

THE ARCHAEO+MALACOLOGY GROUP NEWSLETTER

Issue Number 10, December 2006

Coordinator: Janet Ridout Sharpe, BSc ARCS
66 Radnor Road, Wallingford, Oxfordshire OX10 0PH, UK
email: janet_sharpe@beeb.net

Editorial

Welcome to the 10th issue of the AMG Newsletter, which includes articles on Neanderthal mussel collecting, and the distribution of *Papillifera papillaris* in Istanbul. There are the usual abstracts of publications received, and one or two items besides. As always, I would like to thank all the contributors for their support, and to encourage everyone, please, to submit short articles, comments, queries, news, publications for abstracting - in fact anything archaeomalacological - for the next issue. The future of the newsletter really does depend on your contributions.

Thanks are due, once again, to Kath Szabo of the ICAZ Archaeomalacology Working Group and to Aydin Örstan for posting this newsletter on their websites: <http://triton.anu.edu.au/> and <http://home.earthlink.net/~aydinslibrary/AMGnews.htm>, respectively. These websites also host back issues of the AMG Newsletter. The next issue will hopefully appear at the end of March 2007 – or as soon as I have received sufficient copy, so please keep it coming in! (JRS)

Assessing the seasonal factor of Neanderthal occupation through shell growth-ring analysis: evidence from Gibraltar

Katerina Douka and Thomas Higham

Research Laboratory for Archaeology and the History of Art (RLAHA), University of Oxford, UK
email: katerina.douka@rlaha.ox.ac.uk

Introduction

We report the results of an investigation into the seasonal nature of an archaeological occupation dating to the Middle Palaeolithic period, from the site of Vanguard Cave, Gibraltar. The excavation of the site, under the auspices of the Gibraltar Caves Project, revealed a shallow shell ‘midden’ deposited during the Neanderthal occupation of the cave. This archaeological deposit has been dated to c. 110,000 years ago.

Part of the archaeological assemblage consisted of ~40 mussels (*Mytilus galloprovincialis* Lamarck, 1819). These samples were analysed in order to (i) assess the seasonal nature of the midden deposit and to test the hypothesis that the assemblage represented a short term episode; (ii) use two independent but complementary analytical techniques: growth-ring analysis of shell bands coupled with limited oxygen isotope analysis; and (iii) investigate Neanderthal coastal adaptation to understand the ways in which they exploited different resources. A common feature used to explain some of the differences between Neanderthals (*Homo neanderthalensis*) and anatomically modern humans (*Homo sapiens sapiens*) is that the latter were seemingly able to exploit a wider spectrum of resources. By comparison, Neanderthals are often suggested as being top level carnivores, with an emphasis on animal hunting rather than collecting.

Archaeological background

Theoretical models, archaeological, anthropological and other practical considerations imply a highly mobile nature for Neanderthal communities (Boyle, 2000; Hockett and Haws, 2005) and

the limited attempts to demonstrate this have been mainly made through the study of faunal remains (e.g. Patou-Mathis, 2000). Seasonal evaluations of Neanderthal occupation sites are extremely scarce but it is crucially important that attempts are made to build up a picture of their resource exploitation and to see whether any seasonal round of activities can be determined. This is the first attempt to do this, based upon malacological remains which were directly collected by Neanderthal humans.

The shells were closely associated with Mousterian lithic debris and their horizontal distribution concurred with the spread of ash from an *in situ* hearth (Barton, 2000). The mussels themselves showed little or no surface marks induced by the fire or generated heat.

Methods and Materials

We used two methods of estimating the seasonality of death of the archaeological shell remains: growth-ring analysis and oxygen isotope analysis. Since the shellfish were collected by Neanderthals, estimating the season of the year of their death equates directly with the season of collection by humans.

Growth-ring analysis is based on the fact that molluscan bivalves produce discernible concentric lines that mark various ontological, environmental, biological and metabolic events occurring within their lifetime. We analysed the mussels on the basis of a clear correlation of growth macro-rings with a temporal (annual) periodicity, which is well attested by studies of modern populations. Growth rings, or annuli, in bivalves represent periods of growth cessation usually associated with the mantle's withdrawal from the shell margin during the colder months, and have been shown to form annually (Kautsky, 1982; Richardson, 2001; Seed, 1976). Seasonal estimates obtained through growth-ring analysis should ideally be undertaken with reference to a modern control population (Claassen, 1998). However, this could not be undertaken on a large scale in this study owing to time constraints.

Oxygen isotope studies are still in progress. In this report, therefore, we only comment on the growth-ring analysis results. Forty-two well-preserved *Mytilus galloprovincialis* valves with surviving edge margins were selected for analysis, from the Gibraltar Museum. They were all of a comparatively large size (8-12 cm) and this size was consistent throughout the midden deposit.

Several scholars have shown that the most effective method of observing growth lines in mussels is to examine them in thin or thick section (Lutz, 1976; Richardson, 2001), or to use acetate peels (Kennish, *et al.*, 1980; Rhoads and Lutz, 1980). In this study, sections were found to be of limited use and acetate peels failed to produce effective results. A review of the literature revealed that some researchers had faced similar problems and attributed them variously to (i) the recrystallisation of the material (Berry and Barker, 1975); (ii) the process of fossilisation; (iii) the limited Mediterranean intertidal zone that results in low line visibility (Deith, 1985); or (iv) the unfavourable angular relationship of growth lines to the growing margin and the crystalline elements of the shell structure (Richardson, 1989).

The main bulk of the analysis (measuring and counting) was therefore undertaken on the surficial bands visible under a binocular microscope. Some of the mussels exhibited up to 260 observable bands and up to eight annuli. Great attention was paid to the section of carbonate showing the final year of growth. Several plots were constructed: number and width of bands against the number of annuli or the total size, allometric charts, and percentage of new growth compared to the penultimate annual increment.

Results

Reduced growth rates with increasing age were clearly apparent, especially after sexual maturity. A percentage growth ratio was calculated by expressing the values measured from the penultimate year and the final increment of growth, which showed that a very low percentage of

new growth, if any, occurred before the animals died. Micro- and macroscopic observations of polished sections along the axis of maximum growth revealed the commencement of a small amount of new growth for most of the samples prior to death.

The analysed shells all yielded the same result, indicating early to mid spring collection. Both growth-ring analysis and the preliminary oxygen isotope analysis (not reported here) yielded similar results. We regard this as robust evidence that the midden in question was the result of a brief phase of time which took place around late winter to mid spring about 110,000 years ago.

Discussion

Mussels (*Mytilus galloprovincialis*) sometimes appear to be problematic for use in growth-ring analyses, not only because it is very difficult to identify the annual rings and distinguish them from random surficial disturbance rings, but also because even in section the growth lines can be obliterated. Any future research requires modern control data to improve the reliability of the seasonal estimate. Mussel shells are relatively common, compared with other species, in Palaeolithic archaeological sites around the Mediterranean Rim. There is, therefore, considerable potential for these methods to be applied to other archaeological assemblages to construct a more complete basis for the evaluation of seasonal site use, mobility and coastal adaptation among both Neanderthals and modern humans, in Europe and the Levant.

References

- Barton, N., 2000.** Mousterian hearths and shellfish: late Neanderthal activities on Gibraltar. In: Stringer, C., Barton, N. and Finlayson, C. (eds), *Neanderthals on the edge: papers from a conference marking the 150th anniversary of the Forbes' Quarry discovery, Gibraltar*. Oxford, Oxbow. pp. 210-220.
- Berry, W.B.N. and Barker, R.M., 1975.** Growth increments in fossil and modern bivalves. In: Rosenberg, G.D. and Runcorn, S.K. (eds), *Growth rhythms and the history of the earth's rotation*. New York, John Wiley. pp. 9-25.
- Boyle, K.V., 2000.** Reconstructing Middle Palaeolithic subsistence strategies in the South of France. *International Journal of Osteoarchaeology*, 10(5): 336-356.
- Claassen, C., 1998.** *Shells*. Cambridge, Cambridge University Press. (Cambridge Manuals in Archaeology.)
- Deith, M.R., 1985.** Seasonality from shells: an evaluation of two techniques for seasonal dating of marine molluscs. In: Fieller, N.R.J., Gilbertson, D.D. and Ralph, N.G.A. (eds), *Palaeobiological investigations research design, methods and data analysis*. Oxford. pp. 119-130.
- Hockett, B. and Haws, J.A., 2005.** Nutritional ecology and the human demography of Neanderthal extinction. *Quaternary International*, 137: 21-34.
- Kautsky, N., 1982.** Growth and size structure in a Baltic *Mytilus edulis* population. *Marine Biology*, 68(2): 117-133.
- Kennish, M.J., Lutz, R.A. and Rhoads, D.C., 1980.** Preparation of acetate peels and fractured sections for observation of growth patterns within the bivalve shell. In: Rhoads, D.C. and Lutz, R.A. (eds), *Skeletal growth of aquatic organisms: biological records of environmental change*. New York, Plenum Press. pp. 597-601.
- Lutz, R.A., 1976.** Annual growth patterns in the inner shell layer of *Mytilus edulis* L. *Journal of the Marine Biological Association of the United Kingdom*, 56: 731.
- Patou-Mathis, M., 2000.** Neanderthal subsistence behaviours in Europe. *International Journal of Osteoarchaeology*, 10(5): 379-395.
- Rhoads, D.C. and Lutz, R.A. (eds), 1980.** *Skeletal growth of aquatic organisms: biological records of environmental change*. New York, Plenum Press.
- Richardson, C.A., 1989.** An analysis of the microgrowth bands in the shell of the common mussel *Mytilus edulis*. *Journal of the Marine Biological Association of the United Kingdom*, 69(2): 477-491.
- Richardson, C.A., 2001.** Molluscs as archives of environmental change. *Oceanography and Marine Biology*, 39: 103-164.
- Seed, R., 1976.** Ecology. In: *Marine mussels: their ecology and physiology*. Cambridge, Cambridge University Press. pp. 13-65.

This work was the result of a Master's dissertation undertaken by KD at the Research Laboratory for Archaeology and the History of Art, University of Oxford.

Additional data on the distribution of *Papillifera papillaris* (O. F. Müller, 1774) (Gastropoda: Pulmonata: Stylommatophora: Clausiliidae) in Istanbul, Turkey

Burçin Aşkım Gümüş

Süleyman Demirel University, Medicine Faculty, Nuclear Medicine Department, Çünür, Isparta, Turkey
email: burcinaskim@gmail.com

Papillifera papillaris was the first clausiliid species to be described by O. F. Müller, as *Helix papillaris* in 1774. During the malacological expeditions that I made while preparing my PhD thesis (Gümüş, 2004), I collected this species among other pulmonate specimens from different locations around İstanbul between the years 2001 and 2002. Following the two articles written about *P. papillaris* in the AMG Newsletter (Ridout Sharpe, 2005; Örstan, 2006), I decided that it might be helpful to provide additional data about the distribution of this species in İstanbul (Table 1.)

Station	<i>P. papillaris</i> (+ = present)
Yedikule Zindanları (the dungeons of Yedikule, the walls) (E)	+
Emirgan Korusu (the groves of Emirgan) (E)	+
Rumeli Hisarı (the walls, the beach way and the gardens) (E)	+
Rumeli Kavağı (the last point of the strait, the gardens) (E)	–
Topkapı (the walls) (E)	+
Florya (the villa of Atatürk, the forest) (E)	–
Zeytinburnu (the gardens) (E)	–
Üsküdar (Hidiv Kasrı, the gardens) (A)	+
Kadıköy (the cemetery) (A)	+
Moda (the gardens) (A)	–
Küçük Yalı (the gardens around the trail way) (A)	–
Çamlıca (the forest) (A)	–
Kartal (the gardens, the cemetery) (A)	–
Pendik (the gardens around the trail way) (A)	–
Fenerbahçe (the stadium, the park) (A)	–
Maltepe (the gardens) (A)	–
Kalamış (the gardens) (A)	–
Samandıra (the gardens) (A)	–
Anadolu Kavağı (the last point of the strait, the Castle of Ceneviz, the gardens) (A)	–
Büyükkada (the gardens, rocks near the church of Aya Yorgi) (I)	–
Heybeliada (the forest) (I)	–
Kımalıada (the forest) (I)	–
Sedef Adası (the forest) (I)	–

Table 1. Mollusca collection localities in and around İstanbul (2001-2002) showing the presence and absence of *Papillifera papillaris*. Key: **A** = Anatolian part of İstanbul; **E** = European part of İstanbul; **I** = islands in the Sea of Marmara.

The distribution of *Papillifera papillaris* in İstanbul

Papillifera papillaris exists at most of the stations in the European part of İstanbul, where there are many historical buildings dating from the Byzantine and Ottoman Empires. It appears, however, that the species has not spread far from presumed ‘introduction places’ because there

are no records from the stations at Florya, Zeytinburnu and Rumeli Kavađı. It does occur at the Rumelian Fortress, which was built by Mehmet the Conquerer in 1452 prior to the conquest of İstanbul; this was completed in only four months and is one of the most beautiful works of military architecture anywhere in the world. It is also present at Topkapı Palace, once the great palace of the Ottoman sultans from the 15th to 19th centuries.

Papillifera papillaris was only found at two locations in the Anatolian part of İstanbul. In Üsküdar, a pleasure-house was built for the Ottoman Governor of Egypt, Abbas Hilmi Paşa, in 1907 by the Italian architect Delto Saminati. The house was built in the middle of a huge grove. There is a monumental fountain made of marble in the garden in front of the house. It is possible that the marble of the fountain was brought from Italy, but I could not ascertain the source.

In Kadıköy, specimens were collected from the old Ottoman cemetery. There is no obvious evidence of Roman or Byzantine buildings in or near this cemetery. However, Villehardouin mentions that a palace was built for the Byzantine Emperor Constantine the Second in Kadıköy. A palace was also built for Justinianus and his wife Theodora in Fenerbahçe, although there are no standing ruins today of either of these two palaces. Despite the dense population of *P. papillaris* found in Kadıköy, no specimens of this species were found at Fenerbahçe.

There is a widespread belief that the history of İstanbul began in the Greek and Roman periods and continued with the Byzantine and Ottoman Empires. In fact, the history of İstanbul goes back to at least 3000 years BC. The first natives of the Bosphorus were Thracians. The Phoenicians lived in Moda and Kadıköy in the 15th century BC. The ancient settlement of Khalkedon between Moda and Yođurtçu in the vicinity of Kadıköy dates from the Bronze Age. The most important evidence of this period comes from Truva (Çanakkale) and Alacahöyük (Çorum) and the similarity between the findings at Truva and Khalkedon is acknowledged. Migrants from Megara in Greece settled in Khalkedon in the 7th century BC. The Byzantine Empire has been attributed to the migrants from Megara or the Dorians at Lygos in Sarayburnu in the European part of İstanbul. The Bosphorus was used by other migrants, such as Thracians, Bithynians and Phrygians, and there was also trade between Byzantium and Rome through the Bosphorus.

It was a surprise to me that I could not find any *P. papillaris* at Anadolu Kavađı and the Castle of Ceneviz (Castle of Yoros). In antiquity this was supposed to have been the site of a temple to the Twelve Gods. The present castle is known to have been built by the Genoese, although the exact date of construction is not known, but it is certain that it was originally built during early Byzantine times. The castle was conquered by the Turks in 1305, by the Genoese in 1348 and finally by the Ottomans later in the 14th century. I could not find any specimens of *P. papillaris* either at the other stations in the Anatolian part of İstanbul, such as Küçük Yalı, Çamlıca, Kartal, Pendik, Maltepe, Kalamış and Samandıra, or on the islands in the Sea of Marmara, such as Büyükada, Heybeliada and Sedef. Despite Örstan's (2006) record from Kınalıada, I did not find any specimens on this island. However, unlike Örstan, I did not collect from the hill where the Armenian monastery was.

The records from Emirgan and the cemetery of Kadıköy are new locality records for the distribution of *P. papillaris* in İstanbul.

Discussion

The distribution of *P. papillaris* is given as southern Europe. It has been recorded from Italy, Sicily, Corsica, South of France, Malta, Atlantic islands, Balearic Islands, Croatia (Island of Susak), Albania and Turkey. To date there are no records from Spain, Portugal, Greece and Bulgaria. In Turkey it has been recorded from İstanbul, Bursa, İznik, İzmir and Antalya (Fechter and Falkner, 1990; Bank and Menkhorst, 1994; Štamol and Poje, 1998; Schütt, 2005).

I have been unable to find *P. papillaris* at stations at Bursa, İzmir and Antalya. In addition, I could not find any specimens at ancient sites which were occupied by the Romans, such as Efes (İzmir), the Mausoleum (Bodrum, Muğla), Telmessos (Fethiye, Muğla), Side (Manavgat, Antalya), Sillyon (Abdurrahmanlar-Serik, Antalya), Adada (Sütçüler, Isparta), Antiochia (Yalvaç, Isparta) and Sagalassos (Ağlasun, Burdur) (Gümü, 2005). There are also no records of this species from Tekirdağ, İzmit, Bilecik, Balıkesir, Çanakkale, Kütahya, Manisa, Aydın, Muğla, Denizli, Afyon, Isparta and Burdur (Gümü, 2004).

When the ship of Uluburun (Uluburun-Kaş, Antalya; Turkey) sank in 1300 BC, there were complex trade routes throughout the Mediterranean. The actors in this trade represented the different civilisations of the central Mediterranean (the Minoans), Anatolia (the Trojans, Arzavians, Hittites and Mitanni), Mesopotamia (the Assyrians) and Africa (the Egyptians). It has been hypothesised that land snails were dispersed through the medium of trade goods (construction materials, food, etc.) by ships throughout the Bronze Age (Welter-Schultes, 2001).

The following questions remain to be answered:

- (i) Which is the real homeland of *Papillifera papillaris* - France or Italy?
- (ii) What would be a likely starting date for the dispersal of this species out of its homeland – 3000 or 500 BC?
- (iii) If this species was introduced to İstanbul by the Romans, why has it not been recorded from any locality in Greece and Bulgaria?
- (iv) Is it still living in Anatolia apart from İstanbul?
- (v) Have there been any other wide leaps in dispersal, such as that which led to its establishment in southeast England (Ridout Sharpe, 2005)?
- (vi) Could it originally have been a local species living on the west coast of Anatolia and could it have been transported from there to Italy from İstanbul, İzmir, Bursa or Antalya during the Bronze Age?
- (vii) If so, why did it subsequently disappear from most of these locations - or is it still present and just waiting for a malacologist to discover it?

This morphologically amazing and distributionally mysterious species continues to attract the attention of archaeomalacologists, and in my opinion it deserves a more detailed distributional study and phylogeographical analysis in order to get closer to answering these questions.

References

- Bank, R.A. and Menkhorst, H.P.M.G., 1994.** Katalog der rezenten Clausiliidae (exkl. Gattung *Albinaria*) der Türkei (Gastropoda, Pulmonata). *Deinsea*, 1: 85-122.
- Fechter, R. and Falkner, G., 1990.** Weichtiere Europäische Meeres und Binnenmollusken. *Steinbachs naturführer* 10: 112-280. München.
- Gümü, B.A., 2004.** *Taxonomic studies on the Clausiliidae (Gastropoda: Pulmonata) species distributed in Western Anatolia*. PhD thesis. Süleyman Demirel University, Isparta, Turkey. 170 pp.
- Gümü, B.A., 2005.** The land snails (Gastropoda: Pulmonata: Stylommatophora: Clausiliidae) of the ancient cities in the Marmara, the Ege (Aegean) and the Akdeniz (Mediterranean) regions of Turkey, *Archaeo+Malacology Group Newsletter*, No. 7: 1-4.
- Örstan, A., 2006.** The clausiliid snail *Papillifera papillaris* in Istanbul, Turkey. *Archaeo+Malacology Group Newsletter*, No. 9: 6-7.
- Ridout Sharpe, J., 2005.** *Papillifera papillaris* (Gastropoda: Clausiliidae): a new record for Britain. *Archaeo+Malacology Group Newsletter*, No. 7: 6-7.
- Schütt, H., 2005.** *Turkish land snails 1758-2005*. 4th, revised and enlarged edition. Solingen, Verlag Natur & Wissenschaft. 559 pp.
- Štamol, V. and Poje, M., 1998.** The fossil and recent malacofauna of the island of Susak (Croatia) (Gastropoda: Prosobranchia, Basommatophora, Stylommatophora). *Malakologische Abhandlungen, Staatliches Museum für Tierkunde Dresden*, Band 19, Nr. 11: 103-117.
- Welter-Schultes, F.W., 2001.** Land snails from an ancient shipwreck: the need to detect wreck-independent finds in excavation analysis. *Journal of Archaeological Science*, 28: 19-27.
-

Aliens: what can they teach us?

***Eobania vermiculata* has reached the UK!** This well-known Mediterranean land snail has been described alive and well in southeast London. David Notton of London's Natural History Museum spotted a sub-adult specimen on a wall behind the ticket office of Lewisham railway station in May 2006 (Notton, 2006). No other individuals were found, but one hermaphrodite snail could be sufficient to start a colony if global warming persists. Like its relative *Cornu aspersum*, *Eobania vermiculata* has been transported far and wide throughout the Mediterranean area and way beyond through the agency of man. The Lewisham snail may have been introduced in someone's holiday luggage; introductions elsewhere have been attributed to imported food goods and other commodities.

The British molluscan fauna has seen several additions in recent years, including *Papillifera papillorum* (Ridout Sharpe, 2005) and another Mediterranean species, *Hygromia cinctella*, which is currently undergoing a massive expansion in distribution after spending the first 50 years or so of its existence in this country confined to a small area in south Devon. The reason for this rapid expansion (it has now reached the north of England) may be linked with climate change and further warming may see the establishment of more alien invasive species. For example, several species of tropical freshwater snails are currently being imported into the UK among aquatic plants intended for the aquarium trade: a sample of plants recently purchased over the internet and originating in Singapore contained specimens of *Indoplanorbis exustus*, which is an important intermediate host of the parasite that causes schistosomiasis in cattle.

The introduction of alien species is not a new phenomenon. Many now familiar species on the British list were introduced during the Roman period and later, including *Cornu aspersum* (probably in the 1st century AD), *Monacha cantiana* (in the late Roman period), and so on (see Kerney, 1999). The presence of non-native species in archaeological shell assemblages can indicate the spread of agriculture, population movements, ancient trade routes and the importation of specific goods and materials. Introduced pest species and disease vectors may have a profound economic impact. Alien species may demonstrate climate change in the past, and they may provide dating evidence of the *terminus post quem* variety. They deserve closer study. (JRS)

References

- Kerney, M., 1999. *Atlas of the land and freshwater molluscs of Britain and Ireland*. Colchester, Harley Books.
- Notton, D., 2006. *Eobania vermiculata* in the UK. *Mollusc World*, No. 11: 6.
- Ridout Sharpe, J., 2005. *Papillifera papillaris* (Gastropoda: Clausiliidae): a new record for Britain. *Archaeo+Malacology Group Newsletter*, No. 7: 6-7.

Archaeomalacology in the Eastern Mediterranean

With many thanks to Henk Mienis and David Reese for providing copies of these publications.

Cohen-Seffer, R., Almogi-Labin, A., Greenbaum, N., Sivan, D., Rosenfeld, A., Mienis, H.K. and Inbar, M., 2006. The episode of the coastal wetlands in Israel based on the Carmel coast research. *Israel Geological society Abstracts*, 19-21.02.2006: 22.

ABSTRACT: Two different wetland conditions prevailed in the Carmel coastal plain during the Holocene: the fresh to brackish western coastal marsh, which originated and terminated shortly after the beginning of the Holocene (9540-9130 cal. BP to 9010-8640 cal. BP), and the

freshwater marsh in the east, which originated in 7680-7510 cal. BP and persisted until it was artificially drained in the first half of the 20th century AD. The faunal assemblage in the western marsh is relatively impoverished and is characterised by species that tolerate higher salinities; the dominant molluscs include *Abra nitida*, *Bittium latreillei*, *Cerastoderma glaucum*, *Hydrobia ventrosa* [= *Ventrosia ventrosa*], *Melanopsis lampra*, *Mytilus galloprovincialis* and *Rissoa variabilis*, all typical of brackish and marine environments. The dominant molluscs in the eastern freshwater wetlands are *Gyraulus ehrenbergi*, *Heleobia phaeniciaca*, *Melanopsis buccinoidea*, *M. lampra*, *Oxyloma elegans*, *Radix natalensis* and *Theodoxus karasuna*.

Mienis, H.K., 2006. Chapter 17: Shells. Chapter 20: Shells from Area A. In: Geva, H. (ed.), *Jewish Quarter excavations in the Old City of Jerusalem conducted by Nahman Avigad, 1969-1982. Volume III: Area E and other studies. Final report. Jerusalem, Israel Exploration Society, Institute of Archaeology, Hebrew University of Jerusalem. pp. 316-319, 408-410.*

ABSTRACT: These chapters describe the molluscan material recovered from Areas E and A, respectively, of the Jewish Quarter of the Old City of Jerusalem. The shells were collected by sight; sieving and flotation were not carried out. The material from Area E is dated the 1st century BC and consists of only nine shells or shell fragments: *Lambis truncata sebae* (a body whorl fragment with the sculpture removed, possibly an unfinished shell disc); *Monetaria annulus* (a complete cowry); *Pinctada margaritifera* (an umbonal fragment of mother-of-pearl with geometric engravings); *Spondylus smytheae* (a complete upper valve); *Pycnodonta* sp. (a lower valve of this fossil oyster); *Chambardia rubens arcuata* (three unmodified fragments); *Acanthocardia tuberculata* (one complete valve). These shells indicate contact with the Eastern Mediterranean (63 km), the Gulf of Aqaba (242 km) and the River Nile (380 km). The shells from Area A date from the 1st century BC to the 4th century AD. Eighty-seven shells were recovered, of which 82 were valves of *Donax trunculus* imported from the Mediterranean, probably for food. The remainder were single unmodified shells or fragments of *Hexaplex trunculus*, *Glycymeris insubrica* (both Mediterranean), *Lambis truncata sebae* (Red Sea), *Chambardia rubens arcuata* (Nile) and *Helix texta texta* (Mount Hermon). Apart from the land snail, which may represent food, these shells are thought to have been raw material for the manufacture of shell ornaments.

Mienis, H.K., Ben-David Zaslou, R. and Bar-Yosef Mayer, D.E., 2006. *Glycymeris* in the Levant Sea. 1. Finds of recent *Glycymeris insubrica* in the south east corner of the Mediterranean Sea. *Triton*, No. 13: 5-9.

ABSTRACT: *Glycymeris insubrica* (syn. *Glycymeris violacescens*) is extremely frequent in archaeological marine shell assemblages in Israel and empty valves of this species still form a major component of beach shells. Recent radiocarbon dating of shells has yielded dates ranging between 5950 and 450 cal. BP and has raised the question whether this species is still living along the coast of Israel. A survey of museum specimens indicated that 75 of 199 (37.7%) were of recent origin, based on the criteria that either the animal was preserved in ethanol, the shells were articulated or traces of the ligament remained. The collection data showed that these shells had been taken from water ranging from 8 to 201 m in depth, and from both muddy and sandy substrates. Fully grown specimens formed a minority. The collection dates ranged between 1934 and 1989, since when no further living specimens have been recorded. This may relate to the cessation of scientific dredging operations along the Israeli coast, but if *G. insubrica* still survives the local population is considered to be very small. Further studies will investigate why this species has become rare in the Levant Sea.

Reese, D.S., 2006. The exploitation of aquatic resources at Bakla Tepe, Liman Tepe and Panaztepe. In: Avunç, B. (ed.), *Studies in honor of Hayat Erkanal: cultural reflections*. Istanbul, Homer Kitabevi. pp. 626-630.

ABSTRACT: This paper presents a catalogue of the marine invertebrates (almost entirely molluscs), freshwater molluscs and fish bones recovered from three archaeological sites in the Izmir area of Turkey. Bakla Tepe is situated on a rocky hill 33 km from the sea; the site is mainly Late Chalcolithic and Early Bronze Age I, with a Late Bronze Age III chamber tomb. 398 individuals (=MNI) of marine molluscs, two crab claws and 555 freshwater molluscs are recorded. Liman Tepe is an Early to Middle Bronze Age coastal site and yielded 789 marine molluscs, six other marine invertebrates and two freshwater shells. Panaztepe is largely Middle and Late Bronze Age in date and was formerly a major harbour although it now lies 7 km from the sea; 10,545 marine molluscs and 25 freshwater molluscs were recovered from this site. *Cerastoderma glaucum* was predominant and formed 85.8% of the marine assemblage at Bakla Tepe, 53.3% at Liman Tepe and 98.5% (10,387 individuals) at Panaztepe. Overall, 18 species of marine bivalves, 19 species of marine gastropods, one species of cephalopod (*Sepia officinalis*), one genus of freshwater bivalves (*Unio*) and two genera of freshwater gastropods (*Theodoxus* and *Melanopsis*) were identified. The marine shells appear to have been utilised as both food and ornaments: a number were holed for suspension, including a very small proportion of the *Cerastoderma* shells, and several *Pinna nobilis* had been worked to form pendants. Liman Tepe had a greater range of species than the other two sites.

Reese, D.S. and Webb, J.M., 2006. Marine invertebrates, fresh-water invertebrates and fossil shells. In: Frankel, D. and Webb, J.M. (eds), *Marki Alonia: an Early and Middle Bronze Age settlement in Cyprus. Excavations 1995-2000*. Sävedalen, Paul Aströms Förlag. (SIMA CXXIII: 2.) pp. 257-261, tables, figs, refs.

ABSTRACT: Seventy-four marine invertebrates were recovered during excavations at Marki, of which 45 (60.8%) were dentalia (*Dentalium dentalis* [=*Antalis dentalis*] and *D. rubescens* [=*Fustiaria rubescens*]). The remainder consisted of one to four individuals of *Charonia sequenzae* [=*Charonia variegata*], vermetids, *Murex trunculus* [=*Hexaplex trunculus*], *Patella caerulea*, *Pinna nobilis*, *Erosaria spurca*, *Glycymeris glycymeris*, *Conus mediterraneus*, *Callista chione*, *Cerastoderma glaucum*, *Cerithium vulgatum* and *Phalium undulata* [=*Phalium granulatum*]. There was also one unidentified gastropod, one crab (*Eriphia verrucosa*) claw and two spurred annular pendants made from *Spondylus gaederopus*. Freshwater invertebrates included two *Melanopsis praemorsa* and 14 crabs (*Potamon* sp.). This site was unusual in its large and varied fossil molluscan assemblage: the 89 fossils were identified as *Ostrea lamellosa* (32), *Arca adonis* (19), *Turritella* sp. (16), *Fusus* sp. (7), *Dentalium dentalis* [=*Antalis dentalis*] (5), *Glycymeris pilosa* (2), *Isocardia* sp. (1), *Cardium* sp. (1), *Pecten/Chlamys* sp. (2) and four unidentified specimens. It is assumed that the marine shells were brought to the site for ornamental purposes, even if they do not exhibit natural or man-made perforations; there is no evidence to suggest that molluscs were consumed at this site, which lies some 30 km inland. Both recent and fossil dentalia are interpreted as necklace components, and the absence of posterior fragments suggests that the former were fashioned as beads prior to reaching the site. The presence of fossils is considered to be an accidental by-product of the use of fossil-bearing calcarenite (Pliocene Nicosia/Athalassa Formation) for construction purposes.

Vanhaeren, M., d'Errico, F., Stringer, C., James, S.L., Todd, J.A. and Mienis, H.K., 2006. Middle Paleolithic shell beads in Israel and Algeria. *Science*, 312: 1785-1788.

ABSTRACT: Perforated marine gastropod shells found at the Mount Carmel, Israel, site of Es-Skhul and the North African site of Oued Djebbana indicate the early use of beads by modern

humans in these regions. The remoteness of these sites from the seashore and a comparison of the shells with natural shell assemblages indicated deliberate selection and transport by humans for symbolic use. Elemental and chemical analyses of sediment matrix adhered to one *Nassarius gibbosulus* from Skhul indicated that the shell bead comes from a layer containing 10 anatomically modern human fossils dating to 100,000 to 135,000 years ago, about 25,000 years earlier than previous evidence for personal decoration by modern humans in South Africa. The assemblage from Skhul was excavated in 1931-32 and had been deposited at the Natural History Museum, London. It consists of two perforated *N. gibbosulus*, a valve of *Acanthocardia deshayesii*, a fragment of *Laevicardium crassum*, a cypræid fragment and an unidentified fragment; the *Pecten jacobaeus* described in the original site report is missing. The *N. gibbosulus* from Skhul and the Djebbana specimen all show a single perforation located in the centre of the dorsum; this feature is observed in only 3.5% of modern thanatocoenoses.

Shell necklaces: how were they made?

Paulette Pauc has been experimenting with the perforation and threading of beach shells in an attempt to reproduce prehistoric shell necklaces.

Pauc, P. and Pauc, A., 2006. Enfilage des coquilles de *Columbella rustica* et de *Trivia europeae*. [Threading shells of *Columbella rustica* and *Trivia europeae*.] *euroREA*, 3/2006: 25-30.

ABSTRACT: Apparent necklaces composed of perforated *Columbella rustica* shells, on their own or in combination with worn shells of *Glycymeris* sp., have been found in Early Bronze Age funerary contexts in the Canton of Valais in Switzerland. Attempts were made to reproduce the perforations, using shells collected from a beach at Cap d'Agde in Hérault (Languedoc-Roussillon), France. The first experiment concerned the perforation of a well-preserved shell opposite the aperture: the shell was abraded with a piece of sandstone until a small hole appeared, which was then enlarged with a flint point. Double perforations were achieved using broken and beachworn shells and shells that had been damaged by marine organisms. Double perforations offer two possibilities for threading: either the thread enters through the shell aperture, exits by one hole, re-enters through the second and passes out through the aperture; or the thread enters through one hole and exits by the adjacent one. It was necessary to use a tool, such as a wooden point, to thread a string through the holes. Axial threading was facilitated by the removal of the columella. This research suggests that damage to shell ornaments is not necessarily a by-product of archaeological preservation, but the result of the deliberate selection of worn and damaged shells in the first place.

Shells of the small cowry *Trivia europeae* (syn. *Trivia monacha*) were mainly used during the Palaeolithic and also at the end of the Neolithic period. Archaeological specimens often carry a double perforation on the dorsum, usually one at each end of the long axis but sometimes side by side on the short axis. Attempts to recreate these holes on beach specimens using pressure from a flint point were unsuccessful. As with *Columbella rustica*, the holes first required abrasion and then enlargement of the perforation with a flint point. This process damaged the columella and the thread then moved freely between the two holes. Experiments showed that perforation by percussion was not possible using these small shells, and the appearance of such holes in archaeological specimens may be the result of erosion and wear. Once again, damaged shells appear to have been selected to facilitate threading.

Funerary ornaments in the Proto- and Prehistoric periods

A round table entitled ‘Corps parés de la Préhistoire et de la Protohistoire’ was convened in Carcassonne (Aude, France) from 29 September to 1 October 2006, to discuss the jewellery and other forms of bodily decoration recovered during the excavation of burials dating from the Palaeolithic to the Iron Age.

Several papers concerned shell jewellery: in northern Italy (R. Micheli), in Switzerland (M. Borrello), in France (S. Bonnardin, P. Pauc, A. Polloni), in Germany (M. Heümüller), in Europe (Y. Taborin), in eastern Europe (L. Iakovleva, F. Djindjian), in Europe and Africa (M. Vanhaeren), and in Egypt (N. Baduel).

Sea Changes: Environmental Archaeology in the Marine Zone, from Coast to Continental Shelf

This was the title of a one-day meeting organised by the Association for Environmental Archaeology (AEA) and held at the University of Portsmouth, UK, on 26 September 2006. The presentations and posters covered topics ranging from changing coastal environments, the archaeology of sea fishing, the study of shipwrecks (including the Tudor warship, the ‘Mary Rose’) and archaeological prospecting in the marine environment.

The abstracts for this meeting have been posted on the AEA website and may be found on <http://www.envarch.net/latest/pastevents06.html>. They include:

Beyond means to meaning: using distributions of shell shapes to reconstruct past collecting strategies

Greg Campbell

It has been regular practice in archaeology to interpret shell assemblages by comparing the average size of a given shell species between contexts, with smaller average sizes taken as indicating greater human exploitation. However, this is simplistic, since the average size of a given intertidal or shallow sub-tidal species of shellfish naturally varies considerably across any given shore at any one time. This distribution of shell size, shape and density for a given species varies systematically across a shore, according to a predictable pattern. Ancient shellfish collecting strategies can be reconstructed by comparing distributions in size, shape and age of archaeological shells to this systematic pattern. Interpretations for three species (the limpets, the sea urchins and the cockles) from a multi-period French Atlantic coastal site are presented as examples.
