



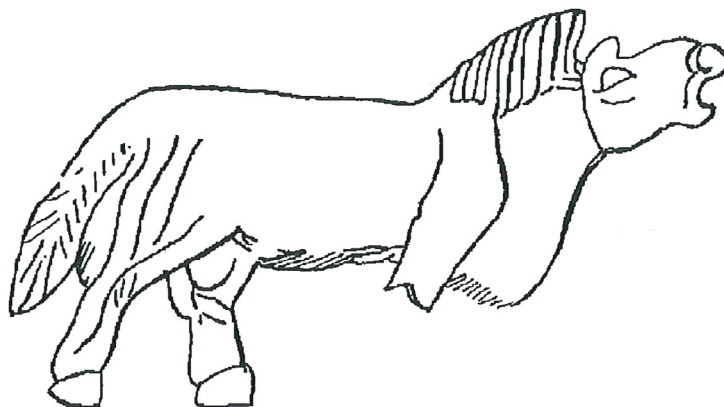
ARCHAEOZOOLOGY OF THE NEAR EAST

IV A

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edited by

M. Mashkour, A.M. Choyke, H. Buitenhuis and F. Poplin



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THE ECONOMIC IMPORTANCE OF MOLLUSCS IN THE LEVANT

Daniella E. Bar-Yosef Mayer¹

Abstract

Shells found in archaeological sites are usually interpreted as food, decoration, “exotic” items of exchange, or as grave goods. This paper discusses the economic value of shells, and the reasons for their collection and exchange using three case studies. During the PPNB of the Levant, Red Sea shells from southern Sinai were traded to the north, where they were valued for spiritual reasons, in exchange for cereals, desired as food by the hunter-gatherers of Sinai. In the Early Bronze Age mound of Tel Qashish there is evidence that freshwater clams were consumed, apparently by the poorer section of the population, who were possibly exploited by higher ranking members of this stratified society. In the Iron Age fortress of Kadesh Barnea, as well as most other Iron Age sites in Israel, the Indo-Pacific cowrie *Cypraea annulus* was apparently used as shell money. These three case studies demonstrate that mollusc shells, although they are often simply interpreted as ornaments or food items may serve in the interpretation of more complex socio-economic situations, and that their use is directly related to food provisioning.

Résumé

Les coquillages dans les sites archéologiques sont généralement interprétés comme des produits de consommation, de décoration, comme des objets exotiques d'échange ou encore comme des offrandes funéraires. Dans cet article, la valeur économique des coquillages ainsi que les raisons de leur collecte et de leur échange sont débattues à travers trois cas d'étude. Durant le PPNB du Levant, les coquillages de la Mer Rouge étaient commercialisés du sud du Sinaï vers le nord où ils avaient une valeur spirituelle dans l'échange des céréales, désirées comme nourriture par les chasseurs-cueilleurs du Sinaï. Dans le Bronze ancien de Tel Qashish, il y a des preuves que les palourdes d'eau douce étaient consommées par la partie la plus pauvre de la population, laquelle était probablement exploitée par des classes plus élevées de cette société hiérarchisée. Dans la forteresse de l'Age du Fer de Kadesh Barnea ainsi que dans la plupart des autres forteresses d'Israël, la porcelaine indo-pacifique *Cypraea annulus* était utilisée comme une «monnaie coquille». Il s'avère d'après ces trois cas d'étude que les coquilles des mollusques, qui sont souvent interprétées simplement comme des ornements ou pour la nourriture, peuvent servir à l'interprétation d'agencements socio-économiques plus complexes. Ces études montrent que leur utilisation est directement liée à l'approvisionnement de l'alimentation.

Key Words: Neolithic, Early Bronze Age, Iron Age, Shells, Levant

Mots Clés: Néolithique, Age du Bronze Récent, Age du Fer, Coquilles, Levant

Introduction

Molluscs were exploited as food by humans perhaps as early as 60,000 years ago (e.g. Volman 1978). Shell middens have been found in the Middle Paleolithic and Middle Stone Age sites of Gibraltar, Haua Fteah in Libya and Klasies River Mouth in South Africa. In the Levant, shells appear as decoration for the first time in the caves of Qafzeh (Vandermeersch, personal communication) and Skhul (Garrod and Bate 1937:224-5), in both cases with the remains of anatomically modern humans. During the Middle and Upper Palaeolithic, molluscs were exploited both as food and as decoration. However, they seem to be found mostly on coastal sites, and up to a day's walk (e.g. Qafzeh Cave) from the beaches where the shells originated.

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It is often the case that shells found in archaeological sites are interpreted as either food or decoration, but in a few cases they are mentioned as “exotic” items of exchange or as grave goods. However, this is often a superficial view of the role of shells in the lives of the inhabitants of a particular site, and therefore the analysis of this element is often neglected when the final excavation reports are published. In this paper, I will try to demonstrate the economic value of shells, and the reasons for their collection and exchange.

Three case studies will be presented in this paper: the production and exchange of shell beads in the PPNB of Southern Sinai (10,500 to 8,500 calibrated BP); the use of molluscs as a dietary supplement in an Early Bronze Age (third millennium BCE) site in the Jezreel Valley, northern Israel; and the use of cowrie shells as money in the Iron Age II (tenth to sixth centuries BCE.) fortress of Kadesh Barnea in Eastern Sinai.

Shell beads

During the PPNB of the Levant, cereals (wheat and barley) and farm animals (sheep and goat) were already domesticated (e.g. Bar-Yosef and Meadow 1995). Some sites, such as Jericho, had populations living in well-structured agriculture-based villages. But at other sites, for instance Yiftah-el in the Lower Galilee, the subsistence base was mixed: On the one hand, we find domesticated legumes, but on the other, the hunting of gazelle continued and goat and sheep were not yet herded (Garfinkel 1987). The agricultural innovations of this period are unquestionably a major factor in the apparent increase in population and the resulting increase in number of sites and in site size. This in turn had an effect on social organization, which is to some extent demonstrated in the prominence of ritual activity (e.g. Bar-Yosef and Bar-Yosef Mayer 1999; Cauvin 1997).

PPNB populations in the Sinai pursued a full hunter-gatherer lifestyle, at least in terms of animal exploitation (Tchernov and Bar-Yosef 1982; Dayan *et al.* 1986). The architecture of the southern Sinai sites also seem to reflect a more nomadic lifestyle: The dwellings are relatively small and mostly rounded (Bar-Yosef 1984, 1985). That the lithic industry contains arrowheads but no sickle blades is a further indication of a hunter-gatherer lifestyle.

The evidence comes from the excavation of six PPNB sites in the Sinai in the 1970's (Bar-Yosef 1984, 1985): Ujrat-el-Mehed, Wadi Tbeik, Gebel Rubsha, Abu Madi III, Wadi Jibba I and Wadi Jibba II. Although there is no evidence for the harvesting of wild or domesticated cereals, many storage pits and grinding stones were found. In addition, thousands of sea shells were collected.

Combining all six assemblages, 5317 shells have been examined (Bar-Yosef Mayer 1997a, 1999), comprising 34 genera and 63 species. The majority of the species are from the Red Sea but three species (a total of 132 shells) are from the Mediterranean, and one (*Theodoxus jordani*) is a freshwater shell from the Jordan River basin (found at Wadi Tbeik). The largest shell assemblage was col-

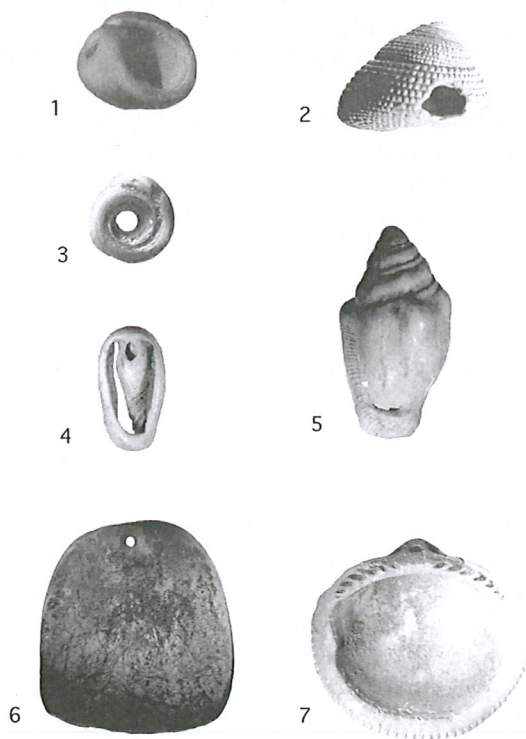


Fig. 1. Shell beads from PPNB Sinai: 1. *Nerita sanguinolenta*, 2. *Clanculus pharaonis*, 3. *Conus* sp., 4. *Persicula terveriana*, 5. *Strombus mutabilis*, 6. Artifact made of *Pinctada margaritifera*, 7. *Glycymeris* sp.

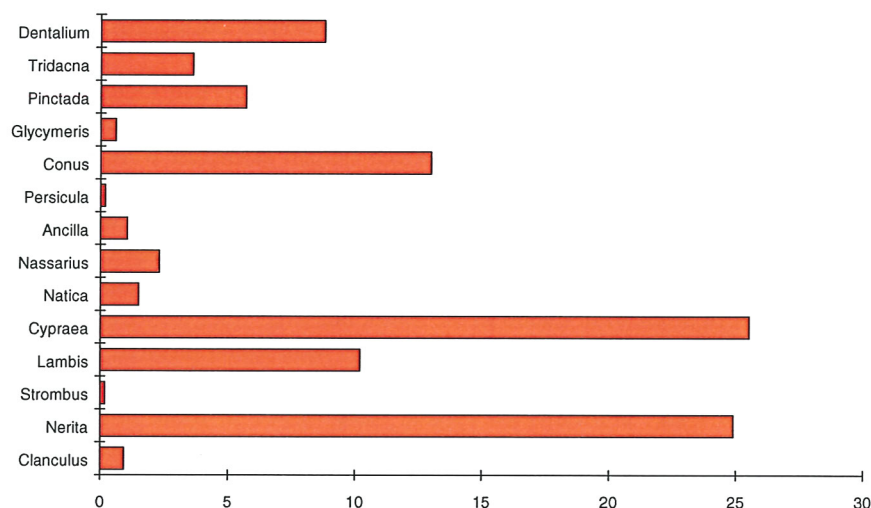


Fig. 2. Shell frequencies at Ujrat-el-Mehed (n=3076)

lected at Ujrat-el-Mehed, which contained over 3,000 shells (Fig. 1). Focusing mainly on this site (the other, smaller sites had a similar composition of shell species), we were able to determine a few traits that all these assemblages share: There are four dominant genera (that together form at least 40% of each assemblage), namely, *Nerita* sp., *Cypraea* sp., *Conus* sp. and *Dentalium* sp. (Fig. 2)

Ten other genera are also found in almost every assemblage: *Clanculus* sp., *Strombus* spp., *Lambis* sp., *Natica* spp., *Nassarius* sp., *Persicula* sp., *Ancilla* sp., *Pinctada* sp., *Tridacna* sp. and *Glycymeris* sp. A few shells (up to 1-3%) in each assemblage originated in the Mediterranean zone.

Most of the shells were worked into simple beads (i.e. one hole was perforated in them to allow stringing). Various methods were used, including grinding, drilling, incising and hammering. Some shells were collected as ready-to-use beads from the beach, but others were made into special artifacts. Those include *Pinctada margaritifera*, which was used for a number of types of pendants, crescents etc., *Lambis truncata*, which was shaped into pendants and one bangle (the latter found at Wadi Tbeik), and a few of the larger *Cypraea* sp. which were made into "nose-rings" (found at Ujrat-el-Mehed, Wadi Tbeik and Wadi Jibba II).

Usually, the shells were scattered randomly over the sites, with no obvious intra-site patterning. There was one exception: *Dentalium* sp. found at Ujrat-el-Mehed, were concentrated in Locus 2. One possible explanation is that these beads, which were also cut to about the same length of 8-12 mm, might have been sewn onto one garment.

In the two largest sites, Ujrat-el-Mehed and Wadi Tbeik, about 40-50% of the shells are worked and almost 10% are complete. This has led to the conclusion that complete shells should be viewed as "raw material" and that the shells were manipulated and worked into beads on site. A similar proportion of about 10% complete shells and about 50% worked shells was also observed in the Early Bronze Age II shell assemblages from southern Sinai. There too, the shells were interpreted as exchange items; Bar-Yosef Mayer 1999).

The large numbers of shells worked by grinding corresponds to the large numbers of grinding stones found in all six sites. The grinding stones, storage pits and the presence of wheat phytoliths in the sediments of the sites (Miller-Rosen 1993) are considered as evidence for the presence of cereals in the southern Sinai sites. It is therefore suggested that shells were collected and brought to the sites to be manufactured into beads and exchanged for cereals with populations from the Mediterranean region.

Although the sites' excavators assumed that the grinding stones served in grinding cereals, they may also have been used for grinding shells. Most of the worked *Nerita* sp., *Cypraea* sp., *Conus* sp. and a few of the other shells (e.g. *Glycymeris* sp.) show clear grinding surfaces around their holes (Fig. 1: 1,3,7). Some microwear analyses of flint tools from Nahal Issaron also testify to the usage of

flint blades in the incising of beads made of shell and/or minerals during this period (Yamada *et al.*, in press).

The context in which the shells were found is yet another important factor in this interpretation. In the Natufian culture of the Levant, preceding the Neolithic, shells were found primarily in burials, however, in the site of Ujrat-el-Mehed where sixteen human skeletons were found (buried in bell-shaped pits under floors of houses/residential areas; Hershkovitz *et al.* 1994), not a single shell was found. The question may be asked, what were those beads used for? Why were they manufactured there? The answer lies in the PPNB sites to the north of Sinai. Nahal Hemar Cave, Jericho, Yiftah'el, etc., contained mainly shells from the Mediterranean, but also some shells from the Red Sea. The Red Sea shells from southern Sinai were traded to the north, but what were they traded/exchanged for, and why were they needed or wanted there? In Jericho, shells were found inserted in the eyes of plastered skulls, as well as in the eyes of a plaster statue. They had value in spiritual activities and beliefs. In the Sinai, on the other hand, domesticated cereals were valued as food. Indeed, in Sinai there are grinding tools as well as storage pits for the grains, probably brought in from the north.

Shells as food

The second case study, concerns an Early Bronze Age mound, Tel Qashish in the Jezreel valley, located between the Galilee and Mt. Carmel, on the right bank of the Qishon River. It was excavated by a team from the Hebrew University of Jerusalem, headed by Prof. Amnon Ben-Tor. The excavation took place as a part of a regional project, in which Tel Yoqne'am was the main urban center, and Tel Qashish one of its surrounding townships.

Fifteen levels were exposed on this tell, spanning the Early Bronze Age I through the Persian periods (Ben-Tor and Bonfil 1988) and it was occupied almost continuously throughout these periods. This discussion will concentrate, however, only on the Early Bronze Age (hence - EB) levels, strata XII-XV. In the two excavated areas (A and B) these levels yielded the remains of an unfortified settlement during the EBI, and a fortified settlement during EBII-III. The excavations uncovered botanical remains of cultivated crops including olive, wheat and vetch (Liphschitz 1989, in press), as well as faunal remains of both domesticated animals (Horwitz and Tchernov 1989) and hunted wild animals (Horwitz, personal communication). One human skeleton found at the site might date to the Early Bronze Age, however, its stratigraphic position was unclear (Sabari and Smith in press).

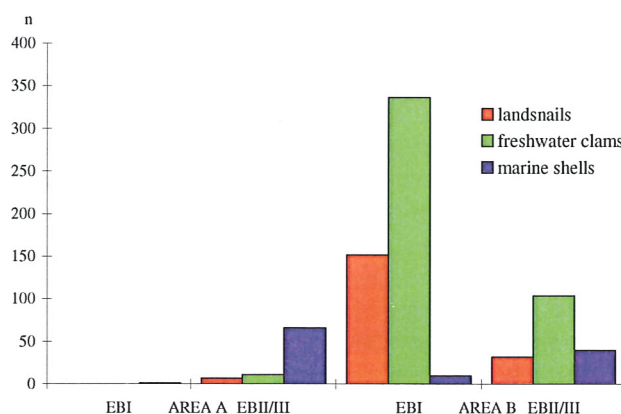


Fig. 3. Distribution of mollusc shells in Tel Qashish

The malacological assemblage consisted of over 5000 shells (NISP) representing 760 specimens (MNI), 452 of which are freshwater bivalves¹ (Fig. 3). About 60% of the entire shell assemblage was composed by a local freshwater clam, apparently originating in the nearby Qishon River. In addition there were some 15% marine shells, all of which are from the Mediterranean (which lies only about 15-20 km to the west), and 25% are landsnails. All of the landsnails species are weed-dwellers, and interestingly, they were found mainly in the context of fills above floors, probably from times the site was uninhabited. The marine shells are mostly Mediterranean, and consisted of *Phalium granulatum*, *Tonna galea*, *Conus mediterraneus*, *Glycymeris violacescens*, *Cerastoderma glaucum* and *Donax trunculus*, all very common Mediterranean species, often found at archaeological sites of this period (e.g. Ezzughayyar and al-Zawahra 1996; Bar-Yosef Mayer 1997b). Worth mentioning are eight *Patella caerulea* (limpet) shells which could have been consumed. Freshwater snails were probably brought in accidentally along with mud for the construction of mud bricks (Bar-Yosef and Heller 1987), but could also have been inadvertently brought in along with drinking water or with the freshwater clams.

The clam, which predominated among the mollusc assemblage is *Potomida littoralis*, a member of the Unionidae family, and a few *Unio terminalis* were also found. *P. littoralis* is extinct nowadays due to chemical pollution of the Qishon, but it is known to have inhabited this stream as it is found in the Mollusc Collection of the Hebrew University, collected by the late Prof. Georg Haas in the 1940's. The large quantities of clams found at the site indicate that they were most probably used as food, or at least as a food supplement.

The most accurate method of verifying whether molluscs were consumed by the inhabitants of Tel Qashish is by conducting analyses of the chemical composition of human skeletons from the site, i.e., strontium isotope ratios (e.g. Schoeninger 1995). Unfortunately, only one skeleton was uncovered at the site, and its stratigraphic position (EB or earlier) is unclear. However, this skeleton does exhibit pathologies which are the result of malnutrition, as do other Early Bronze Age human remains (Smith 1989).

The absence of any other shell midden in the Levant raises the question of why there was a need to consume shellfish. A few points should be made to demonstrate why the occurrence of a shell midden should be considered problematic:

1. This period was more humid than today (e.g. Bar-Matthews *et al.* 1997, Rosen 1989), meaning favorable conditions for the cultivation of cereals and fruits trees (already domesticated by this time; Stager 1985), as well as enough pasture for the herds. So, on the face of it, there should have been plenty of food of a higher quality.
2. In his book "The Food Crisis in Prehistory" Mark Cohen (1977) states that "shellfish are evidently low-prestige resources of last resort for a great many human populations, so that *any* increase in their utilization is probably significant. In individual cases, of course, the exploitation of shellfish may result from cultural preferences or from environmental changes but a widespread increase in their importance presumably indicates a significant stress on other resources" (Cohen 1977:79, emphasis in original).
3. In terms of nutritional value, 452 clams do not contain much protein or calories, however, they are rich in dietary supplements such as iron, phosphorous and calcium (e.g. Parmalee and Klippel 1974; Claassen 1998).

As to date there are no other known shell middens in the Near East, this is probably not a case of cultural preference. In addition, many of the valves had chipped edges, possibly indicating the use of force for opening the clams instead of steaming them or baking them on heated pebbles, which would cause them to pop open, indicating that the people of Tel Qashish had little experience in opening bivalves.

Studying the context in which those shells were found can provide an explanation for the inconsistency described above. Two areas were excavated at this site: Area A and Area B. Area A, located

¹ Counting the bivalve shells, each of the freshwater clams was based on two valves' umbones, while for marine shells, each valve was counted separately assuming that it had a separate function, possibly as a potential ornament but not as food.



Fig. 4. *Cypraea annulus*.

on the summit of the tell revealed a massive and well-constructed architecture; Area B, on the eastern slope yielded mostly mudbrick construction. Apparently, these architectural differences reflect social differences, indicating that the "rich" resided in Area A and the poor in Area B. Area B is where we find many more clams than in Area A, moreover, Area A is where more of the marine shell beads were found, and Area B is where the *Patella caerulea*, an edible marine species, was found. It is thus plausible that the inhabitants of Area B were deprived of certain food resources and therefore had to resort to shellfishing. It should be emphasized that this process took place during the Early Bronze Age, a period when society becomes stratified.

Shells as money

The third case study concerns an Iron Age site in eastern Sinai, Kadesh Barnea. The site is a fortress surrounded by a wall with eight towers, and might have had both military and commercial functions. Being one of only three Iron Age sites in the Negev, it is said to have served not only as a Judean stronghold, but also to control the main road from Gaza (on the Mediterranean) to the Red Sea, as well as controlling nomadic populations of the Negev and eastern Sinai (Cohen 1981; Mazar 1990).

The malacological assemblage included about 400 shells originating in the Mediterranean, the Red Sea and the Nile River, consisting of 23 genera. A few of the finds are of special interest: Those included three specimens of a very large gastropod, *Lambis truncata*, whose body whorls were cut into a dish-shape. *Lambis* was also made into engraved palettes during this period, but these were not found at this site (e.g. Brandl 1984; Reese and Sease 1993). Similar palettes (possibly for cosmetics) were made of *Tridacna* sp., a large bivalve, but although this species was found at the site it was not manufactured into artifacts.

Another species of interest is *Charonia tritonis*, said to have been used as a trumpet and also known from Hazor and Tell Qasile (Yadin 1958; Bayer 1963; Mazar 1980). This species was found at Kadesh Barnea, mainly in the uppermost fortress (seventh-sixth century BCE). Outside of Israel, it is especially known from the Aegean archaeological record (Astrom and Reese 1990; Reese 1995), reflecting possible Greek influence along the Israeli Mediterranean coast and the northern Negev at this time (Oren 1984; Stern 1989).

Isolated beads of *Nerita* sp., *Clanculus pharaonis*, *Dentalium* sp. and other Red Sea species were also found. Not far from Kadesh Barnea is a PPNB site, Ein Qadis I (Mienis 1995b) and it is not impossible that the Iron Age population of Kadesh Barnea engaged in surface collection from the nearby ancient site.

Whereas all the above species from Kadesh Barnea might have been brought to the site primarily for "cultural" uses, one species, *Cypraea annulus*, was probably collected especially for economic reasons. One hundred and twenty eight specimens, forming about a third of all the shells at the site were retrieved, and 75% of them were complete shells. This shell is a relatively small Indo-Pacific

cowrie, and it has several characteristics which make it suitable for use as money i.e., as an intermediary means of exchange: It is not easily degradable; it is easily identifiable by the distinctive yellow-orange ring around its dorsum (Fig. 4), and it is relatively rare: accounts of its current distribution indicate this species is rare in the Gulf of Elat (Mienis 1995a) and in the northern Red Sea (Sharabati 1984) and it is not present north of Qatar in the Persian Gulf (Bosch *et al.* 1995). It should be noted, however, that some of these cowries were shaped into beads and probably served as decoration as well as money. One anthropoid statue made of clay depicts a person wearing a garment decorated with cowries (Beit-Arieh 1995), as is the case in various cultures, where coins serve as ornaments as well. *Cypraea annulus* is the very same species used as shell money in the Bronze Age of China, where historical documents prove their use as money (Pinn 1991). It was also used as money in Egypt of the Middle Ages, in the 16-19th centuries in Africa and in the 7th century bc in India (Hogendorn and Johnson 1986). It is found in numerous Iron Age sites in southern Israel and Jordan. Especially worth noting is Tell-el-Kheleifeh excavated by Nelson Glueck, which is a fortress architecturally and ceramically almost identical to Kadesh Barnea, located on the Gulf of Elat/Aqaba coast.

Other sites include Qitmit (Mienis 1995a), and the City of David (Mienis 1992). Indo-Pacific cowries in this period are also found as far north as Megiddo (Loud 1948: Pl. 217; Bar-Yosef Mayer 2000) and some sites in Syria and Iran (Reese 1989, 1991). The consistent presence of this species throughout Iron Age sites in the Levant, and the fact that they are most often found as complete shells rather than beads, suggests their use as a currency. Furthermore, their rarity might render the shells more valuable, and therefore especially suitable for use as money (Yet it is also possible that their current distribution reflects over-exploitation by humans over the past three millennia).

Eph'al and Naveh (1993), based on epigraphic finds, suggested that during the Iron Age of Israel there were a number of parallel systems for the weighing of goods: A royal system, an urban system, and a rural system. If there were parallel systems for weighing, there might also have been different systems for paying for the goods. This would explain the presence and use of cowries as a form of payment at a time when we know, both from scriptures and from archaeological evidence that silver ingots were used for the same purpose (e.g. Yadin 1961; Aharoni 1966; Ronen 1996). The shells of Kadesh Barnea may have been used as beads, souvenirs, game pieces, charms, dishes, trumpets, raw material or money. Trumpets, for instance, could be used either as a military instrument or ritual instruments. Money may have been useful in food provisioning for both soldiers and merchants residing in the fortress.

Conclusions

This paper examined various uses of shells, based on the study of a number of malacological assemblages of different periods. However, shells are known to have been used in many other ways: For instance, during the Chalcolithic period, mother of pearl was a common raw material for the production of trapezoidal pendants. Both *Pinctada margaritifera* from the Red Sea and *Aspatharia rubens* originating in the Nile River were used, and these can reveal not only long distance contacts, but also the possible use of shells as amulets, often associated with burials (Bar-Yosef Mayer in press a).

Throughout the Late Bronze Age and Iron Age, there seems to be increased evidence for the use of shell in construction (Bar-Yosef Mayer 2000, in press b). Apparently, the marine shells found in very large quantities in floor foundations served in water drainage, and were brought not from the sea or seashore but from nearby geological outcrops. Some shells were collected as tools for burnishing pottery, and others, especially Muricidae, were used in the dye industry (e.g. Spanier 1986). Whereas all of the above have some economic connotations, the three examples discussed above, of beads used in exchange for grains, clams used directly as a dietary supplement, and cowries used as money, have a more direct bearing on food provisioning and are therefore of prime economic importance.

When interpreting malacological assemblages, one should evaluate not only the shells themselves, but all other aspects of the archaeological record including fauna, flora, human remains, architecture, pottery, lithics, etc.

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