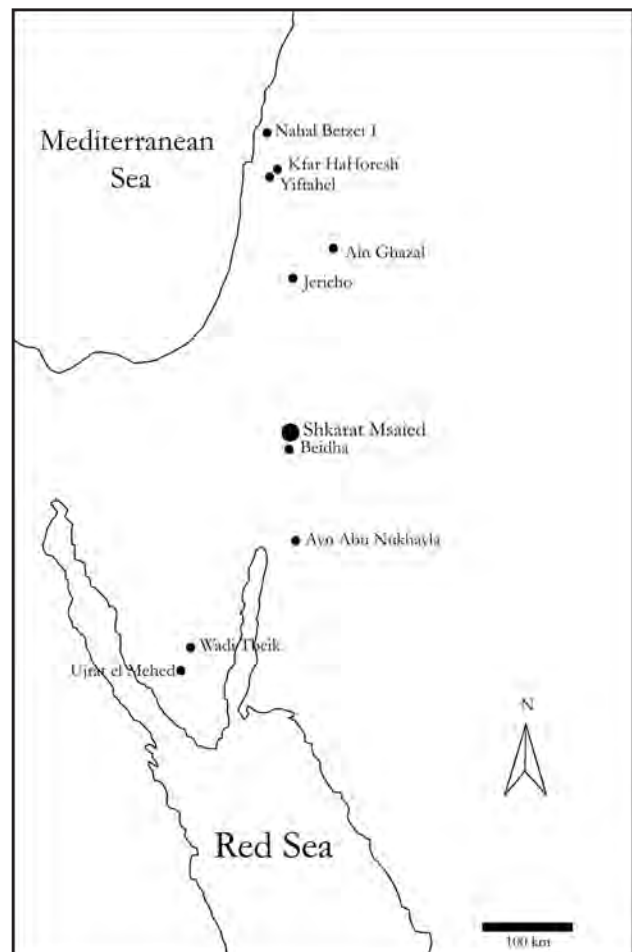


Figure 1-1. Map of MPPNB sites in the southern Levant mentioned in the article.

¹ The study does not encompass the shell assemblage from the last season in 2010.

Shkarat Msaied was mainly occupied during the MP-PNB period – seven uncalibrated conventional ^{14}C dates give a range from $9,500\pm 90$ to $8,880\pm 80$ BP (Hermansen *et al.* 2006:3). The inhabitants comprised a small group of hunter-gatherers who also practised cultivation and possibly the herding of goats (Jensen *et al.* 2005:117-119). The site was only occupied in certain seasons of the year; most probably in spring when wild plants could be harvested and cereals processed (Jensen forthcoming). Shkarat Msaied is estimated to have covered an area of c. 1000 m², of which 600 m² have been exposed (Jensen *et al.* 2005:115). The site consists mainly of circular buildings arranged in clusters and with open spaces between some of them (fig. 1-2). The northern part of the settlement shows evidence of domestic use, whereas the southern part bears evidence of activities of a more communal character. The open spaces functioned as passages, and in certain areas there is evidence of activities such as food processing and tool production.

From a regional perspective and compared to the larger sedentary settlements (4-5 ha) in the Mediterranean zone and the smaller camps (maximum 300 m² in size) occupying the desert regions (Kuijt and Goring-Morris 2002), Shkarat Msaied is a medium sized settlement.

The marine mollusc shells – species and aspects of exchange between groups

Although the amount of marine shells found at the site is low – 379 (NISP), the diversity of species is quite high, with 26 different species identified (table 1-1). More than half of the shell assemblage (57%) ultimately derives from the Red Sea, and less than one fifth (18%) from the Mediterranean. It was impossible to determine the species of the rest of the shell assemblage because the specimens were either too fragmented or worn. In fact, 26% of the shell assemblage was categorised as fragments, i.e. where less than half of the shell is present. Because of the distances over which the shells were transported – 100 km to the Red

² Wood charcoal samples (Lab no. Aar-9335, Aar-9336, Aar-9337, Wk-15159, Wk-15160, Wk-26490, Wk-26491)

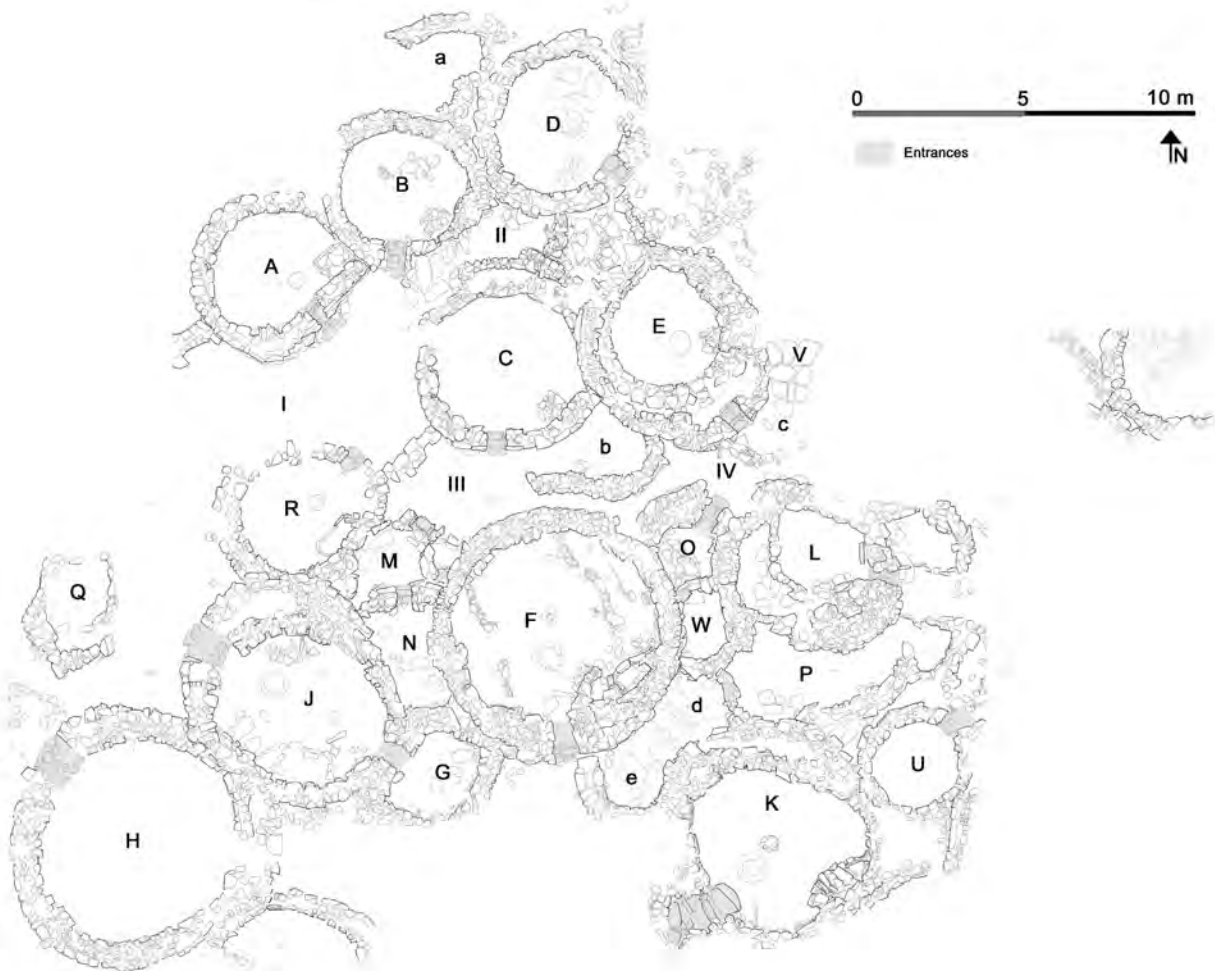


Figure 1-2. Site plan of Shkarat Msaied (Courtesy of Moritz Kinzel).

Sea and 160 km to the Mediterranean Sea – the possibility that the settlers procured the shells directly has been discounted. Thus, the marine shells at the site are considered to have been introduced as a direct consequence of exchange with neighbouring groups.

Comparing the distribution of the shells to that of other sites in the southern Levant, there is a patterned relationship between the quantity found in a given site and its location relative to the sources. The more distant a given material group is from the source, the lower the quantity. Such a distribution pattern produces a fall-off curve from which the process of exchange is explained as down-the-line exchange (Fig. 1-3.a and b). This kind of exchange is characterised as not being hierarchically organised, as there is no sign of a central place at which a certain material group was collected and/or produced. Exchange is consequently viewed as being exclusively reciprocal (Earle 1999:614; Renfrew 1977:73). This explanation model is one-dimensional as mechanisms of exchange are based solely on measurable factors such as geographical distance and statistical densities from excavations.

The most abundant species at Shkarat Msaied are cowries (Cypraeidae) including species in the genera *Cypraea*, *Erosaria*, *Lyncina* and *Monetaria* (148 NISP), of which the Red Sea *Erosaria nebrites* (93 NISP) is the most com-

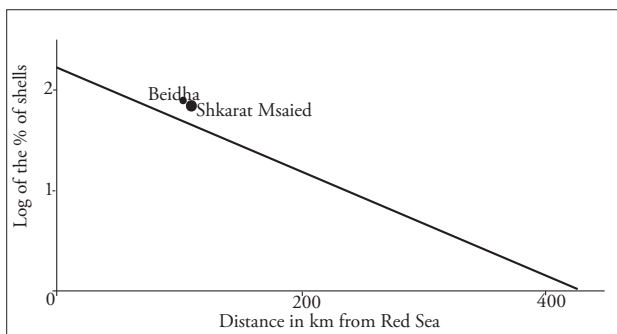


Figure 1-3a. Fall-off curve of Red Sea shell species in the southern Levant.

mon. They are followed by species of *Nerita* (57 NISP).

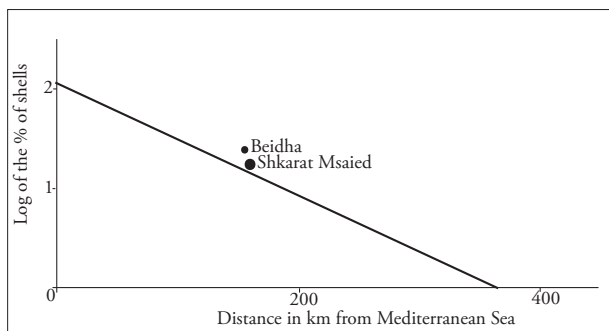


Figure 1-3b. Fall-off curve of Mediterranean shell species in the southern Levant.

These two taxa are also among the dominant marine mollusc categories in other contemporary settlements such as Beidha (Reese unpublished manuscript) and Ayn Abu Nukhayla (fig. 1-4), as well as in smaller encampments in the Sinai such as Ujrat el Mehed and Wadi Tbeik. There is, however, an element of sub-regional variation, as the Sinai sites and Ayn Abu Nukhayla have *Conus* and *Dentalium* shells as the dominant genera (Bar-Yosef Mayer 1999:72; Spatz 2008:77). These two taxa are found in low quantities at Shkarat Msaied and Beidha. On the other hand, the Mediterranean bivalve species *Acanthocardia tuberculata* is well represented followed in quantity by the Red Sea species *Glycymeris livida* both at Shkarat Msaied and Beidha. Moreover, *Nassarius* shells are quite abundant at Ayn Abu Nukhayla (Spatz 2008:76), although the distance of this site to the Mediterranean Sea is higher as compared to Shkarat Msaied and Beidha, where only 6 and 8 *Nassarius* specimens were found respectively.

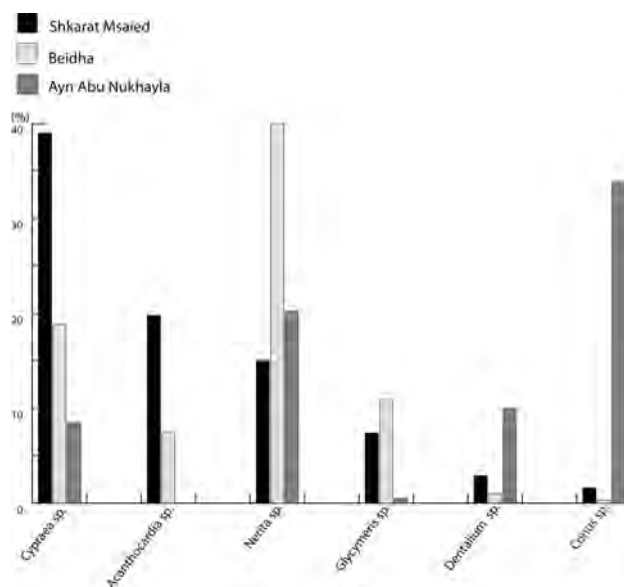


Figure 1-4. Comparison of selected species' quantity (in %) in the sites Shkarat Msaied, Beidha and Ayn Abu Nukhayla.

Cowrie (=“*Cypraea*”) shells seem to have been a ‘trend’ in the southern part of the southern Levant only, as they are not so common in the Mediterranean region at sites such as Nahal Betzet I, Kfar HaHoresh and Yiftahel (Spatz 2008). In this region however, *Cypraea* shells occur in mortuary contexts as grave goods and as eye inlays on plastered skulls as has been observed at Jericho (Kenyon 1957:124). The bivalve species *Acanthocardia* and *Cerastoderma* are among the dominant species constituting together between 30-85% of the marine assemblage at the aforementioned sites situated in the Mediterranean region (Spatz 2008). Although we are not dealing with an organised exchange of shells, there are indications that each group

had a preference for certain species. It is postulated that the shells were primarily selected for their morphological features or shape. Shkarat Msaied and Beidha, only

7 km apart, have unsurprisingly similar preferences for shell species.

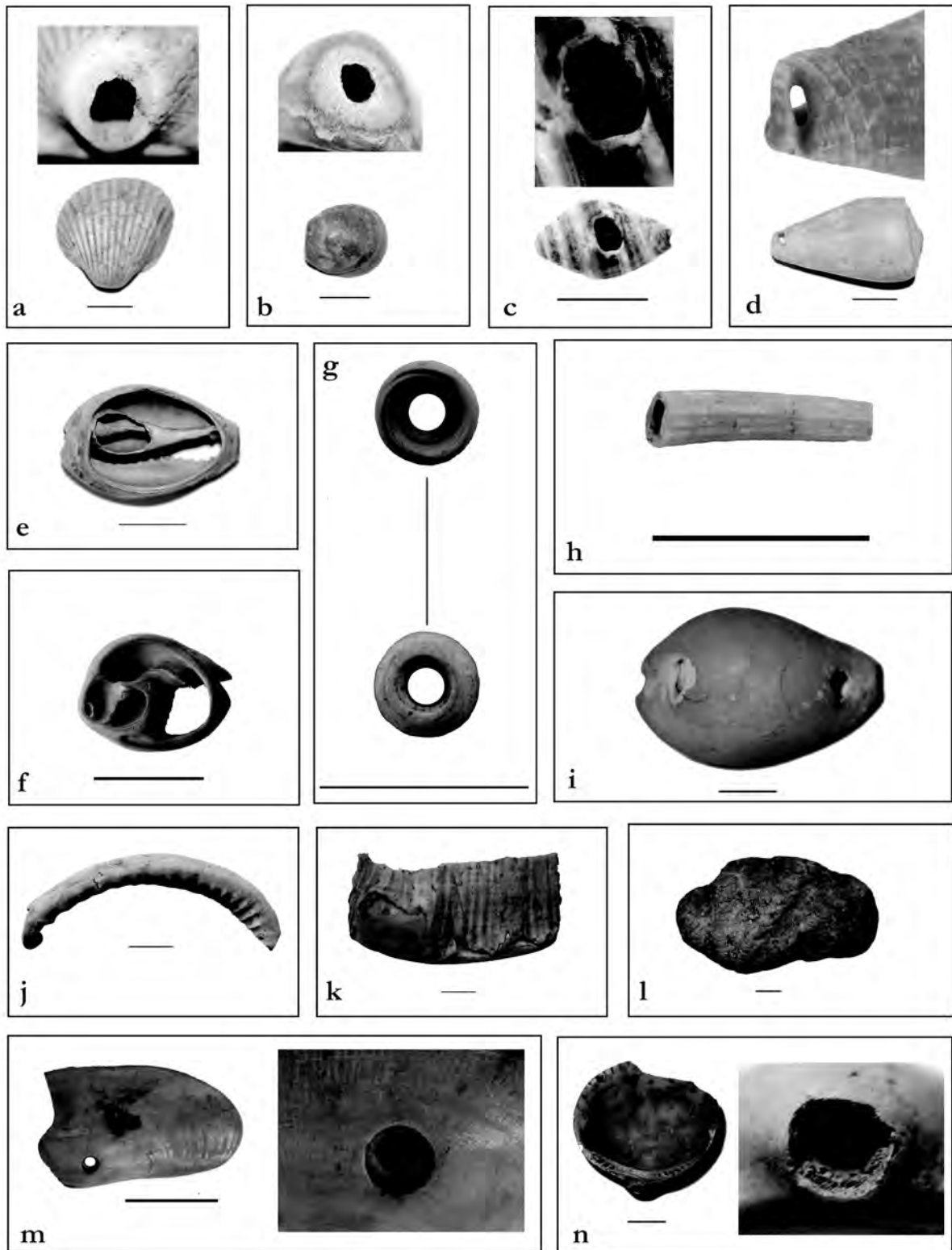


Figure 1-5. Modified shells in Shkarat Msaied. a. *Cerastoderma* sp. (61217), b. *Nerita* sp. (3715c), c. *Engina mendicaria* (251), d. *Conus* sp. (52506b), e. *Erosaria* sp. (71318c), f. *Nassarius* sp. (61328), g. Gastropoda indet. (61912), h. *Dentalium* sp. (1972a), i. *Phalium granulatum undulatum* (3550), j. *Cypraea* sp. (3119). Possibly modified shell: k. Gastropoda indet.(1340) scraper? l. *Tridacna maxima* (52211) possible container. Naturally perforated shells: m. *Donax* sp. (71002), n. *Glycymeris* sp. (52503a). Scale=1cm.

I - A. ABU-LABAN : THE USE OF MARINE MOLLUSC SHELLS AT THE NEOLITHIC SITE SHKARAT MSAIED, JORDAN

	Species	Natural Habitat	NISP	Modified ¹	Unmodified	Fragment
Bivalves	<i>Acanthocardia</i> sp.	Mediterranean Sea	21	0	2	19
	<i>Acanthocardia tuberculata</i>	Mediterranean Sea	54	40	13	1
	<i>Cerastoderma glaucum</i>	Mediterranean Sea	5	3	2	0
	<i>Chama</i> sp.	?	1	0	1	0
	<i>Donax trunculus</i>	Mediterranean Sea	2	2	0	0
	<i>Glycymeris livida</i>	Red Sea	28	16	7	6
	<i>Pinctada</i> sp.	Red Sea	8	0	0	8
	<i>Tridacna maxima</i>	Red Sea	3	1	2	0
Gastropods	<i>Canarium erythrinus</i>	Red Sea	1	1	0	0
	<i>Canarium fusiformis</i>	Red Sea	1	1	0	0
	<i>Clanculus pharaonius</i>	Red Sea	2	2	0	0
	<i>Clypeomorus bifasciata</i>	Red Sea	1	1	0	0
	<i>Conomurex fasciatus</i>	Red Sea	1	1	0	0
	<i>Conus mediterraneus</i>	Mediterranean Sea	1	1	0	0
	<i>Conus tessulatus</i>	Red Sea	1	1	0	0
	<i>Conus</i> sp.	?	4	4	0	0
	<i>Cypraea</i> sp.	?	36	35	0	1
	<i>Engina mendicaria</i>	Red Sea	3	3	0	0
	<i>Erosaria macandrewi</i>	Red Sea	1	1	0	0
	<i>Erosaria nebrates</i>	Red Sea	93	89	4	0
	<i>Lamibs truncata sebae</i>	Red Sea	2	0	1	1
	<i>Lyncina carneola</i>	Red Sea	2	2	0	0
	<i>Lyncina lynx</i>	Red Sea	2	2	0	0
	<i>Monetaria annulus</i>	Red Sea	16	15	1	0
	<i>Nassarius gibbosulus</i>	Mediterranean Sea	6	6	0	0
	<i>Nerita sanguinolenta</i>	Red Sea	57	31	26	0
	<i>Phalium granulatum undulatum</i>	Mediterranean Sea	3	3	0	0
	<i>Polinices mammilla</i>	Red Sea	3	3	0	0
	<i>Thais savignyi</i>	Red Sea	1	1	0	0
	Gastropoda indet.	?	3	3	0	0
	Mollusca indet.	?	5	0	0	5
Scaphopoda indet.	?	11	11	0	0	

¹ Includes fragments of shells with signs of modification

Table 1-1. Marine mollusc species at Shkarat Msaied.

Producing shell beads

More than two thirds of the shells (71%) at Shkarat Msaied have undergone deliberate modification. Most of the shells (96%) can be defined as simple beads, as they only have one hole (Bar-Yosef Mayer 1999:30). The hole is produced at the umbo for all bivalves and at the apex for most of the gastropods (fig. 1-5a and 5b). In some gastropod shells the hole was produced on the body area, either at the body whorl or near the aperture (fig. 1-5c and 5d). Studies show that the preferred technique to produce holes on the umbo and apex was grinding. Gouging or direct percussion was used typically to produce a hole on the body of the shell (Francis 1989). I conducted a small scale experiment on a group of shells, which were ground on a flat piece of sandstone. Sandstone is abundant at the site and used extensively as a building material and for producing tools. Preliminary results show that producing a hole by grinding the umbonal area on bivalves takes less than three minutes, whereas producing a hole on the body area of *Clanculus pharaonius* shells can take up to 10 minutes.

For *Cypraea* and *Nassarius* shells, the dorsum is typically removed by hammering and/or grinding (Francis 1989:29). The edges of some of the cowrie shells seem to have been polished to give a smooth and even surface (fig. 1-5e and 5f).

Sawing is more time consuming than the aforementioned techniques and has only been applied to a few specimens such as a *Conus* shell (fig. 1-5d), and for the production of disc beads (fig. 1-5g). The disc beads are made from gastropod shells and seem to involve sawing off the spire from the rest of the shell as well as removing the top of the spire. A sharp edged flint blade could be used as a sawing device, and the process can take up to two hours (Francis 1989:28). The *Dentalium* shells might also have been sawn or simply broken (fig. 1-5h). Only one cowrie shell bead had the dorsum intact as holes were produced on each side of it; possibly by gouging (fig. 1-5i).

Besides exploiting shells for the use as beads, it is possible that the three *Phalium granulatum undulatum* fragments found at the site were originally used as bangles or bracelets (Bar-Yosef Mayer 1999:31) (fig. -5j). Some shells might have had more utilitarian functions. A fragment of a shell could have been used as a scraper (fig. 1-5k), and two complete unmodified *Tridacna maxima* shells could have been used as some kind of container (fig. 1-5l). One of the *Tridacna* shells was found in situ on a large working sandstone slab in building D.

There are few examples of shells which have natural perforations. Three shells have holes which are characterised as having fine regular striations. The holes have a tapered diameter which is wider at the outer surface (fig. 1-5m). Such holes can only be produced by carnivorous gastropods (personal communication Kenneth Thomas 2008). Otherwise,

most natural holes are generally observed in bivalve shells at the umbo area and have an uneven diameter (fig. 1-5n). Although it would require the use of wear analysis to be certain, naturally perforated shells were probably also used as ornaments (Anderson 2001:132; Claassen 1998:40).

From the study of the modified shells, investment of time as well as the level of skill required for the production of most of the shell beads at Shkarat Msaied proved to be on a low scale. In general, the modification of the shells did not require specialised tools. At present it is impossible to say whether the shells were brought to the site pre-modified or were worked on the site. There is, however, no direct evi-



Figure 1-6. Two cowrie dorsum fragments (52616 and 2900).

dence of a shell bead workshop at Shkarat Msaied. First of all, there is no concentration of unmodified shells that could be used as raw material (Bar-Yosef Mayer 1999:65) in any specific area, although unmodified shells constitute 18% of the entire shell assemblage. Secondly, there is a lack of evidence of shells directly associated with tools that could be related to shell bead production. In the neighbouring site of Beidha a whole sequence of shell bead production – such as blanks and finished beads – were found together on a large sandstone slab with tools related to bead production in one building (Byrd 2005:117).

It is difficult to detect any signs of such a *chaîne opératoire* of shell bead production at Shkarat Msaied. As this study has shown, most of the techniques applied to produce the beads would not leave any significant debris. The only evidence we have of shell debris are two dorsum fragments from cowrie shells (fig. 1-6).

For the time being, it can be asserted that the inhabitants of Shkarat Msaied had the technological know-how for producing beads. Remains of what could either be a dump or workshop area for the production of green stone disc beads were found in Area I and below enclosure 'a' (Jensen 2008). The process of producing these greenstone beads would have required more time and a higher level of skill compared to the simple shell beads. Studies and experiments show that special tools such as borers are required to produce disc beads (Jensen 2008; Wright, Critchley and Garrard 2008).³ It is tempting to suggest that if the shell beads were produced on site, this was conducted on a household level, as opposed to the production

of stone beads, which was an organised endeavour conducted on a collective level.

Compared to other sites in the region, the variety of bead types at Shkarat Msaied seems restricted, as it only comprises simple beads and disc beads. At other sites such as Ayn Abu Nukhayla, the assemblage also includes bead pendants (Bar-Yosef Mayer 1999:70; Spatz 2008:81).

Intra-site distribution of shells and exchange within a group

In order to shed more light on the use of marine shells at Shkarat Msaied, an intra-site spatial analysis was conducted comparing marine shell distributions to the distributions of other material categories; bone and stone tools.⁴ Shells, bone and stone tools are all distributed across the whole site, and are found both in domestic and communal spaces (fig. 1-2). In the domestic buildings (A, B, C, D, E and R), the maximum number of shells found was 25 specimens. They were either absent or found in low quantities in the passage areas (III and IV) and enclosures (b and c), as well as in the small rooms (M, N, G, O and W). Ground stone artefacts were, however, quite abundant there and this implies that shell bead production and/or storage was not part of the function of these spaces.

The analysis shows that the highest concentration of shells as well as stone and bone tools is to be found in building P and enclosures 'd' and 'e'. These facilities are interpreted as storage and possibly also for general production. These areas are not directly accessible from any of the domestic buildings, thus they cannot be linked to any private use and should be interpreted as communal. The very high number of finds in areas P, 'd' and 'e' compared to the buildings designated a domestic function gives an indication that production and distribution of not only tools but also ornaments was controlled on a collective or group level. Shell ornaments, even if they were used for personal expression (Sciama 1998), were like utilitarian objects controlled collectively.

Looking further at the communal buildings F, K and J, all bear evidence of special purpose activities. Building F featured the highest quantity of shells recovered (45 NISP), whereas buildings K and J yielded no more than 8 and 11 specimens respectively. Building J housed activities related to food production, as suggested by grinding tools found *in situ* on the floor. In building K, more than 20 stone objects were placed deliberately on one of the stair cases and on the floor. Some of the stone objects showed remnants of red ochre, and their context implies a ritual activity. Here, only a few shells were found, suggesting

³ It is worth mentioning that a couple of sandstone and bone disc beads were also found at Shkarat Msaied. These beads require the same manufacturing processes and tools as the green stone beads. It is likely that they were produced on site as both materials are abundant at the site.

⁴ This study only includes the distribution of ground stone tools.

⁵ In the 2010 season a child burial was found in building R.

that the rituals carried out in this building did not involve marine shells.

Building F was used for mortuary rituals, as it housed all burials.⁵ The burials were both primary and secondary, and all bodies were interred below the floors of the building. Finding a high frequency of marine shells in this building strongly indicates that marine shells were used in mortuary ceremonies. Only three shells were found in direct burial context, however, they were in a burial fill and not deposited as grave goods. During the MPPNB period leaving grave goods with the interred was not a widespread practice (e.g. Simmons *et al.* 1990:70).

From the distribution of the shells it is not thought that marine shells were used as status or rank markers, that is if hoarding or other evidence of accumulation should be understood as wealth keeping (Hamon and Quilliec 2008). In other contemporary settlements such as Ain Ghazal, Beidha and Kfar HaHoresh, hoarding involved utilitarian objects such as flint tools, or figurines and other cult objects such as plastered skulls. Shells are almost entirely absent from such contexts (Goring-Morris 2005:97; Kirkbride 1967:10; Kuijt 2000:151; Rollefson 2000:167).

Conclusion

Marine shells were used at Shkarat Msaied as personal ornaments. Cowrie and *Nerita* shells were among the favoured types. The time and skills required for the production of the shell artefacts proved to be low level, as opposed to the production of stone beads. Their archaeological contexts suggest that the distribution of marine shells to group members was more or less controlled at a collective level. This was possibly done in order to ensure an egalitarian wealth distribution. It has been suggested by Kuijt (2000) that mortuary rituals, which involved among other practices skull removals and skull caching, were used by MPPNB groups as a means of maintaining egalitarian social systems as a response to emerging social differentiation (Kuijt 2000). Should the marine shells be assigned a value at Shkarat Msaied, it was not necessarily due to their distant origin, but rather because of their association with mortuary rituals.

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