

Aldona Kurzawska<sup>1</sup>, Iwona Sobkowiak-Tabaka<sup>2</sup>

## *SPONDYLUS* SHELLS AT PREHISTORIC SITES IN POLAND

### ABSTRACT

Kurzawska A., Sobkowiak-Tabaka I. 2020. *Spondylus* shells at prehistoric sites in Poland. *Sprawozdania Archeologiczne* 72/2, 41-66.

This article presents the results of research concerning shell ornaments discovered in Poland and described in the literature as made of *Spondylus* shells. Our study focuses on the identification and revision of these artefacts in terms of species, ornament types, and locations of discovery. Additionally, we address the issue of the role of *Spondylus* shell ornaments and their meaning to the Neolithic communities inhabiting the area of present-day Poland. Our research involved specialist analyses, which allowed us to identify seven *Spondylus* shell artefacts discovered at five archaeological sites. The strontium isotope analysis <sup>87</sup>Sr / <sup>86</sup>Sr indicated the Quaternary age of the shells, confirming that they were contemporaneous with prehistoric communities and originated from areas located around the Mediterranean Sea. Presenting the results of our study, we would like to join a wider discussion on the importance of *Spondylus* shell ornaments in Central Europe in the Neolithic period.

Keywords: *Spondylus*, shell, Neolithic, ornaments

Received: 20.02.2020; Revised: 11.04.2020; Accepted: 28.06.2020

<sup>1</sup> Institute of Archaeology and Ethnology, Polish Academy of Sciences, Al. Solidarności 105, 00-140 Warszawa, Poland; aldona.kurzawska@wp.pl; <https://orcid.org/0000-0003-0215-046X>

<sup>2</sup> Faculty of Archaeology, Adam Mickiewicz University, Uniwersytetu Poznańskiego st. 7, 61-614 Poznań, Poland; iwosob@amu.edu.pl; <https://orcid.org/0000-0001-5913-1177>

## INTRODUCTION

*I asked why a shell that is, in simple terms, just an oyster would have been traded from the Mediterranean almost to the British Channel, but I was dissatisfied with the answer repeatedly offered, that it was for 'prestige' (Séfèriadès 2010).*

*Spondylus* is undoubtedly the best-known shell recorded among ornaments dating to the Neolithic period. Nearly 140 years have passed since the first mention of artefacts made of this shell species appeared in the European literature (Virchow 1884). During this time, numerous studies have been published presenting the artefacts themselves, their distribution, and interpretations related to their meaning in prehistoric culture (e.g. Willms 1985; Müller 1997; Ifantidis and Nikolaidou 2011; Champan and Gaydarska 2015; Windler 2018).

The appearance and spread of *Spondylus* ornaments in Central Europe through exchange and trade was associated with the introduction of agriculture and the emergence of a new social order (Séfèriadès 2010). Shells of this species were valued by Neolithic communities not only because of their aesthetic qualities, lustre, or white colour but also due to their cultural meaning.

In Poland, ornaments made of mollusc shells are recorded relatively frequently in funeral contexts at archaeological sites associated with the Neolithic and the Early Bronze Age. So far, such shells have been described mainly in terms of ornament types (necklaces, hip belts, bracelets), burial types (male/female), and, finally, as indicators of the high social status of the deceased (e.g. Czerniak and Pyzel 2013). Many of these valuable ornaments were misidentified with regard to the species (e.g. Jazdzewski 1938; Maciejewski *et al.* 1954; Czerniak 1980), which had a direct influence on archaeological interpretation. To this day, such examples of incorrect identification have been repeatedly quoted in Polish and international literature (e.g. Müller 1997; Séfèriadès 2010; Kowalski 2013). Shell artefacts recorded in the area of Poland have not received much attention so far, which stands in contrast to similar studies carried out all over the world (e.g. Vanhaeren *et al.* 2004; Bonnardin 2009; Álvarez-Fernández and Carvajal-Contreras 2010; Bar-Yosef Mayer *et al.* 2010; Stiner *et al.* 2013; Rigaud *et al.* 2015).

In the article, we present the results of research concerning ornaments discovered in Poland and already identified as made of *Spondylus* shells. Showing the results of our study, we would like to join the wider discussion on the importance of these ornaments in Central Europe in the Neolithic period. Our research focuses on identifying which of the ornaments recorded at archaeological sites in Poland and described in the literature are in fact *Spondylus* shells, which types of ornaments they represent, and where they were found. Additionally, we address the issue of the role of the ornaments discussed and their meaning to the Neolithic communities inhabiting the area of present-day Poland.

## MALACOLOGICAL INFORMATION

*Spondylus gaederopus* (Linnaeus, 1758), a thorny oyster, is a sea mollusc species from the Spondylidae family (Fig. 1). It lives in warm seas at a depth of 6-30 m. It leads a sedentary lifestyle, attaching itself with its left valve to hard substrates – rocks and reefs. Currently, it lives mainly in the western part of the Mediterranean, in the Aegean Sea, the Adriatic, and the Pacific Ocean. The size of adult specimens varies from 6 to 12 cm. The valves of this mussel differ considerably. The lower, left valve of the shell is white, usually oval in shape, and thick-walled. The upper, right valve is violet/purple, oval in shape, and thinner; its outer surface is covered with spikes (Poppe and Goto 2000). It is worth mentioning that currently the specimens of *Spondylus gaederopus* reach smaller shell sizes than specimens known from archaeological sites (Siklósi 2013).

## MATERIAL AND METHODS

Our research on *Spondylus* shell ornaments discovered in the area of present-day Poland is based primarily on shell finds published so far. Therefore, the article presents the history of research and discovery of individual artefacts (see Annex). On the basis of the relevant literature, the following archaeological sites have been selected for analysis (Fig. 2): Karsko, Inowrocław-Mątwy, Brześć Kujawski 4, Biskupin 15, Szczotkowice 1, Krusza Zamkowa 3, Gocanowo, Inowrocław (surroundings). In addition, the analysis was performed on two unpublished artefacts from the sites of Racibórz-Studzienna and Werbkowice-Kotorów (displayed in museum exhibitions). In total, the study material came from ten archaeological sites (Table 1). The artefacts were examined using standard methods of archaeomalacological analysis (Claassen 1998). The poor state of preservation of some of the investigated shells made it impossible to identify their exact species and places of origin. In those cases, the strontium isotope analysis  $^{87}\text{Sr} / ^{86}\text{Sr}$  was applied (Table 2). The selected shell samples (ca. 24-40 mg), prepared for the analysis, were examined in the Isotope Laboratory of Adam Mickiewicz University in Poznań.

## RESULTS

The analyses have allowed us to identify seven artefacts made of *Spondylus* shells, discovered at five archaeological sites located in the area of present-day Poland. A detailed description of these shells is presented in the annex to the article. The summary of information about the examined artefacts is included in Table 1. The artifacts identified as ornaments made of *Spondylus* shells were recorded in funerary contexts. They include (Fig. 3):



Fig. 1. *Spondylus gaederopus*, a modern shell from the collection of the National Museum in Belgrade, photo by Biljana Mitrović

- three medallions made of shell valves, discovered at Karsko, Inowrocław-Mątwy, and Brześć Kujawski 4 (Fig. 3: A, B, C);

- three large beads – two irregular/barrel-shaped and one cylindrical, discovered in Szczotkowice (Fig. 4: A);

- a pendant, which was originally a bead of an irregular/barrel shape, discovered at Werbkowice-Kotorów (Fig. 4: B);

All the above-mentioned ornaments bear traces of long use indicated by microwear visible on their surfaces:

- traces of repairs (broken holes in the medallion from Karsko – replaced by new perforations; Fig. 3: A),

- use-wear traces made by a string, visible on the edges of shells in medallions from Brześć Kujawski and Inowrocław-Mątwy (Fig. 3: B),

- a pendant made of a damaged bead – the find from Werbkowice-Kotorów (Fig. 4: B).

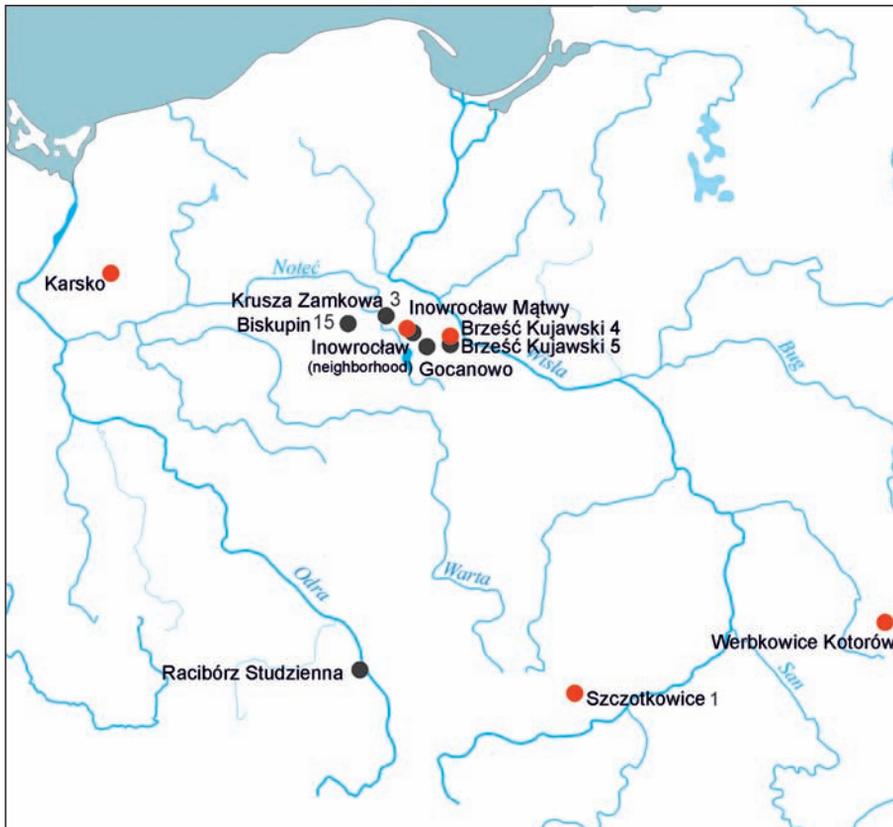


Fig. 2. Map with archaeological sites mentioned in the article (red dots mark the locations where confirmed *Spondylus* artefacts were recorded)

Table 1. Shell artefacts mentioned in the article. LBK – Linear Band Pottery culture; SBK – Stroke Band Pottery culture; BKC – Brześć Kujawski culture

Site	Feature	Artefact	No of artefacts	Species	Chronology/ archeological classification	References	Location of artefacts
Biskupin, site 15	burial II	disc beads	365	<i>Unio</i> spp.	BKC	Smoczyńska, 1952, 3, tab. I, 7; Maciejewski <i>et al.</i> 1954; Czerniak, 1980, 102	Archaeological Museum in Biskupin
Brześć Kujawski, site 4	burial IV	disc beads (necklace)	?	<i>Unio</i> spp.		Jazdźewski, 1938, Tabl. III2	
	burial VII	disc beads	8?	<i>Unio</i> spp.		Jazdźewski, 1938, Tabl. VI 2b, h	
	burial XXXIV	disc beads	?	<i>Unio</i> spp.		Jazdźewski, 1938, Tabl. XIX 8	
	burial XXXIX	medallion (perforated shell valve)		<i>Spondylus gaederopus</i>	BKC	Jazdźewski, 1938, Tabl. XXII 3	Museum of Archaeology and Ethnography in Łódź, no. IN 2617
	XXXIV	disc beads	2	<i>Unio</i> spp.		Jazdźewski, 1938, Tabl. XXV3b	
Brześć Kujawski, site 5	XXXVIII	disc beads	?	<i>Unio</i> spp.		Jazdźewski, 1938, Tabl. XIV3	
	XXXIX	disc bead	1	<i>Unio</i> spp.		Jazdźewski, 1938, Tabl. XXVII 5	
Gocanowo	burial? found in 1883	disc beads (necklace)	c. 100	<i>Unio</i> spp.	BKC	Smoczyńska, 1952, 13, tab. III; Czerniak, 1980, 102	Leon Wyczółkowski District Museum in Bydgoszcz nr 2075

Inowrocław (neighborhood)	skeletal burial	disc beads	7	<i>Urio</i> spp.			Waga 1931, 11, 32, fig. 4; Smoczyńska, 1952, 19, fig. 74	Archaeological Museum in Poznań, no. MAP 1897: 388
Inowrocław-Mątwy	burial remains	medallion (perforated shell valve)	1	<i>Spondylus gaederopus</i>	LBK or BKC		<i>Jahrbuch...</i> 1894; Smoczyńska, 1952, 19; Szałkowska-Łoś, Łoś 2014, 34-35	Leon Wyczółkowski District Museum in Bydgoszcz, no. 1233 / no. A621
Karsko	burial remains	medallion (perforated shell valve)	1	<i>Spondylus gaederopus</i>	SBK		Walter 1898; Kunkel, 1927; Siuchniński 1972; Kulezycka-Leciejewiczowa 1979, 164, fig. 87; Galiński <i>et al.</i> 2012, 94-95	National Museum in Szczecin, no. MNS/A/22065
Krusza Zamkowa, site 3	burial 392	disc beads (bracelet)	89	<i>Urio</i> spp.				Deposit of the Adam Mickiewicz University in Poznań Faculty of Archaeology in
	burial 412	disc beads (hip belt)	2293	<i>Urio</i> spp.	BKC		Bednarzyk <i>et al.</i> 1980, 60-63, fig. 8, 9, 10, 17; Czerniak 1980, 102, 103, fig. 40, 44, 45	Archaeological Museum in Poznań, no. 1296B XXXVIII
		disc beads (hip belt)	1575?	<i>Urio</i> spp.				
Racibórz Studzienna	?	?	1	<i>Ostrea edulis</i>	?			Racibórz Museum
Szczotkowice, site 1	burial	beads (1 cylindrical and 2 irregular)	3	<i>Spondylus gaederopus</i>	LBK		Krauss 1964	Archaeological Museum in Kraków, no. MAK/KA/272
Wetkowice-Kotorów	burial	pendant	1	<i>Spondylus gaederopus</i>	LBK		Liana and Piętka-Dąbrowska 1962	Lublin Museum



Fig. 3. *Spondylus* shell artefacts recorded in Poland: A – Karsko (National Museum in Szczecin, photo by Anna Ryś), B – Inowrocław-Mątwy (Museum in Bydgoszcz, photo by Wojciech Woźniak), C – Brześć-Kujawski (Museum of Archaeology and Ethnography in Łódź, photo by Władysław Podhorecki)

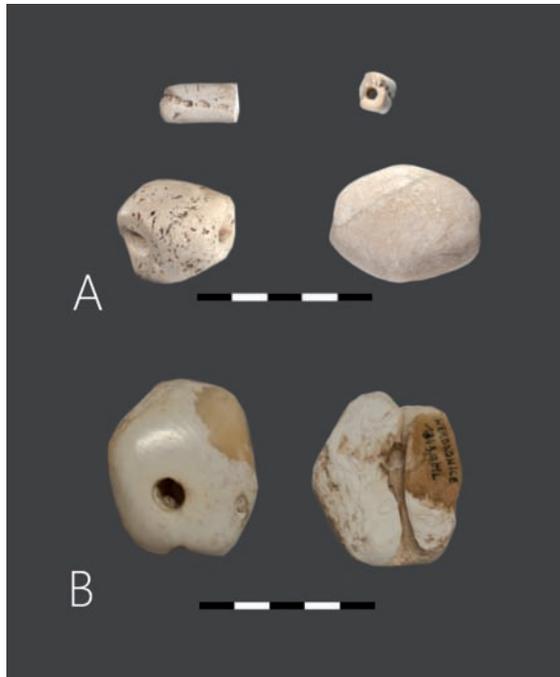
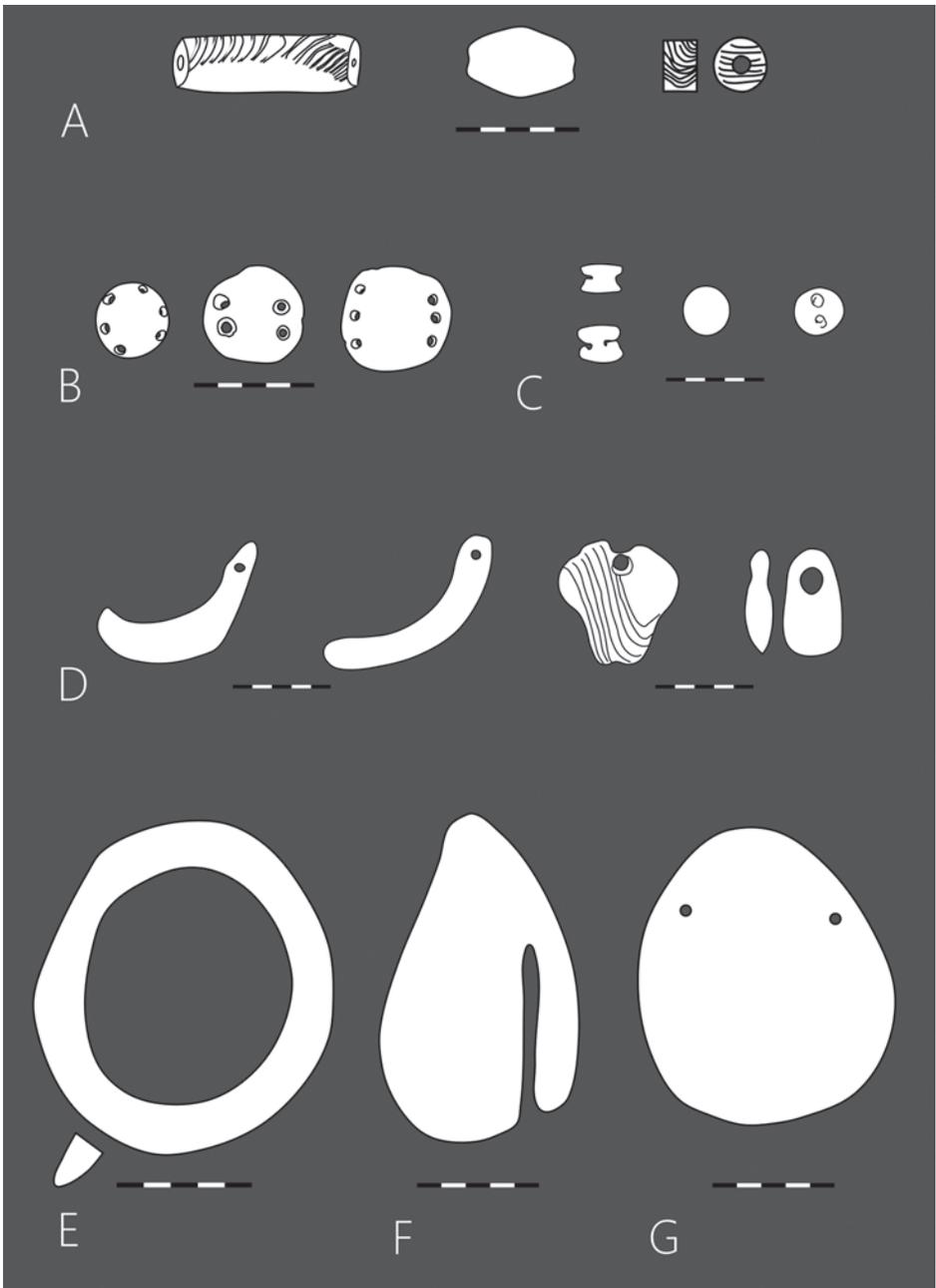


Fig. 4. *Spondylus* shell artefacts recorded in Poland: A – Szczotkowice (Archaeological Museum in Kraków, photo by Agnieszka Susuł), B – Werbkowice-Kotorów (Lublin Museum, photo by A. Kurzawska)

Other shell ornaments known from the literature as *Spondylus* items were also subject to analysis, which allowed for their identification as disc beads made of the shells of freshwater mussels from the Unionidae family. They were recorded at the following sites: Krusza Zamkowa 3 (Czerniak 1980; Bednarczyk *et al.* 1980), Brześć Kujawski 4 and 5 (ornaments from the remaining graves), Biskupin 15, Gocanowo, Inowrocław. One of the artefacts, recovered at Racibórz-Studzienna (currently on display at the Museum in Racibórz), was identified as the European flat oyster *Ostrea edulis*.

The proper identification of shell species provides certainty as to their origin. However, it is not always possible due to, *e.g.* taphonomic alterations of the material. The method used successfully for the identification of shell sources in such cases is strontium isotope dating (*e.g.* Shackleton and Elderfield 1990; Vanhaeren *et al.* 2004; Bentley 2006; Bajnóczy *et al.* 2013; Kurzawska *et al.* in prep.). In our research, due to the poor state of preservation of *Spondylus* shell artefacts and the uncertainty with regard to their origin, it was decided to perform the strontium isotope analysis  $^{87}\text{Sr}/^{86}\text{Sr}$ . The goal was to identify fossil shells derived from local deposits and/or Quaternary (subfossil) shells originating probably from the Mediterranean (Shackleton and Renfrew 1970). Three samples were selected for the analysis: a cylindrical bead from Szczotkowice (previously damaged by cutting off a thin



**Fig. 5.** Types of *Spondylus* shell ornaments: A – beads, B – small plates with perforation, C – buttons, D – pendants, E – bangle, F – buckle, G – medallion (based on: Bonnardin 2009; Siklósi 2004; Ifantidis and Nikolaidou 2011), prepared by P. Rutkowska

Table 2. Results of the strontium isotope analysis  $^{87}\text{Sr}/^{86}\text{Sr}$ 

Sample	Species	$^{87}\text{Sr}/^{86}\text{Sr}$	Chronology
Szczotkowice	<i>Spondylus</i> sp.	0,709183 ± 9	Quaternary
Karsko	<i>Spondylus</i> sp.	0,709259 ± 15	Quaternary
Inowrocław-Mątwy	<i>Spondylus</i> sp.	0,709426 ± 12	Quaternary

section, see Krauss 1964), and two medallions – from Karsko and from Inowrocław-Mątwy, which resemble ‘fossilised’ shells (Table 2).

Fossil shells, morphologically similar to subfossils, occur locally in the area of Poland in Miocene or Oligocene deposits (G. Jakubowski pers. com.; Kurzawska *et al.* in prep.). A fossil origin was particularly suspected in the case of the find from Karsko, which was very similar to fossil shells of the Oligocene species of *Spondylus tenuispina* (Sandberger 1863; G. Jakubowski, pers. com.). The analysis clearly indicated that the shells date to the Quaternary. The obtained results and the dating have been assessed with the standard curve of  $^{87}\text{Sr}/^{86}\text{Sr}$  ratios (McArthur *et al.* 2001). The strontium signatures are close to those received from previous research by Shackleton and Elderfield (1990), and they fit well into Quaternary. Thus, it can be concluded with certainty that the shells under study were contemporaneous with people living in prehistory, and they originated from areas located around the Mediterranean Sea.

## DISCUSSION

*Spondylus* shell artefacts recorded at archaeological sites in Central Europe are mainly ready-made ornaments discovered in grave contexts. They were manufactured from whole shell valves or shell fragments. It should be remembered that both the size and the shape of the valves determined the appearance and type of the ornament (Siklósi 2013). The types of *Spondylus* shell artefacts are presented in Fig. 4 (based on Siklósi 2004; Bonnardin 2009; Ifantidis and Nikolaidou, 2011). They include:

- thick and high bangles – made of right shell valves,
- thin bangles – made of left shell valves,
- V-shaped belt buckles (made of right shell valves),
- pendants:
  - so-called medallions – made of complete *Spondylus* shell valves, with 2-4 suspension holes; optionally, 1 large perforation in the centre; recorded in burials in the chest and waist areas,
  - pendants made of shell fragments: arched – from fragments of bracelets (?), animal tooth-shaped, arched pendants with a perforation in the upper part,
  - irregularly shaped pendants made of damaged ornaments, *e.g.* from larger beads,

- beads: cylindrical, barrel-shaped, oval, disc-shaped, biconical irregular; in all different sizes (large, medium and small),
- V-perforated buttons,
- small plates with perforations.

The repertoire of ornaments made of *Spondylus* shells is repeatable, and their presence is additionally linked with specific regions of Europe, and also, closely, with chronology; even their size points to a certain timeframe (Siklósi and Csengeri 2011).

The artefacts in question were used mainly by the communities inhabiting the areas located along the Aegean Sea and in south-eastern Europe between 6,500 and 5,500 BC. In the next stage, ca. 5,500-5,000 BC, the spread of these artefacts can be observed; they were used by peoples living in the areas of Central Europe up to the Paris Basin, and slightly later, in the fifth millennium, also in the Carpathian Basin and along the Black Sea. From the fourth millennium onwards, this mussel species was used sporadically by people inhabiting present-day Romania and Greece for consumption only (Windler 2018).

The importance of items made of *Spondylus* shells varied in time. Initially, in the early stage of their use by the communities of the Linear Band Pottery culture (LBK), they rarely served as grave goods. Probably, they were valuable items worn by living people who handed them down from generation to generation (Windler 2018). Over time, however, their status evolved, and with the advent of the Copper Age (e.g. Kalicz and Szénászkzy 2001) they began to appear in larger quantities. They likely lost their importance, becoming ‘common goods’ and being gradually replaced by other resources and items, mainly copper ones (Nieszery 1995; Siklósi and Csengeri 2011).

Shell ornaments discovered at archaeological sites in Poland have been poorly recognized so far in comparison with the artefacts of this kind known from other regions of Europe (Müller 1997; Bonnardin 2009; d’Errico *et al.* 2009; Perlès and Vanhaeren 2010; Séfériadès 2010; Borello and Micheli, 2011; Ifantidis and Nikolaidou, 2011; John 2011; Cristiani *et al.* 2014; Dimitrijević 2014; Sakalauskaite *et al.* 2019). Although mentioned in numerous archaeological reports, they have rarely been precisely analysed or properly identified.

The first records concerning *Spondylus* shell ornaments found in the area of Poland appear in the literature relatively early. The oldest mentions come from the end of the nineteenth century and relate to finds from Inowrocław-Mątwy (Jahrbuch... 1894, 88; Smoczyńska 1953) and Karsko (Walter 1898). Tracing back the history of later discoveries of shell ornaments in Polish archaeology, it is worth mentioning a medallion found in Brześć Kujawski. The publication of this finding by K. Jażdżewski (1938), which included descriptions of other shell ornaments recorded in graves at the same site, long remained the only reference for scholars searching for analogies to their subsequent discoveries. Probably for this reason each shell ornament found at Neolithic sites was automatically identified as a *Spondylus* specimen (Smoczyńska 1953; Maciejewski *et al.* 1954). The lack of interdisciplinary studies (in this case malacological) contributed to the repetition of

incorrect information. An exception to this rule was the analysis carried out in 1964 by W. Krach from the Museum of Geology, Polish Academy of Sciences in Kraków, who, on the basis of a thin-section, correctly identified beads discovered in a grave at Szczotkowice, site 1, as made of *Spondylus* shells. A later work by L. Czerniak (1980) presenting the summary of research carried out at Krusza Zamkowa, site 3, comprises the most complete description of ornaments found in graves thus far. Referring to previous publications, the author repeats the incorrect information about ornaments made supposedly of *Spondylus* shells. However, this is the first publication in Poland that includes the typology of shell artefacts and draws attention to analogous finds from the Carpathian Basin. In fact, the disc shell beads from Krusza Zamkowa 3 were identified by A. Dzieczkowski as being made of freshwater bivalve shells (Bednarczyk *et al.* 1980). He noticed that the shells discussed were thicker than those known from Poland and suggested that they may have been imports, though still thinking of freshwater bivalves. Due to a misunderstanding, these local freshwater shells were repeatedly quoted in the literature as *Spondylus gaederopus* shells – at the time the only shell known to archaeologists as an imported shell item. It is important to mention that the disc beads made of shells are not similar to other *Spondylus* ornaments found in Poland. They more closely resemble disc beads made of white stones known from the Tiszapolgár burials in Hungary (Bognár-Kutzian 1963). This hypothesis may be confirmed by a find from Krusza Zamkowa, where in one of the graves (no. 412) a single bead made of white stone was found among shell disc beads in a hip belt.

The research on shell artefacts from the area of Poland has allowed us to confirm the identification of ornaments from only four of the examined sites. In addition, one artefact made of a *Spondylus* shell, previously misidentified as stone, was noticed by the authors at the exhibition in the Lublin Museum (a pendant from Werbkowice Kotorów).

In total, the archaeological literature mentions eight archaeological sites in Poland where *Spondylus* shells were recorded. The study by L. Czerniak, particularly the part concerning ornaments made of imported shells discovered in the graves of ‘princesses’, has often been cited by researchers. It has become the source for subsequent interpretations, mostly concerning issues of trade, imports, connections with neighboring and distant populations, and the meaning of shells and shell ornaments in magic-related practices (Cofta-Broniewska and Koško 1982; Müller 1997; Kadrow 2008; Siklósi 2013; Kowalski 2013, 2014). Recently, shell ornaments have also been recognized as one of the aspects of cultural syncretism, changes in the social structure, and even cultural redefinition of the role of men and women in the Brześć Kujawski Culture (BKC; Czerniak and Pyzel 2019).

The artefacts known from the literature and misidentified as *Spondylus* shells included mostly disc beads made from shells of freshwater mussels from the Unionidae family. Their freshwater origin has been additionally confirmed by isotope analysis (Apolinarska and Kurzawska 2020). In the light of the results of our research, ornaments made of *Spondylus* shells are considerably less numerous than previously thought, and they include the most common types: pendants – medallions (3 items), beads (3 items), and a pendant

made of a large, damaged bead (1 item). They were recorded in graves as single finds (except for the beads from Szczotkowice), and, as already mentioned, they bore traces of long use.

Chronologically, two *Spondylus* shell ornaments are certainly associated with the communities of the LBK. The cultural attribution of the find from Inowrocław-Mątwy is problematic (it could be related to either LBK or BKC). Only one find comes from a site of the Stroke Band Pottery Culture (SBK), and one from the cemetery of the Brześć Kujawski culture (BKC). More accurate dating, although only relative, is known for Szczotkowice – the music-note phase of the LBK development, about 5,300-5,000 BC (Czekaj-Zastawny 2009), and for Brześć Kujawski (the classic phase the BKC; ca. 4,500-4,300 BC – Grygiel 2008). The first of the aforementioned chronological horizons in Europe was characterised by the presence of *Spondylus* shell artefacts in the form of pendants, beads, and bracelets (see Nieszery 1995; Siklósi 2004; Table 1). The closest analogies to the beads from Szczotkowice can be found, for example, at the cemetery of Vedrovice in Moravia, e.g. in graves H19/75, H9/88, H39/76, H 65, H62, H46, H36, H78/79 (Podborský 2002); at Garadna-Elkerülő út, site No. 2, grave No. S191 (Bükk Culture; Siklósi and Csengeri 2011), and at Mlynárca in Slovakia (Nitra period; Novotny 1958: Tab. XXIX: 7-14). Our observations have shown that this type of bead was common at cemeteries rich in ornaments made of *Spondylus* shells. Medallions similar to those found at Karsko, Inowrocław-Mątwy, and Brześć Kujawski were also relatively popular throughout the whole period in which decorations made of this shell species were 'in fashion'. Analogous medallions have been discovered at numerous cemeteries of the LBK in France (e.g. Aisne, tombe 1; Bas-Rhin, tombe 2; Bonnradin 2009), Germany (Nieszery 1995), Hungary (Siklósi 2013), the Czech Republic (Vedrovice, e.g. in graves H9/88, H70/79, H19/75, H86/80), and Ukraine (Rovancě in Volhynia; Bardeckyi *et al.* 2016).

In the fifth millennium BC, a substantial increase in the number of *Spondylus* shell ornaments can be observed in the area of Europe. As mentioned earlier, they became common and more diverse. Various types of pendants, bracelets and beads are known from that time (Siklósi 2004; Table 2). In Poland, only one such artefact dating to that period has been recorded so far, i.e. the medallion from grave XXIX at Brześć Kujawski, site 4.

The number of shell ornaments found in Poland is low in comparison with the rest of Europe – there are only seven artefacts of this kind (from five archaeological sites). They are distributed over a wide area, without any specific concentration in a particular location (see Fig. 2). Their interpretation poses many problems due to the scarcity of contextual data. Out of five burials containing *Spondylus* shell ornaments, the identification of the age and sex of the deceased was possible in only two cases. The two people buried were adult men equipped with grave goods including, *i.a.* shell medallions. In the absence of additional evidence, it would be difficult to undertake any in-depth analysis of the finds.

## THE MEANING OF SHELL ORNAMENTS IN THE LIGHT OF NEW ANALYSES (SUMMARY)

Ornaments are mainly personal objects that play a significant role in human non-verbal communication. They can signify or symbolise belonging to a given social group, sex, age, social status or position; they can also convey certain ideas or reflect a way of life. Importantly, the meaning of the message they carry is only understood by certain communities. Wearing ornaments and decorating the body serve to satisfy the needs of both the individual and the community. The possession of an appealing decoration can bring admiration not only to the object itself but also to the person wearing it (Sommer 2003, 67-68; Séfériadès 2010; Vanhaeren 2005).

In a difficult attempt to interpret the meaning of ornaments made of *Spondylus* shells discovered in Poland, several factors must be taken into account. First, it should be stressed that the majority of *Spondylus* shell ornaments known from this region were recorded at the end of the nineteenth century (Karsko, Inowrocław-Mątwy) and in the 1930s and early 1960s (Brześć Kujawski, Werbkowice Kotorów, Szczotkowice). Interestingly, wide-range rescue excavations carried out in recent years ahead of the construction of roads and motorways have not yielded new finds of shell ornaments. Such a small number of these artefacts prompts us to perceive them as unique items and assume that they had some special meaning for the Neolithic communities inhabiting the area of present-day Poland.

The shell ornaments discussed were high-quality items made of 'exotic' raw material. They functioned in specific social groups for a long time (handed down from generation to generation?), as indicated by previously mentioned traces of use and repair. The ornaments reached the Polish lands in a ready-made form through trade(?), as gifts(?), or together with people from the south who settled in the area under study.

In the opinion of some researchers (Séfériadès 2010), the best explanation why objects made of *Spondylus* shells were handed down from generation to generation is the phenomenon of shamanism. Also, the ornaments may have been used for a long time in the areas where access to precious/prestigious items was difficult or limited. Clay imitations of shell ornaments recorded at archaeological sites (Siklósi 2004) – one of them discovered in the area of Poland (Czarniak 2007) – confirm the significance of these objects in Neolithic communities. Interestingly, the majority of ornaments recorded in the area of present-day Poland are associated with burials of the LBK or SBK communities. Only one of them – the medallion from Brześć Kujawski – is chronologically linked with the later period.

Although a single find, it may be considered additional proof of the connection between the BKC communities and earlier groups of the LBK. So far, evidence of the use of LBK sites or structures in a special way by BKC communities has been found primarily in the location of burials (around the LBK houses), the construction of houses on the plans of LBK houses, or the use of LBK objects. These traces have been interpreted as the remnants

of rituals of BKC communities, who possibly worshiped – or otherwise considered significant – the remains of LBK settlements, believing that they were the homes of their mythical ancestors (Czerniak and Pyzel 2013; 2019). Thus it can be assumed that the use of shell ornaments (or their imitations), which were typical and characteristic for the LBK communities in almost all Europe, may additionally confirm, even in this individual case, some relationship of the BKC with the LBK communities in the sphere of beliefs and rituals.

According to R. Grygiel (1966, 2008a), the Brześć Kujawski Culture was shaped by societies of the Stroke Band Pottery Culture and migrants from Silesia, and particularly communities of the Jordanów-Silesia group. These contacts between the BKC and communities from Silesia were visible throughout its entire duration. We should also bear in mind strong links with LBK cultures from western Europe – Hinkelstein and Rössen – and with the Lengyel Culture from the areas located to the south of Poland (Grygiel 1983, 2008a). Taking into account the presence of hip belts and other shell ornaments in BKC and contemporaneous cultures, *i.e.* the aforementioned Hinkelstein and Rössen (Nieszery 1995), Tiszapolgár (Bognár-Kutzián 1963) and Lengyel (Pavúk and Batora 1995) cultures, we cannot exclude that the medallion made of *Spondylus* might have been an object of exchange or trade between the BKC and societies related to the listed cultures.

Typologically, the medallion does not indicate any specific period of time. This type of ornament was used throughout the Neolithic and Eneolithic periods, when items made of *Spondylus* were common. Only traces of wear, such as smoothed edges, damage or repairs (making subsequent suspension holes) indicate that the artefact was in use for a long time, but it is not known when or for how long. Therefore, both hypotheses explaining the origin of the find from Brześć Kujawski are possible.

The wide distribution of *Spondylus* shells in Europe in the Neolithic period suggests that they were associated mostly with agricultural communities, and that they symbolised a new social order (Séfériadès 2010). However, the meaning of shell ornaments changed through time and was certainly determined by the distance between the places where the shells naturally occurred, the places where the ornaments were produced, and the locations where ready-made objects were deposited (Windler 2018). ‘Traditionally’ *Spondylus* shell ornaments are considered symbols of social status and prestige (see wider discussion, *e.g.* Müller *et al.* 1996; Kalicz and Szénászkzy 2001; Siklósi and Csengeri 2011; Gaydarska and Chapman 2015). However, is this a sufficient answer to the question raised about the meaning of these artefacts (Séfériadès 2010)?

In light of the new analyses presented in this article, it appears necessary to revise previous interpretations concerning *Spondylus* shell ornaments recorded in Poland (see *e.g.* Cofta-Broniewska and Koško 1982; Kadrow 2008; Kowalski 2013, 2014; Czerniak and Pyzel 2019).

Although the hypotheses linking these artefacts with long-distance exchange and trade or with social status and prestige cannot be excluded, the confirmed scarcity of evidence significantly limits the possibilities of interpretation. Therefore, in our opinion, conside-

rations concerning these finds should focus on the meaning of the object itself, which reflected a certain idea associated with the Neolithic period, brought to the area of Poland by the first farmers. Thus, maybe we should perceive *Spondylus* shell ornaments as items which identified certain communities or individuals as members of agricultural society, with its specific social structure, and the owners of the ornaments as unique and representative for that society?

### Acknowledgements

Thanks are expressed to Ryszard Grygiel (Museum of Archaeology and Ethnography in Łódź), Krzysztof Kowalski (National Museum in Szczecin), Józef Łoś (Museum in Bydgoszcz), Marta Cyran (Lublin Museum), Jacek Górski and Albert Zastawny (Archaeological Museum in Kraków), who provided us with materials from archaeological sites and enabled our studies. We are grateful to Patrycja Rutkowska for preparing figures for the article. Special thanks to Stanisław Wilk (Karkonoskie Museum in Jelenia Góra) for consultation concerning the chronology of the grave from Werbkowice-Kotorów. This work was supported by the National Science Centre, Poland, under Grant No. 2015/19/D/HS3/01594, awarded to Aldona Kurzawska.

### References

- Álvarez-Fernandez E. and Carvajal-Contreras D. (eds) 2010. *Not only food. Marine, terrestrial and freshwater molluscs in archaeological sites. Proceedings of the 2nd Meeting of the ICAZ Archaeomalacology Working Group (Santander, February 19th-22nd 2008)* (= *munibe. Suplemento – Gehigarria* 31). Donostia: Sociedad de Ciencias Aranzadi Zientzia Elkarte.
- Apolinarska K. and Kurzawska A. 2020. Can stable isotopes of carbon and oxygen be used to determine the origin of freshwater shells used in Neolithic ornaments from Central Europe? *Archaeological and Anthropological Sciences* 12(1), 1-16. <https://doi.org/10.1007/s12520-019-00978-2>.
- Bajnóczi B., Schöll-Barna G., Kalicz N., Siklósi Zs., Hourmouziadis G.H., Ifantidis F., Kyparissi-Apostolika A., Pappa M., Veropoulidou R. and Ziota Ch. 2013. Tracing the source of Late Neolithic *Spondylus* shell ornaments by stable isotope geochemistry and cathodoluminescence microscopy. *Journal of Archaeological Science* 40(2), 874-882. <https://doi.org/10.1016/j.jas.2012.09.022>.
- Bardec'kyj A., Dębiec M. and Saile T. 2016. Zwei runde Spondyluskappen aus der bandkeramischen Siedlung von Rovanceč in Wolhynien. Ein Beitrag zu Tausch und Statusim frühen Neolithikum. *Sprawozdania Archeologiczne* 68, 183-192. <https://doi.org/10.1007/s12520-019-00978-2>.
- Bar-Yosef Mayer D. E., Gümüs B.A. and Islamoglu Y. 2010. Fossil hunting in the Neolithic: Shells from the Taurus Mountains at Çatalhöyük, Turkey. *Geoarchaeology* 25, 375-392. <https://doi.org/10.1002/gea.20311>.

- Bednarczyk J., Koško A. and Czerniak L. 1980. Z badań nad zespołem osadniczym ludności z kręgu kultur ceramiki wstęgowej w Kruszy Zamkowej, stan. 3, woj. Bydgoszcz (część sepulkralna). *Sprawozdania Archeologiczne* 32, 55-83.
- Bentley R.A. 2006. Strontium Isotopes from the Earth to the Archaeological Skeleton: A Review. *Journal of Archaeological Method and Theory* 13, 135-187. <https://doi.org/10.1007/s10816-006-9009-x>.
- Bognár-Kutzián I. 1963. *The Copper Age Cemetery of Tiszapolgár-Basatanya*. Budapest: Institute of Archaeological Sciences.
- Bonnardin S. 2009. *La parure funéraire au Néolithique ancien dans les Bassins parisiens et rhénans. Rubané, Hinkelstein et Villeneuve Saint Germain (= Société Préhistorique Française, Mémoire 49)*. Paris: Société Préhistorique Française.
- Chapman J. and Gaydarska B. 2015. Spondylus Gaederopus/Glycymeris exchange network in Neolithic and Chalcolithic. In Ch. Flower, J. Harding and D. Hofmann (eds), *The Oxford Handbook of Neolithic Europe*. Oxford: Oxford University Press, 639-656. <https://doi.org/10.1093/oxfordhb/9780199545841.013.014>.
- Claassen C. 1998. *Shells. Cambridge Manuals in Archaeology*. Cambridge: Cambridge University Press.
- Cofta-Broniewska A. and Koško A. 1982. *Historia pierwotna społeczeństw Kujaw*. Warszawa, Poznań: PWN.
- Cristiani E., Farbstein R. and Miracle P. 2014. Ornamental traditions in the eastern Adriatic: The Upper Palaeolithic and Mesolithic personal adornments from Vela Spila (Croatia). *Journal of Anthropological Archaeology* 36(1), 21-31. <https://doi.org/10.1016/j.jaa.2014.06.009>.
- Czerniak K. 2007. Gliniany amulet z osady starszej fazy kultury lendzielskiej w Zarzycy na Dolnym Śląsku. *Sprawozdania Archeologiczne* 59, 115-121.
- Czekaj-Zastawny A. 2009. Obrządek pogrzebowy kultury ceramiki wstęgowej rytej [Funerary rite of the Linear Pottery culture]. In A. Czekaj-Zastawny (ed.), *Obrządek pogrzebowy kultur pochodzenia naddunajskiego w neolicie Polski południowo-wschodniej (5600/5500-2900 BC) [Funerary rite of the Danubian cultures in the Neolithic of southeastern Poland (5600/5500-2900 BC)]*. Kraków: Instytut Archeologii i Etnologii PAN, 25-51.
- Czerniak L. 1980. *Rozwój społeczeństw kultury późnej ceramiki wstęgowej na Kujawach*. Poznań: Wydawnictwo Naukowe UAM.
- Czerniak L. and Pyzel J. 2013. Unusual Funerary Practices in the Brześć Kujawski Culture in the Polish Lowland. In N. Müller-Scheeßel (ed.), *„Irreguläre” Bestattungen in der Urgeschichte: Norm, Ritual, Strafe...? Akten der Internationalen Tagung in Frankfurt a. M. vom 3. bis 5. Februar 2012 (= Römisch-Germanische Kommission des Deutschen Archäologischen Instituts. Kolloquien zur Vor- und Frühgeschichte 19)*. Bonn: Dr. Rudolf Habelt GmbH, 139-150.
- Czerniak L. and Pyzel J. 2019. The Brześć Kujawski culture. The north-easternmost Early Chalcolithic communities in Europe. In R. Gleser and D. Hofmann (eds), *Contacts, boundaries & innovation in the fifth millennium: exploring developed Neolithic societies in central Europe and beyond*. Leiden: Sidestone Press, 59-90.

- D'Errico F., Vanhaeren M., Barton N., Bouzougar A., Mienis H. and Richter D. 2009. Additional evidence on the use of personal ornaments in the Middle Paleolithic of North Africa. *Proceedings of the National Academy of Sciences of the United States of America* 106(38), 16051-16056. <https://doi:10.1073/pnas.0903532106>.
- Dimitrijević V. 2014. The provenance and use of fossil scaphopod shells at the Late Neolithic/Eneolithic site Vinča-Belo Brdo, Serbia. In K. Szabó, C. Dupont, V. Dimitrijević, L.G. Gastelum and N. Serrand (eds), *Archaeomalacology: shells in the archaeological record* (= *BAR International Series* 2666). Oxford: Archaeopress, 33-41.
- Galiński T., Dziewanowski M. and Kowalski K. 2012. Epoka kamienia – katalog zabytków. In K. Kowalski and A. Marciniak (eds), *Zaginione – Ocalone. Szczecińska kolekcja starożytności pomorskich*. Szczecin: Muzeum Narodowe, 81-100.
- Chapman J. and Gaydarska B. 2015. Spondylus Gaederopus/Glycymeris exchange network in Neolithic and Chalcolithic. In Ch. Flower J. Harding and D. Hofmann (eds), *The Oxford Handbook of Neolithic Europe*. Oxford: Oxford University Press, 639-656.
- Grygiel R. 2008. *Neolit i początki epoki brązu w rejonie Brzeźcia Kujawskiego i Osłonek 2: 1. Śródkowy neolit. Grupa brzesko-kujawska kultury lendzielskiej*. Łódź: Fundacja Badań Archeologicznych K. Jażdżewskiego.
- Grygiel R. 2008a. *Neolit i początki epoki brązu w rejonie Brzeźcia Kujawskiego i Osłonek 2: 3. Śródkowy neolit. Grupa brzesko-kujawska kultury lendzielskiej*. Łódź: Fundacja Badań Archeologicznych K. Jażdżewskiego.
- Ifantidis F. and Nikolaidou M. 2011. (eds), *Spondylus in Prehistory. New data and approaches. Contributions to the archaeology of shell technologies* (= *BAR International Series* 2216). Oxford: Oxford University Press.
- Jahrbuch... 1894. Jahrbuch der Historischen Gesellschaft für Netzedistrikt zu Bromberg.
- Jażdżewski K. 1938. Cmentarzyska kultury ceramiki wstęgowej i związane z nimi ślady osadnictwa w Brzeźciu Kujawskim. *Wiadomości Archeologiczne* 15, 1-105.
- John J. 2011. Status of Spondylus artifacts within the LBK grave goods. In F. Ifantidis and M. Nikolaidou (eds), *Spondylus in prehistory. New data and approaches. Contributions to the archaeology of shell technologies* (= *BAR International Series* 2216). Oxford: Oxford University Press, 39-45.
- Kadrow S. 2008. Gender-differentiated burial rites in Europe of the 5th and 4th millennia BC: attempts at traditional archaeological interpretation. *Analecta Archaeologica Ressoviensia* 3, 49-95.
- Kalicz N. and Szénászky J.G. 2001. Spondulus-Schmuck im Neolithikum des Komitats Békés. *Praehistorische Zeitschrift* 76, 24-54. <https://doi.org/10.1515/prhz.2001.76.1.24>.
- Krauss A. 1964. *Grób kultury starszej ceramiki wstęgowej ze Szczotkowic, pow. Kazimierza Wielka*. In S. Nosek (ed.), *Studia i Materiały do badań nad neolitem Małopolski*. Wrocław, Warszawa, Kraków: Zakład Narodowy im. Ossolińskich, 69-76.
- Kowalski A. P. 2013. *Mit a pięknem. Z badań nad pochodzeniem sztuki*. Bydgoszcz: Oficyna Wydawnicza Epigram.

- Kowalski A. P. 2014. *Archeologia zamierzonych znaczeń*. Toruń: Polskie Towarzystwo Historyczne.
- Kurzawska A., Sobkowiak-Tabaka I. and Jakubowski G. (in prep.). Miocene shells in the Late Neolithic and Early Bronze Age burials in Poland. *Geoarchaeology*.
- Liana T. and Piętka-Dąbrowska T. 1962. Sprawozdanie z badań ratowniczych przeprowadzonych w 1959 r. na stanowisku I w Werbkowicach-Kotorowie, pow. Hrubieszów. *Wiadomości Archeologiczne* 28(2), 152-173.
- Maciejewski F., Rajewski Z. and Wykrój Z. 1954. Ślady osadnictwa kultury t. zw. brzesko-kujawskiej w Biskupinie, pow. Żnin. *Wiadomości Archeologiczne* 20(1), 67-79.
- McArthur J. M., Howarth R. J. and Bailey T. R. 2001. Strontium isotope stratigraphy: LOWESS Version 3: Best Fit to the marine Sr-isotope curve for 0-509 Ma and accompanying look-up Table for Deriving Numerical Age. *The Journal of Geology* 109, 155-170.
- Micheli R. 2012. Personal ornaments, Neolithic groups and social identities. Some insights into Northern Italy. *Documenta Praehistorica* 39, 227-255 <https://doi.org/10.4312/dp.39.16>.
- Müller J. 1997. Neolithische und chalkolithische Spondylus-Artefakte. Anmerkungen zu Verbreitung, Tauschgebiet und sozialer Funktion. In C. Becker, M. L. Dunkelmann, C. Metzner-Nebelsick, H. Peter-Röcher and M. Roeder and B. Teržan (eds), *Chronos. Beiträge zur prähistorischen Archäologie zwischen Nord- und Südosteuropa. Festschrift für Bernhard Hänsel. Internationale Archäologie (= Studia honoraria 1)*. Espelkamp: Leidorf, 91-106.
- Müller J., Herrera A. and Knossalla N. 1996. Spondylus und Dechsel – zwei gegensätzliche Hinweise auf Prestige in der mitteleuropäischen Linearbandkeramik? In J. Müller and R. Bernbeck (eds), *Prestige – Prestigegüter - Sozialstrukturen. Beispiele aus dem europäischen und vorderasiatischem Neolithikum (= Archäologische Berichte 6)*. Bonn: Holos, Deutsche Gesellschaft für Ur- und Frühgeschichte e.V., 81-96.
- Nieszery N. 1995. *Linearbandkeramische Gräberfelder in Bayern (= Internationale Archäologie 16)*. Espelkamp: Marie Leidorf.
- Novotný B. 1958. *Slovensko v mladšej dobe kamennej*. Bratislava: SAV.
- Pavúk J. and Batora J. 1995. *Siedlung und Gräber der Ludanice-Gruppe in Jelšovce*. Nitra: Archeologický ústav SAV.
- Perlès C. and Vanhaeren M. 2010. Black Cyclope neritea marine shell ornaments in the Upper Palaeolithic and Mesolithic of Franchthi Cave, Greece: arguments for intentional heat treatment. *Journal of Field Archaeology* 35(3), 298-309. <https://doi:10.1179/009346910X12707321358874>.
- Podborský V. 2002. *Dvě pohřebiště neolitického lidu s lineární keramikou ve Vedrovicích na Moravě*. Brno: Ústav archeologie a muzeologie, Filozofická fakulta Masarykovy University.
- Poppe G. T. and Goto Y. 2000. *European Seashells. Vol 2. Scaphopoda, Bivalvia, Cephalopoda*. Hackenheim: ConchBooks.
- Raczky P. and Anders A. 2017. The chosen ones: unconventional burials at Polgár-Csöszhalom (north-east Hungary) from the fifth millennium cal BC. In P. Bickle, V. Cummings, D. Hofmann, J. Pollard and A. Whittle (eds), *The Neolithic of Europe: Papers in honour of Alasdair Whittle*. Oxford: Oxbow Books, 63-81.

- Rigaud S., d'Errico F. and Vanhaeren M. 2015. Ornaments reveal resistance of North European Cultures to the spread of farming. *PLoS One*, e0121166. <https://doi.org/10.1371/journal.pone.0121166>.
- Sakalauskaite J., Andersen S. H., Biagi P., Borrello M. A., Cocquerez T., Colonese A. C., Bello F. D., Girod A., Heumüller M., Koon H., Mandili G., Medana C., Penkman K. E. H., Plasseraud L., Schlichtherle H., Taylor S., Tokarski C., Thomas J., Wilson I. J., Marin F. and Demarchi B. 2019. 'Palaeoshellomics' reveals the use of freshwater mother-of-pearl in prehistory. *eLife* 2019; 8: e45644. <https://doi:10.7554/eLife.45644>.
- Séfériadès M. L. 2010. Spondylus and long-distance trade in prehistoric Europe. In D. W. Anthony and J. Chi (eds), *The lost world of old Europe. The Danube valley, 5000-3500 BC*. New York, Princeton, Oxford: Institute for the Study of the Ancient World at New York University, Princeton University Press, 179-186.
- Shackleton J. and Elderfield H. 1990. Strontium isotope dating of the source of Neolithic European Spondylus shell artefacts. *Antiquity* 64, 312-315.
- Shackleton N. and Renfrew C. 1970. Neolithic trade routes re-aligned by oxygen isotope analyses. *Nature* 228, 1062-1064.
- Siklósi Zs. 2004. Prestige goods in the Neolithic of the Carpathian Basin. *Acta Archaeologica Academiae Scientiarum Hungaricae* 55, 1-62.
- Siklósi Zs. 2013. *Traces of Social Inequality during the Late Neolithic in the Eastern Carpathian Basin* (= *Dissertationes Pannonicae ex Instituto Archaeologico Universitatis de Rolando Eötvös nominatae Budapestinensis provenientes. Ser. IV. Vol. 3*). Budapest: Eötvös Loránd University, Institute of Archaeological Sciences.
- Siklósi Zs. and Csengeri P. 2011. Reconsideration of Spondylus Usage in the Middle and Late Neolithic of the Carpathian basin. In F. Infantidis and M. Nikolaidou (eds), *Spondylus in Prehistory: New data and approaches. Contribution to the archaeology of shell technologies* (= *BAR, International Series 2216*). Oxford: Archaeopress, 47-62.
- Siuchniński K. 1972. *Klasyfikacja czasowo-przestrzenna kultur neolitycznych na Pomorzu Zachodnim. 2. Opracowanie analityczne*. Szczecin: Muzeum Pomorza Zachodniego.
- Smoczyńska Ł. 1953. Kultura ceramiki wstęgowej w Wielkopolsce. *Fontes Archaeologici Posnanienses* 3, 1-84.
- Szałkowska-Łoś J. and Łoś J. 2014. Odkrywanie przeszłości – zarys historii badań archeologicznych w regionie. In *Na pograniczu Wielkopolski i Pomorza. Bydgoszcz i regionu zarania dziejów*. Bydgoszcz: Muzeum Okręgowe w Bydgoszczy, 9-101.
- Sommer M. 2003. *Zbieranie. Próba filozoficznego ujęcia*. Warszawa: Oficyna Naukowa.
- Stiner M. C., Kuhn S. L. and Güleç B. E. 2013. Early Upper Paleolithic shell beads at Üçağızlı Cave I (Turkey): Technology and the socioeconomic context of ornament life-histories. *Journal of Human Evolution* 64(5), 380-398. <https://doi.org/10.1016/j.jhevol.2013.01.008>.
- Todorova H. 2002. Die Mollusken in den Gräberfeldern von Durankulak. In H. Todorova (ed.), *Durankulak, Band II. Die prähistorischen Gräberfeldern von Durankulak*. 1. Sofia: Deutsches Archäologisches Institut in Berlin, 177-190.

- Vanhaeren M. 2005. The Evolutionary significance of beadmaking and use. In F. d'Errico and L. Backwell (eds), *From tools to symbols, from early hominids to modern humans*. Johannesburg: Wits University Press, 525-553.
- Vanhaeren M., d'Errico F., Billy I. and Grousset F. 2004. Tracing the source of Upper Palaeolithic shell beads by strontium isotope dating. *Journal of Archaeological Science* 31, 1481-1488. <https://doi.org/10.1016/j.jas.2004.03.011>.
- Virchow R. 1884. Excursion nach Bernburg (Anhalt). *Zeitschrift für Ethnologie* 16, 398-420.
- Willms C. 1985. Neolithischer Spondylus Schmuck: Hundert Jahre Forschung. *Germania* 63, 321-344.
- Windler A. 2018. *Der Austausch von Spondylus gaederopus in Europa zwischen 5500 und 5000 v. Chr.: eine ökonomische Analyse* (= *Der Anschnitt Beiheft* 40). Bochum: Verlag Marie Leidorf.

## Annex

### KARSKO

#### History of the discovery

Undoubtedly, the first documented find of a *Spondylus* shell found in the area of present-day Poland comes from a grave discovered accidentally on the northern shore of Lake Płoń in Karsko in 1884. This artefact was described in 1898 by E. Walter in *Die steinzeitlichen Gefäße des Stettiner Museums*. It was again defined as a *Spondylus* shell in 1927 by O. Kunkel in *Reallexikon der Vorgeschichte*. The find was also published in 2012 in an exhibition catalogue, where R. Borówka described it as 'a bowl made of an oyster shell with traces of 5 holes (...) the shell was largely silicified, which suggests that the bowl was made of a Cretaceous oyster' (Galiński *et al.* 2012, 94-95).

#### Description of the find

The medallion (Fig. 3: A), 80 mm long and 73 mm wide, was made of the left valve of a *Spondylus* shell. In the upper part (umbo) of the shell valve, from the hinge side, partly preserved human-made suspension holes (5) are visible.

#### Context

The site is located on the northern shore of Lake Płoń. The skeletal grave with the body of an adult man was furnished with a pedestal bowl, a three-part vessel with a biconical body, a vessel with spherical body and base, a fragment of a vessel's body, 2 lower tusks of

a boar, 5 flint blades, and a shell (Galiński *et al.* 2012, 94-95). The grave is attributed to the Stroke Band Pottery culture.

## INOWROCLAW-MĄTWY

### History of the discovery

The artefact was discovered at the end of the 19th century. In 1893, a teacher from Bydgoszcz named Hellmann discovered the remains of a grave in a gravel pit in Inowrocław-Mątwy. The grave contained two large valves of a *Spondylus* shell. The find was described in *Jahrbuch der Historischen Gesellschaft für Netzedistrikt zu Bromberg* in 1894 (Jahrbuch... 1894, 88; Smoczyńska 1953).

### Description of the find

The medallion (Fig. 3: B), 104 mm long and 102 mm wide, was made of the left valve of a *Spondylus* shell. In the upper part of the shell, on both sides of the umbo, two suspension holes are present. Between the holes and the edge, on both sides of the shell, use-wear traces made by a string are visible, indicating the way the ornament was suspended.

### Context

Originally, the Museum in Bydgoszcz was in possession of 2 valves of a *Spondylus* shell (inv. no. 1233), which may have come from the same damaged skeletal grave. Currently, there is only one medallion (inv. no. A621; Szalkowska-Łoś, Łoś 2014, 34-35) displayed at the permanent exhibition. The cultural attribution of the grave is problematic, as the two shell valves are the only known elements of grave equipment. Based on analogies to a very similar medallion found at Brześć Kujawski (BCK) and other finds from European LBK sites (*e.g.* Vedrovice in Czech Republic or at French sites), we can consider the burial to be chronologically related to LBK or BCK.

## BRZEŚĆ KUJAWSKI, SITE 4

### History of the discovery

In his publication on the results of the research carried out at Brześć Kujawski (1938), K. Jażdżewski described in detail the *Spondylus* shell ornaments recorded in graves. The shells were identified by S. Feliksiak from the State Museum of Zoology in Warsaw. In total, nine graves were described containing artefacts identified as *Spondylus* shells (Jażdżewski 1938, 56 Table).

## Description of the find

The medallion inv. no. IN 2617 (Fig. 3: C), 110 mm long and 93 mm wide, was made of the left valve of a *Spondylus* shell. Suspension holes (4-5) are placed near the shell's outer edge, on both sides of the umbo.

## Context

“Grave XXIX. In a very even, rectangular grave pit, at a depth of 35-35 cm, on the left side, lay a skeleton of an adult human in a strongly contracted position, with the head oriented to south-east and the face looking north-east. The deceased's right arm was bent at the elbow at a right angle, with the palm turned down towards the knees. The left hand, also bent at the elbow, was stretched forward. By the forehead of the deceased, a dozen or so copper beads were placed, probably as a decoration of the forehead. On the chest, below the lower jaw, rested a medallion made of a large *Spondylus* shell. In front of the chest, lay an antler battle axe. Near the knees, several flint objects were scattered. The height of the deceased was about 1.5 m. The grave pit, filled with grey hummus, was 49 cm deep, and it contained potsherds of the Brześć Kujawski culture” (Jażdżewski 1938).

Grave equipment: an antler battle axe, a shell ornament, copper beads. Chronologically, the find is associated with the Brześć Kujawski culture.

## Other finds

Other artefacts recorded in graves include disc beads made of shells of mussels from the Unionidae family (see Table 1). We suppose that the reason behind the misidentification of the shells was their poor state of preservation – disc beads, unintentionally stuck together in rows, looked like cylindrical beads; in addition, they were covered with sediment and taphonomically altered, which probably made the identification more difficult.

## SZCZOTKOWICE, SITE 1, PINCZÓW DISTRICT

### History of the discovery

In 1961, during the construction of a road in the area of Szczotkowice, a burial attributed to the Linear Band Pottery culture was discovered. Grave goods included, *i.a.* three ornaments made of *Spondylus* shells (Krauss 1964; Czekaj-Zastawny 2009) identified by W. Krach (Geological Museum, Polish Academy of Sciences, Kraków) on the basis of a thin section cut from a cylindrical bead (Krauss 1964, 72, fig. 4).

## Description of the find

The first bead (Fig. 4: A), measuring 32.65 mm × 30.89 mm, was made of the upper (umbo) part of a *Spondylus* shell. It has an irregular shape. A biconical hole running through the bead's center, with an outer diameter of 5.89-5.95 mm, was made by drilling the bead from both sides. The second bead (Fig. 3: D.2), measuring 42.63 mm × 34.17 mm, is of a similar shape. It also has a biconical hole running through the center, with an external diameter of 6.12-6.32 mm, made by drilling from both sides. The third artefact (Fig. 4: A) is a large cylindrical bead measuring 24.08 mm × 11.92 mm, partly damaged. The damage on one side was made in prehistory as the result of friction from the string. Its other end was cut off for a thin-section analysis by W. Krach in 1964. Roughly rectangular holes visible on the bead's surface, previously described as decorations, are of natural origin; they were present in the shell already at the time the bead was manufactured. Microwear traces on all the beads testify to their long use.

## Context

“In the spring of 1961, during the construction of a country road in Szczotkowice, Kazimierza Wielka district, a skeletal grave with a stone frame was unearthed. It was equipped with vessels and beads. It was located on the northern part of the road, about 100m north of the Nidzica River (...). According to the information obtained, the deceased was buried in a contracted position, in a west-east direction, with the head turned westwards. Its equipment consisted of beads found by the head, and three vessels together with a stone enclosure at the side of the skeleton. The entire grave was covered with ochre, which was visible on the bones and artefacts” (Krauss 1964).

During the field investigation carried out in 1961, only fragments of skull bones were collected. The deceased's equipment consisted of 3 vessels (2 small bowls and an amphora) deposited by his side as well as 36 biconical beads made of white marble and 3 *Spondylus* beads placed by the head (Krauss 1964). The shell beads were probably elements of a necklace. Chronologically, the burial is associated with the Linear Band Pottery culture (LBK).

## WERBKOWICE-KOTORÓW

### History of the discovery

The artefact was discovered in a grave published in 1962; it was described as an amulet made of limestone (white chalk; Liana and Piętka-Dąbrowska 1962). Currently, it is on display at the archaeological exhibition in the Lublin Museum. In 2016, when visiting the exhibition, the authors of the article noticed this artefact described as a stone (limestone) object. After initial examination, they identified it as made of a *Spondylus* shell.

## Description of the find

The artefact (Fig. 4: B) is now an irregularly shaped pendant measuring 43 mm × 46 mm. In its central part, it has a suspension hole with a diameter of 7 mm. Originally the artefact was probably a large, irregularly shaped bead with a hole running through the centre. Due to its high value, after the damage, the broken bead was ‘repaired’ by drilling a hole in the middle so that the ornament could be used further.

## Context

“The grave was heavily damaged by a bulldozer. The skeleton lay just below the surface; some of the bones were protruding from the surface. The skull was completely crushed. The grave pit was characterised by a slightly grayish colour. The grave was damaged in the eastern part by pit 45, as a result of which the bones of the left foot and partially the right one were not preserved. The skeleton was oriented north-east, with the head turned westwards. The legs were contracted, and the hands placed under the chin. Next to the bones of the right arms an amulet was deposited (Fig. 12). Inventory: a limestone (white chalk) amulet with a drilled hole (Tabl. XXXIII: 9). Sex of the deceased: female; unspecified age; height 153 cm; chronology: the Neolithic period, the Stroke Band Pottery Culture” (Liana, Piętka-Dąbrowska 1962).

Based on analogies to the orientation of the skeleton and the shape of the pendant, the artefact should be linked with the Linear Band Pottery culture (LBK).