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Frog in the Pond: Gökçeada (Imbros), an Aegean Stepping-stone in the Chalcolithic use of *Spondylus* Shell

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The use of marine shells in the manufacture of bracelets and beads is a well-attested phenomenon of the Neolithic and Chalcolithic periods of Western Anatolia, the Aegean, and the Balkans. The site of Gökçeada-Uğurlu, located on an island in the Aegean between mainland Europe and Anatolia, shows evidence for the manufacture and use of bracelets and beads from Spondylus and Glycymeris shell. This use of personal ornamentation ties the site into one of the widest material culture production and trade networks of the prehistoric period. This article explores the possible role of, and influences on, an island site within the wider context of long-distance exchange. The life history of shell products is investigated, showing that a bracelet may have gone through processes of transformation in order to remain in use. The article also questions whether there was a relationship between the use of marine shell and white marble from which similar products were manufactured in contemporary contexts. In its conclusions the article addresses the value of materials and of the personal ornaments they were used to make.

Keywords: *Spondylus*, *Glycymeris*, personal ornamentation, Chalcolithic, bracelets, beads, long-distance exchange

Shells of the marine bivalves *Spondylus* and *Glycymeris* were widely used during the Neolithic and Chalcolithic of the Aegean, Balkan, and western Anatolian regions. The size of the shells makes them suitable for bracelet production as well as use for various forms of beads. There is increasing evidence that there was also a concurrent industry in the production of similar items, both bracelets and beads, from white marble across much of the same area. The site of Uğurlu on Gökçeada, an island in the Aegean Sea close to the Turkish coast (Fig. 1), excavated under the direction of B. Erdoğu, has yielded a large number of artefacts manufactured from both *Spondylus* and *Glycymeris*. The location of the island as a stepping-stone within a cultural crossroads raises questions about what role it might have played in the manufacture, distribution, and use of shell products. The apparent production of the items of personal ornamentation at the site also raises questions about its social and cultural affiliations and interactions with other, distant, areas in what may have been complex trade and exchange relationships.

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GÖKÇEADA-UĞURLU, A NEOLITHIC & CHALCOLITHIC ISLAND SETTLEMENT

The island of Gökçeada is located in the Aegean Sea, close to the mouth of the Sea of Marmara and the division between the land-masses of Europe and Asia (Fig. 1). The island location is of importance in terms of understanding how islands and their surrounding seas related to the mainland areas (for discussion see Broodbank 2013, 152–6, 188, 212–18) and also how processes of change progressed from one land-mass to another via island routes (Erdoğu 2013, 1). This has been of particular importance in this region where the processes of Neolithisation have been much debated (Erdoğu 2013; Gerritsen *et al.* 2013). The material culture of island sites such as Uğurlu has much to offer our understanding of interactions and the way in which islands participated in and facilitated networks, an area of increasing debate within artefact studies (Knappett 2013).

The site of Uğurlu has been excavated by a team from the University of Thrace under the direction of B. Erdoğu since 2009 (Erdoğu 2011a; 2011b; 2012), revealing both Neolithic and Chalcolithic levels. The site is located to the western part of the island and consists of a mound of about 250 × 200 m located close to a spring and stream (Erdoğu 2013, 2). Excavation has exposed deposits between 3 m and 4 m in depth comprising five cultural phases, the two earliest of which (IV and V) date to the Neolithic *c.* 6500–5600 cal BC. Phase III is transitional Neolithic/Chalcolithic and Phase II is securely Chalcolithic (Erdoğu 2013, 3). The habitation of the Chalcolithic levels, the primary concern in this article, consists of rectilinear dry stone architecture, including considerable numbers of *in situ* artefacts, such as bone tools, stone weights, grinding stones, and handstones, as well as considerable numbers of *Murex* shells, which give some indication of the range of possible activities (Erdoğu & Yücel 2013, 188).

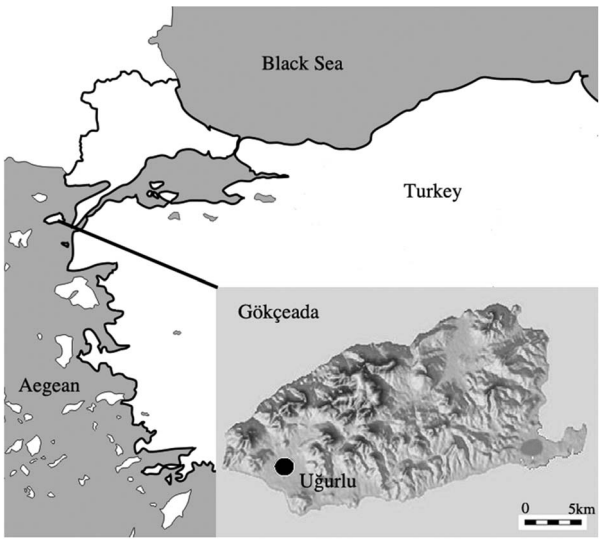

Fig. 1.
Location of Gökçeada-Uğurlu

The settlement of Phase III was divided into two sections, a residential area in the east and a storage area and workshops in the west. A large, multi-roomed structure (Building 3), 10 × 10 m in size, has been excavated in the eastern part of the settlement (Fig. 2). The building was quite sophisticated, being built with dry stone walls and yellow-coloured plaster clay floors. The plan of the building consists of two cell-like rooms (R3 & 4) in the west and a relatively large room (R1) in the east. Another cell-like room (R2) in the east was almost completely destroyed by surface activities. The largest room measures *c.* 4 × 4 m and its corners were paved with stone slabs. A large well-made *Spondylus* bracelet was found in Room 1 with another *Spondylus* bracelet in the debris of Room 2.

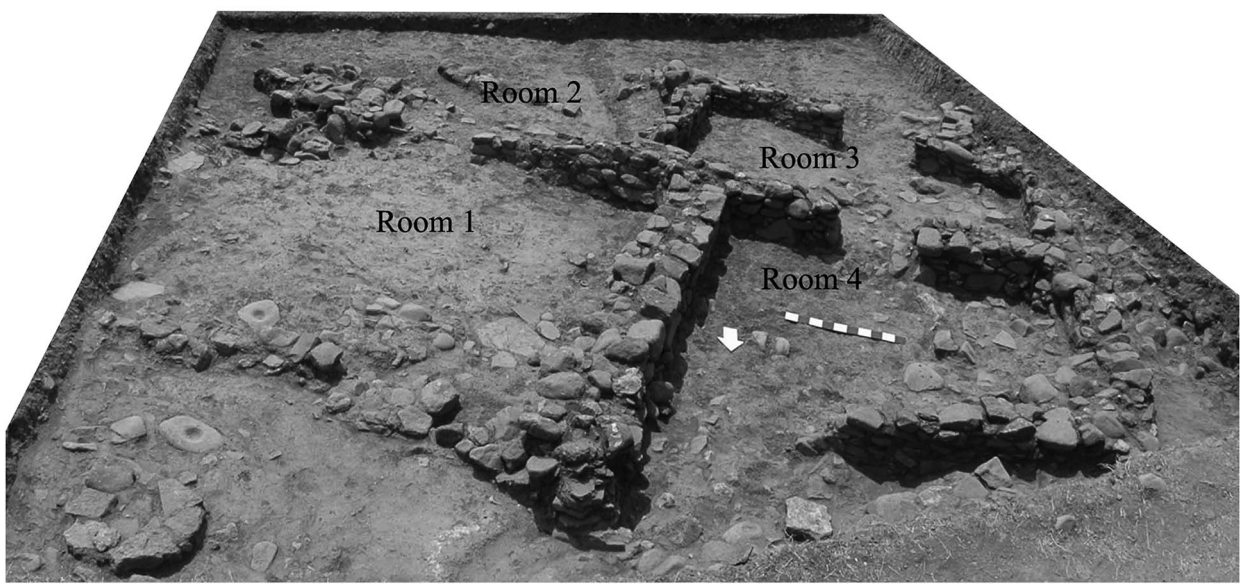

Fig. 2.
Uğurlu Phase III building 3

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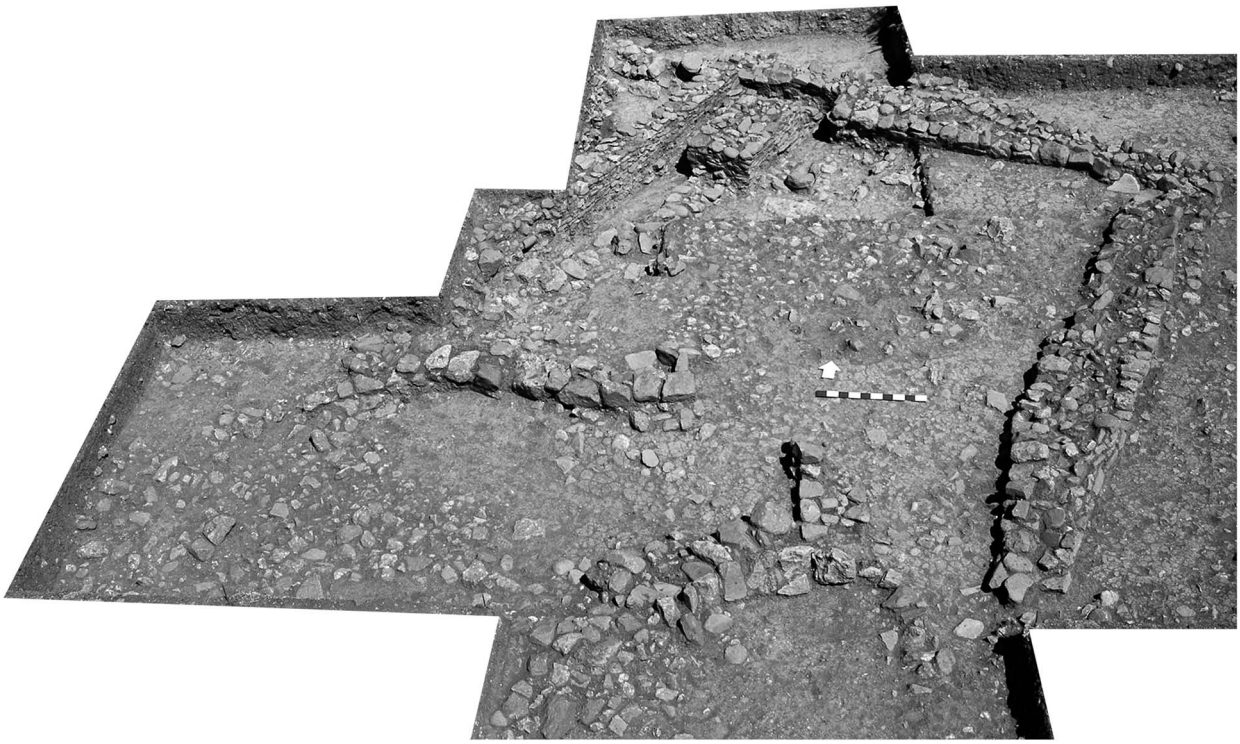

Fig. 3.
Uğurlu Phase II building 1

In the western part of the settlement 12 pits were excavated in an 8 × 5 m trench. The inner walls and the pit bottoms were plastered with yellow-coloured clay, 30–50 mm thick. They were circular in shape with diameters of 1 m and some as deep as 1 m. They were deliberately filled with large stones before abandonment. A large quantity of animal bones and pottery sherds was found inside the pits, as is usual for waste. Five bracelets or rings from *Spondylus gaederopus* and *Glycymeris* and four pendants from *Cerastoderma* were recovered in two pits. The pits were dug through a layer that contained hundreds of *Spondylus gaederopus* pieces and nine bracelets or rings made from these shells, along with a number of bone tools.

The accompanying pottery sherds resemble the Balkan Karanovo III and early Vinča culture ceramics, although not closely enough to identify them as imports; there is no noted connection to mainland Anatolian ceramics. The ceramic style is currently regarded as being local to the island. By Phase II the site shows resemblance to the western Anatolian Chalcolithic Kumtepe Ia-Beşik Sivritepe Culture suggesting that around 5000 cal BC the Anatolian mainland culture had been extended to the island.

Excavations in Phase II have revealed a trapezoidal building (Building 1, Fig. 3) with stone walls measuring *c.* 5 × 5 m. It had suffered from a partial collapse, and an additional wall and a stone buttress were constructed on the northern part of the building to make it useable again. The stone buttress measured 1.50 × 0.87 m and stood to a height of 0.40 m. A post-hole with a large stone with a hole in the middle lay near the stone buttress. The building had a compact earthen floor. The south-western part of the building was designated for storage. Large storage vessels and a total of 130 *Muricidae* shells were found there. Four *Spondylus* bracelets or rings were also found in the building.

Over time the site of Uğurlu shows a range of different influences and material cultural allegiances. A major change took place between Phase IV and Phase III in the pottery assemblage, although continuity in the use of chipped stone indicates that there was stability in some practices. There have been various interpretations of the changing cultural influences within this area; some have claimed that there was an

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Anatolian–Balkan cultural zone that existed from the Neolithic onwards (Özdoğan 1993) while others have suggested slow migrations from Anatolia to the Balkans (Garašanin 1956). Despite major changes on a wider regional scale it seems that the site of Uğurlu largely maintained a material cultural identity of its own. Whatever the case, the use of *Spondylus* seems to have been a consistent feature of a wide geographic area reaching from the Danube, across the Aegean, and into western Anatolia. The use of *Spondylus* shell bracelets and other items of personal ornamentation also seem to have been a constant feature of the material culture of the site of Uğurlu.

TABLE 1: FREQUENCIES OF *SPONDYLUS/GLYCYMERIS* BRACELETS, BEADS & PENDANTS BY PHASE AT GÖKÇEADA-UĞURLU

Period	*Phase*	*Bracelet fragments*	*Beads/ pendants*
Neolithic	IV	5	13
Chalcolithic	II	9	7
	II or III	2	0
	III	16	7
Chalcolithic (probable)		1	0
Surface & unstratified		18	4
Total		51	31

SPONDYLUS & *GLYCYMERIS* SHELLS AS PERSONAL ORNAMENTS

The use of marine shells to produce items of personal ornamentation and their transportation over very long distances has a long history, with examples of inland usage during the Epipalaeolithic and Neolithic in Anatolia (Baysal 2013a) and also across the Levant (Reese 1991; Bar-Yosef 2005). The use of *Spondylus* and *Glycymeris* was widespread during the Neolithic and Chalcolithic of large areas of the Aegean, in the Balkans, and as far as central Europe, with particularly well-known and prolific use in the Carpathian Basin (Bajnóczi *et al.* 2013, 875). The importance of this usage has been acknowledged over the last few decades (Sterud *et al.* 1984). There has been much debate about whether the shells that were used all originated from the Aegean, or whether the Adriatic or Black Seas might have also been involved (eg, Ivanova 2012). However recent analyses have increasingly suggested that the Aegean and Adriatic were the likely sources (Bajnóczi *et al.* 2013, 881). Their long-distance movement and remarkably consistent use at a wide variety of sites indicate the attribution of economic, social, or symbolic value to the shells. The Aegean island site of Uğurlu was ideally placed to exploit the *Spondylus* and *Glycymeris* materials available within close proximity. Evidence of manufacture and use of shell products indicates that the inhabitants were actively procuring and modifying the materials within their own settlement.

The Uğurlu shell assemblage

The assemblage of artefacts made from the large marine shells *Spondylus* and *Glycymeris* recovered from Uğurlu consists of 51 bracelet fragments in varying degrees of preservation (Tables 1 & 2) and 31 beads and bead blanks of various forms (Table 1). There are also hundreds of unworked shells (Fig. 4), which were brought to the site from the sea presumably with the intention of working them into artefacts. A single example of a Chalcolithic figurine head made from *Spondylus* shows that the material was used with a degree of flexibility for different types of artefacts (Erdoğu 2013, 22, fig. 26). The use of *Spondylus* for figurine manufacture, while not as common as ornamentation, is also reported in contemporary cases in Romania (Kogălniceanu 2012a, 87).

The majority of the artefacts from Uğurlu are considered here to date to the Chalcolithic phase of habitation, to layers provisionally dated 5500–5300 BC and 4900–4300 BC. The artefacts dating to the earlier phase were concentrated in one area of the site and were associated with unworked materials; these are considered to be possible evidence of a specialised production area on the island (Erdoğu & Yücel 2013, 190).

Bracelets

The two shell types are easy to distinguish in their raw form, however, when heavily modified by the removal of distinguishing features, they are difficult to differentiate and can be used in the manufacture of broadly similar products. Only four of the 51 bracelet fragments recovered at Uğurlu are of *Glycymeris* (for example Fig. 5.1), the remainder being *Spondylus* (Fig. 5.2–7), a trend that fits the wider pattern of usage across the region.

The Uğurlu bracelets are quite slender in profile (Table 2) indicating that the left valve of the shell was

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TABLE 2: SIZE OF *SPONDYLUS* & *GLYCYMERIS* BRACELET FRAGMENTS FROM GÖKÇEADA-UĞURLU

Phase	*Shell genus*	*Length (mm)*	*Thickness/ diam. (mm)*
Neolithic IV	*Spondylus*	43.9	10.7
Neolithic IV	*Spondylus*	36.7	3.9
Neolithic IV	*Spondylus*	44.6	9.1
Neolithic IV	*Spondylus*	39.5	8.2
Neolithic IV	*Spondylus*	26.6	16.6
Chalcolithic III	*Spondylus*	40.7	6.6
Chalcolithic III	*Spondylus*	43.9	4.7
Chalcolithic III	*Spondylus*	41	5.5
Chalcolithic III	*Spondylus*	50.4	5.1
Chalcolithic III	*Spondylus*	42.9	3.9
Chalcolithic III	*Spondylus*	40.6	4
Chalcolithic III	*Spondylus*	35.4	3.4
Chalcolithic III	*Spondylus*	51	14.2
Chalcolithic III	*Spondylus*	30	4.4
Chalcolithic III	*Spondylus*	35.9	7.7
Chalcolithic III	*Spondylus*	24.6	7
Chalcolithic III	*Spondylus*	40.7	7
Chalcolithic III	*Spondylus*	–	10
Chalcolithic III	*Spondylus*	–	5
Chalcolithic III	*Glycymeris*	45.8	2.9
Chalcolithic III	*Glycymeris*	46	2.7
Chalcolithic II or III	*Spondylus*	35.5	4.3
Chalcolithic II or III	*Spondylus*	53.3	4
Chalcolithic II	*Spondylus*	42.15	3.4
Chalcolithic II	*Spondylus*	53.64	3.4
Chalcolithic II	*Spondylus*	36.85	3.1
Chalcolithic II	*Spondylus*	20	5.7
Chalcolithic II	*Spondylus*	34.6	3.2
Chalcolithic II	*Spondylus*	45.9	8.4
Chalcolithic II	*Spondylus*	49.9	4.6
Chalcolithic II	*Spondylus*	44.2	5.2
Chalcolithic II	*Glycymeris*	30.6	3.5
Chalcolithic (prob.)	*Spondylus*	36.9	7
Unstratified	*Spondylus*	50.2	4.3
Unstratified	*Spondylus*	37.6	3.5
Unstratified	*Spondylus*	27.7	3.9
Unstratified	*Spondylus*	45.8	4.8
Unstratified	*Spondylus*	58.4	6
Unstratified	*Spondylus*	35.2	3.9
Unstratified	*Spondylus*	44	3.3
Unstratified	*Spondylus*	27.2	3.5
Unstratified	*Spondylus*	33.2	6.9
Unstratified	*Spondylus*	69.9	7.5
Unstratified	*Spondylus*	61.2	7.5
Unstratified	*Spondylus*	57.1	4.7
Unstratified	*Spondylus*	33.9	3.2
Unstratified	*Spondylus*	50.7	5.3
Unstratified	*Spondylus*	51.1	4.6
Unstratified	*Spondylus*	39	3.7
Unstratified	*Spondylus*	42.6	8
Unstratified	*Glycymeris*	–	4

preferred in their manufacture. The degree of preservation of the bracelets is variable, however most examples are less than 50% intact (eg, those depicted in Figs 5.3–7). The diameter of the original bracelets would have been relatively small, and often too small for use on an adult wrist, with an average external diameter of 57 mm (this figure is based on artefacts that are complete enough to estimate their diameter). While some of the bracelets would have fitted adult or sub-adult wrists, around half would only have been useable as bracelets by very small children or infants. It has been suggested that smaller annular forms may have been intended for suspension rather than use on a wrist (Gebel & Bienert 1997) or that the *Spondylus* bracelets might have been intended specifically for use by children and, once grown-up, the broken pieces were then adapted into pendants and beads (Ifantidis 2011). This may explain the degree of fragmentation of the artefacts recovered and suggests that some of these artefacts were used by the local community.

Fig. 4.
Unworked *Spondylus* shell

The bracelets were recovered from a variety of contexts. Some were within buildings, probably in contexts related to use rather than manufacture. The most interesting, potentially evidencing manufacturing practices, are those recovered from the pit area (Phase III) in the western part of the settlement. This is a likely candidate for a working area into which pits, of unknown use, were later dug. The large amount of *Spondylus* material, in conjunction with a significant number of bracelets and bone tools that may have been used in bracelet manufacture suggest shell processing activity in this area. Phase II has not yet revealed any evidence of shell processing, but the presence of bracelet fragments within Building 1 is suggestive of on-site bracelet use.

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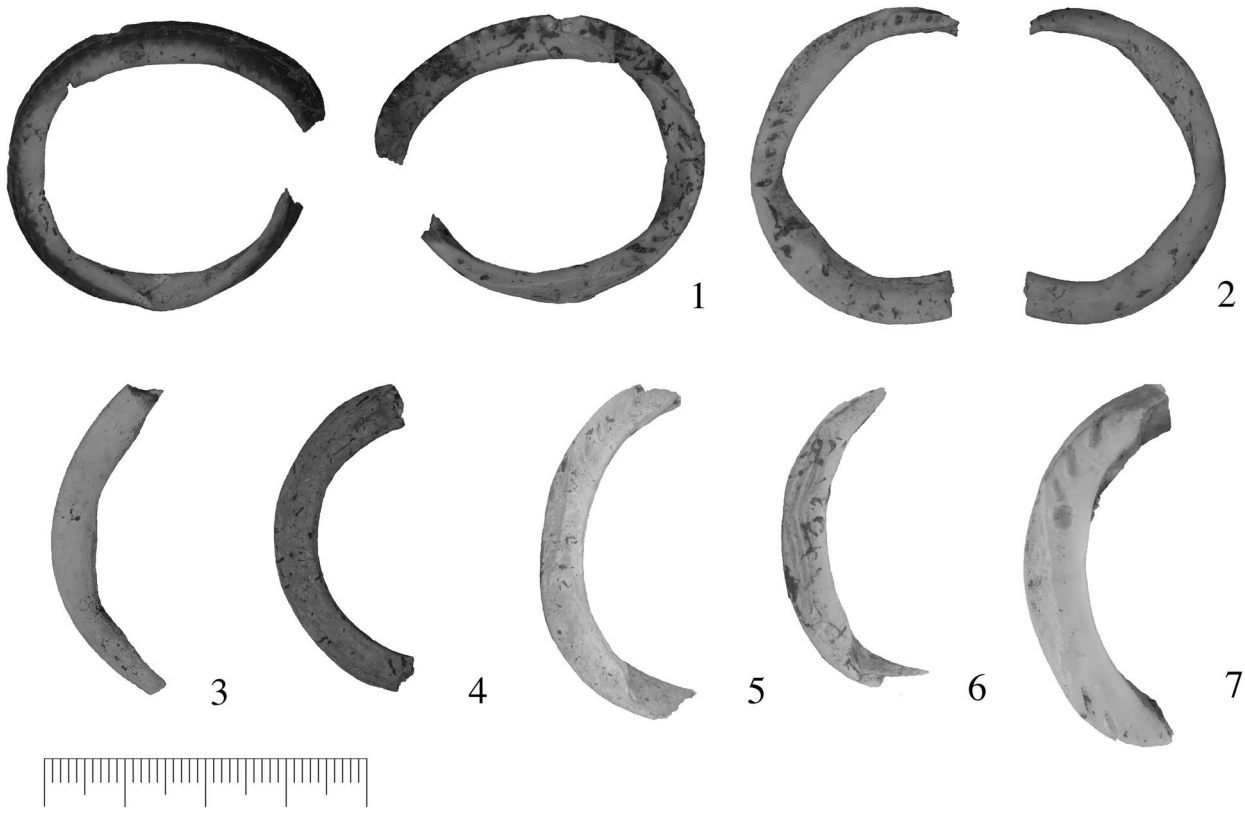

Fig. 5.
Typical examples of the shell bracelets from Gökçeada-Uğurlu; top left: *Glycymeris*; top right & bottom row: *Spondylus*

Beads

Spondylus, rather than *Glycymeris*, is commonly chosen for the manufacture of beads owing to its more massive structure. In the smaller and more heavily modified examples, however, it is not easy to distinguish between *Spondylus* and *Glycymeris* with confidence. The beads and bead blanks found at Uğurlu are mostly disc-shaped (Fig. 6.3); there is no indication of standardisation in diameter or thickness. Diameter ranges from 5 mm to 14 mm. There are examples of long barrel beads of similar diameter to the larger discs and also long biconical beads drilled from both ends. There is a single example of a bead made from *Spondylus* in the form of a red deer canine tooth (Fig. 6.1).

The bead blanks (Fig. 6.4) indicate that there was not a fixed *chaîne opératoire*, some were drilled after being roughly chipped into shape, others were well formed before drilling was started. The longer beads, drilled from both ends, would have required some degree of skill in manufacture. There is no conclusive evidence of secondary use of bracelet fragments in bead production at Uğurlu.

Beads were more frequent in the Neolithic phases of the site (Table 1), perhaps suggesting that, as bracelets became a more important part of manufacturing activity, interest in beads declined. This may also relate to changing influences – marine shell beads are an important part of the material cultural tradition of the Anatolian Neolithic. It is possible that the demand for bracelet production was driven by Aegean and Balkan influence in the following periods.

Evidence of manufacture and use

The presence of large numbers of complete shells alongside the finished products at Uğurlu indicates that the artefacts were not arriving on the island in their finished form. There are no bracelets abandoned during manufacture, but this may be due to the fact that the main part of the working area (suspected to be

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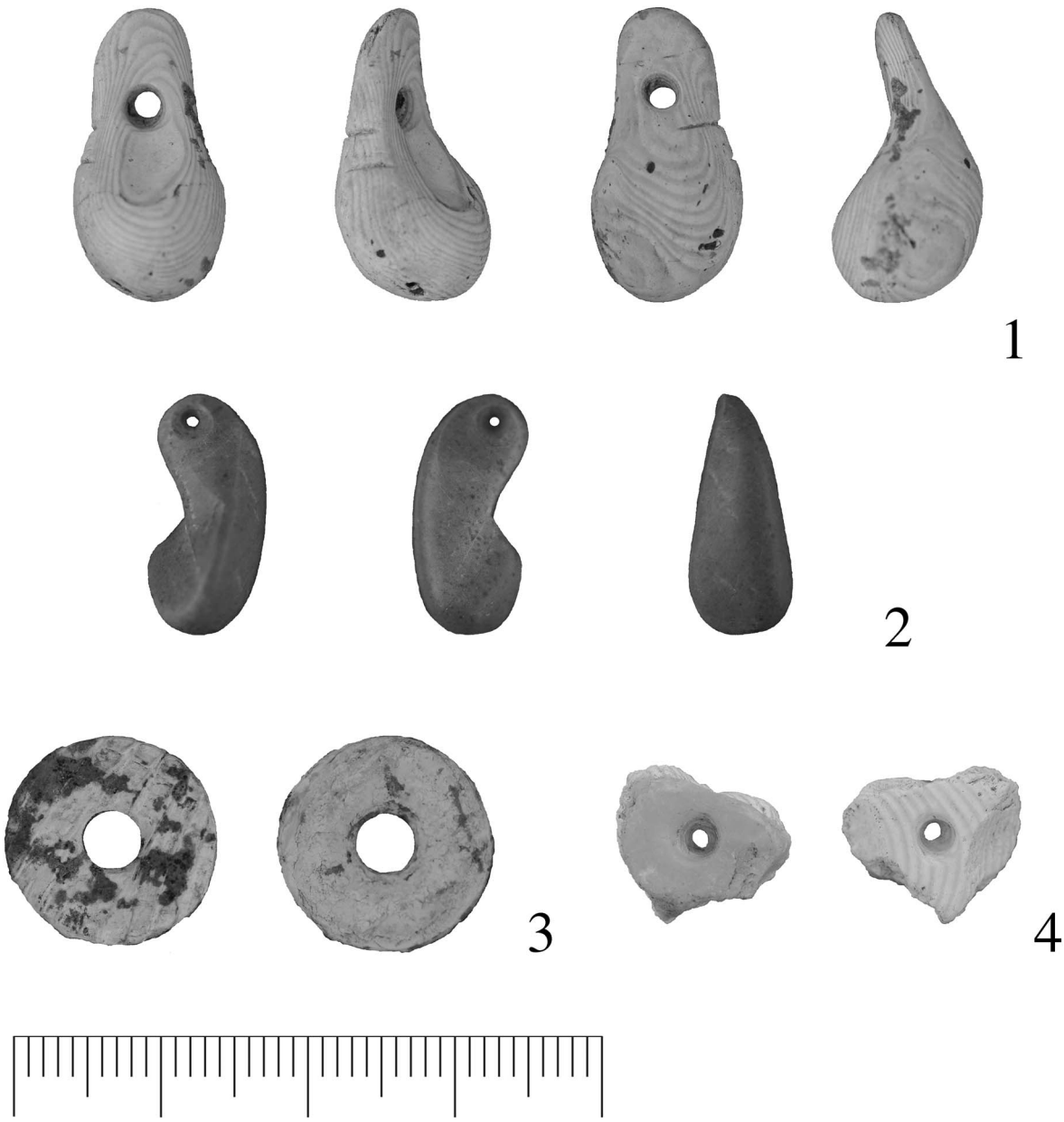

Fig. 6.
Spondylus and related beads from Uğurlu, 1. Deer canine form, *Spondylus*; 2. Deer canine form, blue stone; 3. *Spondylus* disc; 4. *Spondylus* bead pre-form

in the western area during Phase III) has not been revealed yet. There is at least one example of a pierced shell bead blank, probably of *Spondylus* (Fig. 6.3), whether this was a broken fragment of an artefact or was part of production from raw material, this indicates that beads were manufactured at Uğurlu. Whether the products of the site were also exported from the island to mainland locations remains to be seen. The exact level of production, although apparently specialised, cannot yet be estimated. The authors intend to pursue quantitative analyses of raw materials and production waste once suitable data are available.

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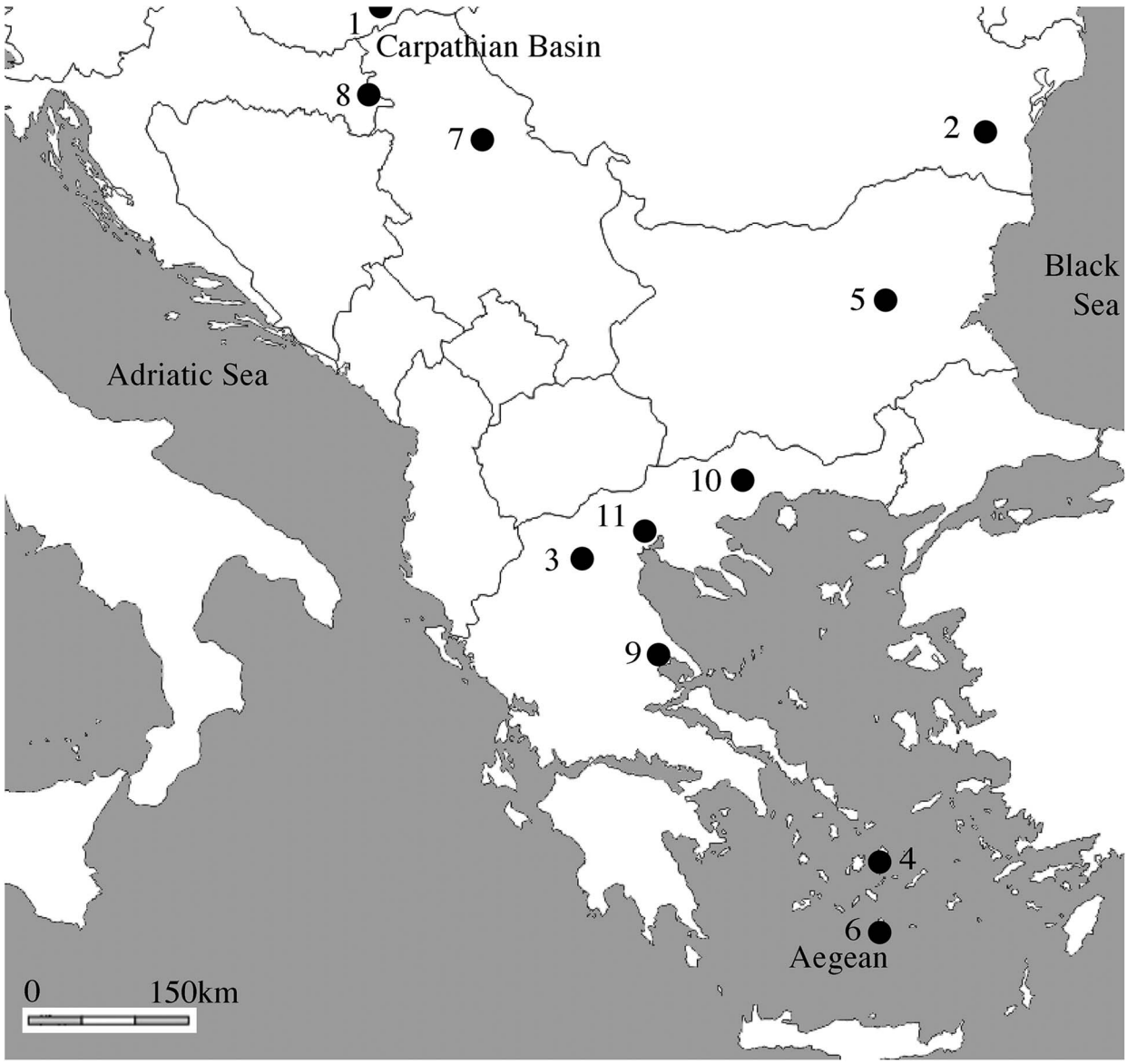

Fig. 7.
Map showing locations of *Spondylus* and *Glycymeris* finds outside Turkey mentioned in the text: 1. Aszód-Papi földek; 2. Cernavodá; 3. Dispilio; 4. Naxos; 5. Omurtag; 6. Thera; 7. Vinča; 8. Vukovar; 9. Dimini; 10. Sitagroi; 11. Stavroupolis

Evidence currently suggests that most initial processing of *Spondylus* shells took place close to the source of the material and that reprocessing and adaptation took place in a greater number of locations (eg, Kogălniceanu 2012a, 86). According to this view, shell working on Gökçeada should predominantly be primary manufacture, probably intended for redistribution. This division between primary and secondary production broadly implies that there was no restriction in the skills needed for shell working but instead that the manufacture and exchange system operated in a certain pattern.

Although there are, as yet, no shell artefacts from burials at Uğurlu, and therefore no evidence of their use, at other sites there are strong indications that the annular items were employed as bracelets or upper

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armlets and that males, females, and children wore them, although as time went on their use might have become increasingly restricted to women and children (Siklósi & Csengeri 2011). There is considerable burial evidence from the Balkans indicating the use of shell bracelets, unbroken, in child and adult graves (Kogălniceanu 2012b). As the broken examples at Uğurlu appear to have been used before breakage they potentially indicate part of a complicated life history that involved secondary usage through reworking, although this hypothesis cannot be confirmed yet.

THE CULTURAL MILIEU OF *SPONDYLUS* USE

The recycling of Spondylus artefacts

The recycling of *Spondylus* bracelets into other items of ornamentation is well-attested at a number of sites. There are two uses to which the broken bracelets seem to have been regularly put: some were pierced to be used as pendants and others were reshaped into disc beads. Recycling of items of personal ornamentation is known from the Early Neolithic onwards in Anatolia (eg, at Boncuklu Höyük; Baysal 2013b), indicating the value that was attributed to some items.

At Vinča-Belo Brdo there is considerable use of pierced bracelet fragments, some with multiple perforations, which are often at or close to the umbo or umbonal cavity. It has been suggested that this practice was carried out to prolong the life of the artefact (Dimitrijević & Tripković 2006, 245). The alteration of artefacts was largely carried out at locations where there was no manufacture (*ibid*., 249), indicating that practices differed according to proximity to source or place of initial modification.

At Dispilio in Greece (Fig. 7) recycling of shell products was common, altering both the form and the use of the artefact (Ifantidis 2011, 131). For example a bracelet could be converted into a series of pendants or beads of a variety of forms. Ifantidis (*ibid*.) has concluded that the fragmentation of bracelets at Dispilio was probably deliberate as the breakage rate is very high. It can be speculated that, at a site so far removed from the sources of raw materials, this recycling practice related to the conservation of valuable, hard to procure, or exotic materials.

Chapman *et al.* (2012, 195) have strongly argued that the movement of *Spondylus* artefacts and their adaptation and remodelling might be related to the value systems of which they were part. They suggest that bracelets might have been used for very extensive periods of time and that they might have been exchanged and accumulated, often as items symbolic of distant places and, perhaps, dangerous seas. They conclude that the assemblages of *Spondylus* items found in burials in Vukovar derived from a broad date range and included collections of beads that had been amassed and added to over time. This hypothesis is supported by the Omurtag hoard (Gaydarska *et al.* 2004) which seems to be a collection of items of various materials, including *Spondylus*, that were particularly prized, probably because of their distant origins, and may even have belonged to a shell-worker. Chapman (2010) has also suggested that the broken fragments of bracelets might signify the person to whom the item belonged and that the objects might, in that sense, be inalienable. As a site with access to raw materials and a local production industry Uğurlu would have been well placed to take advantage of trade and exchange opportunities, which may have resulted from the activities of passing seafarers.

Balkans and Aegean

Although at Uğurlu *Spondylus* and *Glycymeris* were readily available close to the site and, as a result, the material might be assumed to be of relatively low value to the inhabitants of Gökçeada, the transportation of these materials over great distances during the same period was common. There has been much work to understand the overland networks that propelled these materials over such distances and that have indicated to us the importance with which they were attributed.

The closest examples to Uğurlu of the exploitation of these marine shells are from Greece where production centres of *Spondylus* objects have been found, dated to *c.* 5000–4500 cal BC (Chapman *et al.* 2011, 140). There has been debate about the way in which the material was processed and used at Dimini (Fig. 7), where a varied assemblage of bracelets, buttons, and beads was found (Tsuneki 1989; Halstead 1993). Comparable *Spondylus* workshops have also been identified at Sitagroi and Stravroupolis (Miller 2003; Souvatzi 2008), again in locations with similar access to the sea.

The site of Dispilio in west Macedonia, located 120 km from the sea and dated to 5500–3500 BC (Ifantidis 2011, 125) has the largest and most diverse assemblage of ornaments from Neolithic Greece. One of the exotic materials imported to the site was

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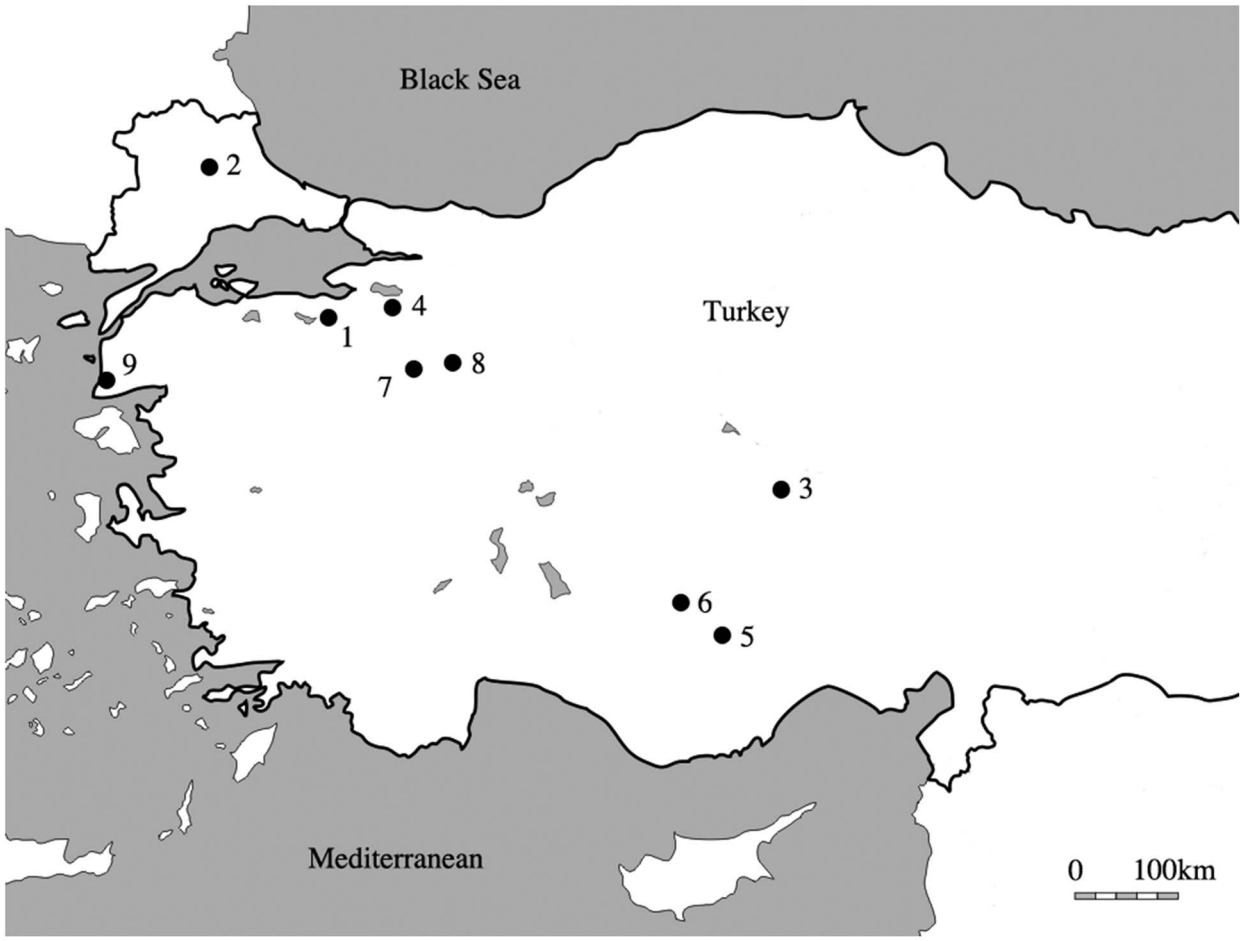

Fig. 8.
Sites in Turkey mentioned in the text: 1. Aktopraklık; 2. Aşağı Pınar; 3. Aşıklı Höyük; 4. Barcın Höyük; 5. Canhasan; 6. Çatalhöyük; 7. Kanlıtaş; 8. Orman Fidanlığı; 9. Smintheion

Spondylus shell with a number of other marine shells also being found in small numbers. The assemblage includes 70, mostly fragmentary, annular artefacts of shell (*ibid*., 127). The size of many of the annulets would have been suitable for an adult female wrist, or those of children and young adults (*ibid*., 128). There is evidence that broken bracelets were recycled into pendants by means of piercing, while there are also other pendant forms. Beads were made exclusively from *Spondylus* and show no standardisation in form, interpreted by Ifantidis (2011, 129) as being a result of the recycling of broken bracelets.

Spondylus and *Glycymeris* were very widely used in Vinča sites in the Carpathian Basin. The Vinča site itself is more than 500 km from the nearest coastline (Dimitrijević & Tripković 2006, 239). Ornament assemblages at Vinča sites are dominated by shell bracelets and there appear to be variations in balance between *Spondylus* and *Glycymeris* through time with an increasing predominance of *Spondylus* (*ibid*., 244). *Spondylus* were generally used to produce the larger bracelets; with an average diameter of 50–60 mm; the *Glycymeris* examples, if used as bracelets, would only have fitted sub-adult wrists. *Spondylus* also seems to have been preferred in the manufacture of beads (*ibid*., 245).

There are strong indications that there were changes in the use of *Spondylus* shells through time and by area. For example, in the western Black Sea region, right-valve bracelets were a signature of the

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late 6th–early 5th millennia BC; these were then superseded by the slimmer, left-valve, bracelets, similar to those of Uğurlu (Chapman *et al.* 2012, 195). Such distinction is not seen across the rest of continental Europe.

Although it is not clear how Gökçeada fitted into the wider usage of *Spondylus*, it seems that the shell products found on mainland Europe were probably, in most cases, manufactured at sites close to the coast and that only processes of recycling were carried out inland. Chapman and Kostov (2010) provide some evidence from the site of Orlovo, located 120 km from the sea, that in some cases manufacturing was carried out inland. The fact that there seems to have been large-scale production at Uğurlu and the location of the site at a physical and social crossroads suggests that the site was part of a trading network that related to inland demands for shell products.

Anatolia

Although there are fewer sites with reported *Spondylus* and *Glycymeris* use in Turkey than in the Aegean and Balkan regions, there is evidence of the use of these materials in personal ornamentation from the Neolithic onwards. Barcın Höyük's (Fig. 8) bead assemblage shows that *Spondylus* was employed during the Early Neolithic of north-west Anatolia (6600–6000 BC; Baysal 2014) without any association with either *Spondylus* bracelet manufacture or white marble bracelet manufacture, but with definite concurrent use of white marble disc beads of similar size and proportion to the shell examples (Baysal 2014). *Spondylus* bracelets including some drilled examples are reported from levels of Aşağı Pınar in Eastern Thrace (Fig. 8) dating between 6200 and 4800 BC (Özdoğan 2013, 260).

There is limited evidence of inland use of *Spondylus* and *Glycymeris* in Anatolia, in contrast to sites in mainland Europe. At Canhasan I two possible examples of *Glycymeris* artefacts are reported from Chalcolithic layers dated to around 6000 cal BC (French 2010, 149), however there are more marine shells of species that have traditionally been associated with central Anatolia and the Near East such as *Dentalium* (Baysal 2009).

The site of Smintheion, located 1 km from the Aegean Sea at the southern end of the Troad, is not far from the island of Gökçeada (Fig. 8). The Chalcolithic habitation of the site dates to 5200–4800 BC (Yavşan 2013, 5). Within a profuse use of marine shells at Smintheion is a small but significant assemblage of items of personal ornamentation. There are 20 examples of necklaces of various shell types including six *Glycymeris glycymeris* shells used in an unaltered form, pierced through the umbo with a round or oval shape (Yavşan 2013, 83). While there are examples of *Spondylus* at the site, there is no evidence of them being worked. It is assumed that they were procured for food (*ibid.*, 63). This indicates that there was a degree of localised differentiation in the exploitation of locally available raw materials.

SKEUOMORPHISM

The use of white marble

The suggestion that there are similarities, both in form and use, between shell and marble bracelets that indicate the imitation of one material with another is reasonable given the increasing amounts of evidence. There are six examples of white marble bracelet fragments from Uğurlu; three of these date to the Chalcolithic Phase III, two to Phase II (5500–4500 cal BC) and one is of unknown date. This indicates that there was a degree of overlap between the use of shell and stone bracelets at the site and also that the colour white was predominant in the bracelet repertoire. The form of the shell and stone items is broadly comparable in that the left valve of the shell was used to make relatively lightweight bracelets, with profiles similar to those of the stone products.

The Cernavodá Hamangia cemetery in Romania (Kogălniceanu 2012a) shows interchangeable use of *Spondylus* and marble and provides concrete evidence that the marble was deliberately employed as an imitation of shell. The cemetery has examples of beads of both materials and of similar forms strung side by side in necklaces such that when worn they would be indistinguishable. The shell examples are thought to have been largely recycled from bracelets and show signs of prolonged usage. The skeuomorphism in bracelets includes an extraordinary example of an imitation thick right-valve *Spondylus* bracelet accurately reproduced in marble (Kogălniceanu 2012a, 83). White limestone is also associated with shell ornamentation at the site of Aszód-Papi földek in Hungary where stone and shell beads were used interchangeably. The stone beads are assumed to be imitations of the shell versions and are visually similar enough not to have been distinguishable when worn (Bajnóczi *et al.* 2013, 881). At Vinča-Belo Brdo white stone was used

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to produce bracelets in imitation of shell, and there is also an example of the copying of a *Glycymeris* bracelet form using bone, which is a more accurate representation than those in stone (Dimitrijević & Tripković 2006, 246). The reproduction items are so convincing that many marble artefacts were initially recorded as shell. It is not, of course, clear whether such a direct equivalency between the different items was perceived at all the locations where they were used side-by-side. The identification by Gimbutas (1976) of imitation left-valve *Spondylus* bracelets made from clay at the site of Anza, Serbia, indicates that direct equivalency may not always have been of prime importance, but perhaps that there were variations in value (Apostolika 2005, 137).

The imitation items also show similarities in their use-lives with those of *Spondylus* artefacts. An example of a fragmented marble bracelet from the site of Dispilio in western Greek Macedonia dating to 5300–5100 BC (Ifantidis & Papageorgiou 2011) shows the potential complexity of the life history of an artefact. The material for the bracelet was obtained from the Cycladic island of Naxos (*ibid*., 37) and thereby formed part of a wider procurement of materials for use in the manufacture of a broad range of products such as figurines. The size of the marble and shell bracelets from Dispilio are similar, measuring on average 70 and 75 mm respectively. They would be wearable on a relatively small adult wrist (*ibid*., 37).

There are sites where white marble bracelet manufacture and use show no association with production of similar items in shell. For example, at Orman Fidanlığı (Ay-Efe 2001) and Kanlıtaş (Baysal *et al*. forthcoming) marble bracelets were manufactured in considerable numbers in apparent specialised workshop areas. There is also a similar white marble bracelet industry at Aktopraklık (Karul & Avcı 2013) (Fig. 8).

In Anatolia it can be suggested preliminarily that the white marble bracelets may, at least in some cases, have been intended to imitate shell. The presence of large-scale manufacture of white marble bracelets at sites that have yielded no equivalent shell items either indicates a lack of correspondence between the materials or that access to shell was restricted. However, the case with beads is much less clear. There is a preference for well-made white marble beads which begins in the Early Neolithic across central and western Anatolia, without association with shell, that continues into the later Neolithic and Chalcolithic (Baysal 2013b; 2014). In north-western Anatolia marble and shell examples are found in contemporaneous contexts, which supports the possibility of equivalency between the two materials.

Red deer canine form

Although the use of *Spondylus* for the production of disc beads is common, and its use for the production of relatively large beads of geometric form is also known (eg, at Barcın Höyük; Baysal 2014), its use as part of one of the most widespread imitation industries of prehistory has not yet been reported. The single example of an imitation deer canine made of *Spondylus* recovered at Uğurlu (Fig. 6.1) is part of a complicated pattern of imitation stretching deep into prehistory. In addition to the *Spondylus* example, a similar form made from blue stone was also found (Fig. 6.2).

Deer canine beads can be found from France (Choyke 2001, 253) to the Levant (Dubin 1987, 31) from the Palaeolithic onwards and seem to have held a universal fascination for reasons that may relate to their scarcity (Choyke 2001, 252) or relationship to hunting activities. The teeth were valued to such an extent that they were frequently copied in bone in what appear to be, in some cases, serious attempts at fakery (*ibid*., 252; Chapman & Kostov 2010, 79). The production of deer canines developed into an industry as evident at Çatalhöyük (Russell 2005, 262) and Asikli Hoyuk (diadem of 52 deer teeth in room KE trench 7 M; Esin 1995, 65).

DISCUSSION

Although there is much evidence for the manufacture and recycling of shell products, little is known about their consumption. It is clear that many of the bracelets, including the majority from Uğurlu, were small in diameter and might have had a limited use with an individual sub-adult owner. The recycling and adaptation of the shells may be part of a pattern that involved rights of passage tied to the different phases of use of the shell products; as suggested by Chapman *et al*. (2011, 154) there may have been a process of individualisation of both people and annulets. There are indications of variations in ring size and deposition pattern by site, with cemetery areas and production sites showing distinct characteristics (Chapman *et al*. 2011, 153).

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The shell artefacts at Uğurlu were produced in large amounts for local consumption and export. On the basis of the items included in the Chalcolithic hoard at Omurtag, it is possible that there may have been a long distance trade network that reached from either Thera or Lesbos, via a number of islands including Gökçeada, to the European mainland (Gaydarska *et al.* 2004, 30). Although this example is dated slightly later than the assemblage from Uğurlu discussed here, it explains one of a number of possible processes of island interaction.

The consideration of shell movements in relation both to the movement of other materials and to interregional material cultural influences and the exchange of ideas is a key issue. It is clear from the changing influences on ceramics at Uğurlu that both contacts and the impact of contacts on material culture probably varied through time, perhaps moving from earlier Balkan affiliations to later ties with Anatolia. The use of white materials for personal ornaments was common to both areas and suggests that there was a widespread preference for this colour, which would explain its continuity of use at the site. This may have been because of the striking appearance of the artefacts (as discussed by Whittaker 2011, 138) or because of the exotic qualities associated with both marine shells and white marble. Gheorghiu (2011, 22) argues convincingly for the communication of social status via the human body using both original and skeuomorphic artefacts.

The consistency in shell-use during the different phases of the habitation at Uğurlu allows us to suggest that the site was consistently engaged in the manufacture of shell products, despite variations in other aspects of material culture through time. This continuity is likely to relate to the site's position as a calling point in seafaring routes, a 'stepping-stone' between the Balkans and Anatolia.

CONCLUSIONS

The shell beads and bracelets of the Chalcolithic settlement at Uğurlu evidence a consistent engagement with *Spondylus* and *Glycymeris* throughout the Chalcolithic occupation period, and particularly during Phase III. The bracelets are mostly highly fragmented, and were small in size, probably suitable for subadults and made from the left valve of the shell. The number of unworked *Spondylus* shells recovered indicates that bracelet manufacture was carried out at the site, probably with a degree of specialisation. Likewise, *Spondylus* was also used in the manufacture of beads at the site, although it is not yet clear whether this was primary manufacture or the recycling of used bracelet pieces. The ease with which material could be procured means that conservation and secondary usage would not have been a necessity. Any processes of recycling would therefore have been for social or cultural reasons. Overall the usage of the shells was relatively conservative in consumption when compared with many of the much heavier and bulkier items of the Middle Neolithic in the Balkans.

The importance of the relationship between large shells, *Spondylus* and *Glycymeris,* and the use of white marble, and other materials, for the manufacture of similar products, and a wider sphere of multi-layered imitations in bracelets and beads is beginning to emerge. The presence of skeuomorphic artefacts in marble and imitation of deer teeth in shell and stone at a site able to source large quantities of shells suggests that the material itself may not have been of prime importance. It may be that appearance, colour, form, or exotic associations might have been key to desirability. It appears that the people of Uğurlu sourced, perhaps manufactured, redistributed, and consumed both *Spondylus* and marble bracelets. Uğurlu appears to have been part of a long-distance exchange network and it was probably not just a connecting point given the presence of both worked and unworked shells. Only future research may reveal how these artefacts were distributed and consumed.

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RÉSUMÉ

Une grenouille dans la mare: Gökçeada (Imbros), une pierre de gué égéenne dans l'utilisation du coquillage Spondylus *au chalcolithique*, de Emma Baysal et Burçin Erdoğu

L'utilisation de coquillages marins dans la fabrication de bracelets et de perles est un phénomène bien attesté des périodes néolithique et chalcolithique de l'Anatolie occidentale, de la mer Egée et des Balkans. Le site de Gökçeada Uğurlu, qui se trouve sur une île de la mer Egée entre le continent européen et l'Anatolie, met en évidence des témoignages de fabrication et d'utilisation de bracelets et de perles en coquillages *Spondylus* et *Glycymeris*. Cet usage de parures personnelles rattache ce site à un des plus vastes réseaux de production et et de commerce de culture matérielle. L'article explore les éventuels rôles et influences que peut exercer un site situé sur une île à l'intérieur du contexte plus étendu d'échanges lointains. On examine la biographie des articles en coquillages, démontrant qu'un bracelet peut avoir subi des procédés de transformation afin de rester en usage. L'article pose aussi la question de savoir s'il y avait un lien entre l'utilisation de coquillages marins et le marbre blanc qui entrait dans la fabrication d'articles similaires dans des contextes contemporains. Dans ses conclusions l'article aborde la question de la valeur des matériaux et des parures qu'ils servaient à fabriquer.

ZUSSAMENFASSUNG

Frosch im Teich: Gökçeada (Imbros), ein ägäisches Sprungbrett für die chalkolithische Nutzung von Spondylus, von Emma Baysal und Burçin Erdoğu

Die Nutzung von Meeresschnecken für die Herstellung von Armreifen und Perlen ist ein gut dokumentiertes Phänomen des Neolithikums und Chalkolithikums in Westanatolien, der Ägäis und auf dem Balkan. Der Fundplatz Gökçeada Uğurlu, der auf einer Insel in der Ägäis zwischen dem europäischen Festland und Anatolien liegt, liefert Hinweise auf die Herstellung und Nutzung von Armreifen und Perlen aus Spondylus- und Glycymeris-Muschelschalen. Die Nutzung solchen persönlichen Schmucks bindet den Fundplatz in eines der größten Netzwerke der Produktion und des Austauschs materieller Kultur prähistorischer Epochen ein. Dieser Beitrag untersucht die mögliche Rolle von und die Einflüsse auf eine Insel innerhalb des weiteren Kontexts des Ferntauschs. Die Lebensgeschichte von Muschelprodukten wird erforscht; dies zeigt, dass ein Armreif Transformationsprozesse durchlaufen haben kann um weiter dem Gebrauch dienen zu können. Der Beitrag stellt auch die Frage, ob es eine Beziehung gab zwischen der Nutzung von Meeresschnecken und weißem Marmor, aus dem vergleichbare Produkte in zeitgleichen Kontexten angefertigt wurden. In seinen

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Schlussfolgerungen befasst sich der Artikel auch mit dem Wert von Materialien und von den persönlichen Schmuckgegenständen, die daraus gemacht wurden.

RESUMEN

Una rana en el estanque: Gökçeada (Imbros), un peldaño en el uso de la concha de Spondylus *en el Calcolítico en el Egeo*, por Emma Baysal y Burçin Erdoğu

El uso de conchas marinas en la elaboración de brazaletes y cuentas es un fenómeno bien documentado durante el Neolítico y el Calcolítico en el oeste de Anatolia, el Egeo y los Balcanes. El yacimiento de Gökçeada Uğurlu, situado en una isla del Egeo entre Europa y Anatolia, presenta evidencias de la manufactura y uso de brazaletes y cuentas realizadas en concha de *Spondylus* y *Glycymeris*. Este uso de la ornamentación personal relaciona al yacimiento con una de las redes de producción e intercambio de cultura material más amplia de época prehistórica. Este artículo explora el posible rol e influencias del yacimiento insular en un contexto amplio de intercambios a larga distancia. Se analiza la "historia" de los productos en concha, mostrando que un brazalete puede haber sufrido numerosos procesos de transformación para mantenerlo en uso. Este artículo también indaga en la posible relación entre el uso de las conchas marinas y el mármol blanco a partir de los cuáles se elaboraron productos similares en contextos contemporáneos. En sus conclusiones, el artículo aborda el valor de los materiales y de los adornos personales en que fueron transformados.

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